



# GRADE 2 SUPPLEMENT

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## Set A9 Number & Operations: More Multi-Digit Addition & Subtraction

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### Skills & Concepts

- ★ develop fluency with two-digit addition and subtraction using efficient, accurate, and generalizable strategies, and describe why the procedures work
- ★ add and subtract whole numbers accurately using the standard regrouping algorithm
- ★ use the mathematical relationship between addition and subtraction and properties of addition to model and solve problems
- ★ solve contextual problems involving adding and subtracting of whole numbers and justify the solutions
- ★ estimate sums to predict solutions to problems or determine reasonableness of answers
- ★ solve simple word problems involving length
- ★ find the distance between numbers on the number line
- ★ find missing values in open sentences

**Bridges in Mathematics Grade 2 Supplement**

**Set A9** Numbers & Operations: More Multi-Digit Addition & Subtraction

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*Bridges in Mathematics* is a standards-based K–5 curriculum that provides a unique blend of concept development and skills practice in the context of problem solving. It incorporates the Number Corner, a collection of daily skill-building activities for students.

The Math Learning Center is a nonprofit organization serving the education community. Our mission is to inspire and enable individuals to discover and develop their mathematical confidence and ability. We offer innovative and standards-based professional development, curriculum, materials, and resources to support learning and teaching. To find out more, visit us at [www.mathlearningcenter.org](http://www.mathlearningcenter.org).

# Set A9 ★ Activity 1



## ACTIVITY

### Modeling the Standard Algorithm for Double-Digit Addition

#### Overview

Students work in pairs to solve a double-digit addition story problem. They share their strategies with the entire class while the teacher records each method on a poster. The teacher then presents the standard algorithm and has the whole class practice using it to solve several more 2-digit addition problems.

#### Skills & Concepts

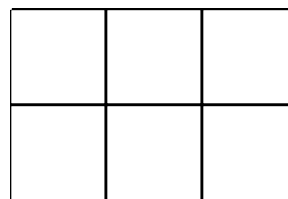
- ★ add whole numbers accurately using a regrouping algorithm
- ★ solve contextual problems involving adding of whole numbers and justify the solutions
- ★ estimate sums to predict solutions to problems or determine reasonableness of answers
- ★ solve simple word problems involving length

#### You'll need

- ★ The Ribbon Problem (page A9.7, run 1 copy on a transparency)
- ★ Addition Board (page A9.8, run 1 copy on a transparency)
- ★ Ten Frames (page A9.9, see Advance Preparation)
- ★ 12" × 18" light blue construction paper (1 sheet for each pair of students, see Advance Preparation)
- ★ copy or lined paper (1 sheet per student)
- ★ 3–4 pieces of 12" × 18" white drawing or construction paper
- ★ 3–4 blank overhead transparencies
- ★ overhead base ten pieces
- ★ set of base ten pieces for each pair of students
- ★ glue sticks (half-class set)

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**Advance Preparation** Run a quarter class set of the Ten Frames sheet and cut the frames apart along the heavy lines. Each pair of students will need 3 ten frames. Fold the 12" × 18" light blue construction paper into sixths, as shown below. Crease the folds firmly so they show up well, and then set some heavy books on top of the sheets to smooth them out.



#### Instructions for Modeling the Standard Algorithm for Double-Digit Addition

1. Display the Ribbon Problem on the overhead. Read the problem out loud with the class and ask students to restate the question in their own words. Work with their input to underline any information that will help solve the problem. Then ask students to pair-share estimates, and call on a few volunteers to share their thinking with the class.

**Activity 1** Modeling the Standard Algorithm for Double-Digit Addition (cont.)

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**The Ribbon Problem**

Mrs. Jones is wrapping presents for her son's birthday. She used 36 inches of ribbon for one present. She used 56 inches of ribbon for the other present. How many inches of ribbon did she use in all?

2. Give students each a blank piece of paper. Have them work in pairs to solve the problem. Ask them to record all of their work, along with the solution, on their own paper. Remind them that they can use sketches and numbers, and that the base 10 pieces are available as well. Circulate to observe and talk with students as they're working. Pass out blank transparencies to at least 3 students, each of whom has used a different strategy, and ask them to copy their work onto the transparency to share with the class.
3. When most pairs are finished, ask the students you selected to share their solutions and explain their strategies at the overhead. Record each strategy on a separate piece of 12" × 18" paper labeled with the student's name. Ask the contributing students to work with the rest of the class to name their strategies.


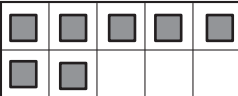

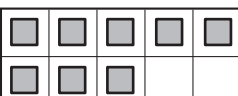

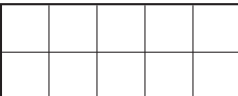
<p style="text-align: center;"><b>Andre's Tens &amp; Ones Method</b></p> $\begin{array}{r} 36 \\ + 56 \\ \hline \end{array}$ <p><math>30 + 50 = 80</math> <math>6 + 6 = 12</math></p> $\begin{array}{r} 80 \\ + 12 \\ \hline 92 \text{ inches} \end{array}$	<p style="text-align: center;"><b>Derek's Base Ten Way</b></p> $\begin{array}{r} 36 \\ + 56 \\ \hline \end{array}$ <p style="text-align: center;">    .....     ..... .....</p> <p>10, 20, 30, 40, 50, 60, 70, 80, 86, 87, 88, 89, 90, 91, 92</p> <p>92 inches</p>	<p style="text-align: center;"><b>Rhonda's Carrying Method</b></p> $\begin{array}{r} 1 \\ 36 \\ + 56 \\ \hline 92 \text{ inches} \end{array}$ <p><math>6 + 6 = 12</math> You have to move the 10 in 12 over to the 10's column.</p> <p><math>10 + 30 + 50 = 90</math>, so the answer is 92 inches of ribbon.</p>
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4. Acknowledge everyone's strategies. If none of the students shared the standard algorithm, contribute one to the collection yourself by creating a poster similar to Rhonda's above as students watch. Explain that this strategy is called the regrouping method, and adults sometimes use it for solving multi-digit addition problems.
5. Now model the standard algorithm step-by-step with a new combination,  $57 + 38$ . First, record the combination on the board. Ask students to estimate the total and pair-share their ideas. Then have several volunteers share their estimates and reasoning with the class. Next, place the Addition Board on display at the overhead, and build both numbers with the base 10 pieces, as shown below.

**Activity 1** Modeling the Standard Algorithm for Double-Digit Addition (cont.)

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

### Addition Board

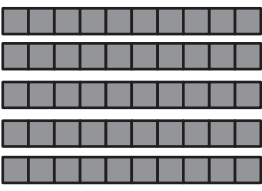
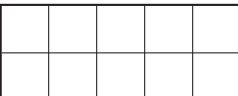

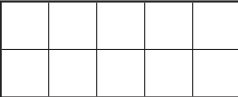

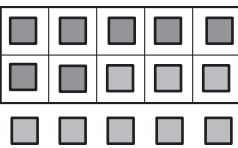
Tens	Ones
	
	
	

$$\begin{array}{r} 57 \\ + 38 \\ \hline \end{array}$$

6. Explain when people use standard methods, they usually start with the 1s instead of the 10s. Ask students to add  $7 + 8$  mentally. Next, move all the units down to the bottom row and count them with the class to confirm the total, 15.

Set A9 Number & Operations: More Multi-Digit Addition & Subtract on Blackline Run 1 copy on a transparency

### Addition Board

Tens	Ones
	
	
	

**Activity 1** Modeling the Standard Algorithm for Double-Digit Addition (cont.)

7. Trade ten of the units in for a strip and move the strip over to the 10s column. Then record your action in numeric form at the board. Ask students to explain what you have done so far. Why did you trade some of the units for a strip and move it over? Why did you write a 5 in the one's place and then record a 1 above the 5 in the ten's place?

$$\begin{array}{r} 1 \\ 57 \\ + 38 \\ \hline 5 \end{array}$$

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline. Run 1 copy on a 11x17 in. sheet.

**Addition Board**

**Students** Every time you get 10 in the 1s place, you have to trade in for a strip, just like when we played that race game.

You can't keep 15 in the 1s column.

If you just write down 15 below the line and then add the tens, you'll get 815. That's silly! You can't add 57 plus 38 and get more than 100!

8. Ask students to take a careful look at the strips. What quantities do they see in each row? Then have them read the numbers in the ten's column. The digits are 1, 5, and 3. Is that really what is being added? Why or why not?

**Students** It looks like you're adding  $1 + 5 + 3$ , but it's really  $10 + 50 + 30$ .

You can see what you're really adding if you look at the strips.

You can also just tell if you look at where the numbers are. They're in the ten's place. They're tens, not ones.

9. Ask students to add  $10 + 50 + 30$  mentally and report the results. Then combine the strips to confirm that the total is 90 and record the results on the board to complete the problem. Does the answer make sense? Why or why not?

**Activity 1** Modeling the Standard Algorithm for Double-Digit Addition (cont.)

$$\begin{array}{r} 1 \\ 57 \\ + 38 \\ \hline 95 \end{array}$$

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Addition Board**

Tens	Ones																																																																																																				
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10. Erase the problem and remove the pieces from the transparency. Then explain that the children will work in pairs to create their own addition boards. Give each pair of students a pre-folded piece of 12" × 18" light blue construction paper and 3 of the paper ten frames. Ask them to work together to write "Tens" at the top of the left-hand column and "Ones" at the top of the right-hand column. Then have them glue the 3 ten frames into place, 1 in each row on the right-hand side of the paper, so their addition board looks just like yours. Ask them to put their names on the back.

Tens	Ones										
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11. As students finish making their addition boards, have helpers distribute base 10 pieces to each pair. Repeat Steps 5 through 9 with the combinations below. As you record each combination at the board,

**Activity 1** Modeling the Standard Algorithm for Double-Digit Addition (cont.)

have children estimate a solution to the problem and explain their estimates. Then have them work in pairs on their addition boards to model each action with the base 10 pieces as you work with the overhead pieces and record each step with numbers at the board.

$$\begin{array}{r} 26 \\ + 37 \\ \hline \end{array} \quad \begin{array}{r} 48 \\ + 32 \\ \hline \end{array} \quad \begin{array}{r} 29 \\ + 50 \\ \hline \end{array} \quad \begin{array}{r} 18 \\ + 38 \\ \hline \end{array}$$

12. Collect students' addition boards for use in the next activity, and have them put their base ten pieces away. Place the Ribbon Problem transparency on display at the overhead. Re-read the problem with the students. Then work with their input to solve the problem using a front-end strategy and the standard algorithm. Ask the children to compare and contrast the two methods. How are they alike? How are they different?

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**The Ribbon Problem**

Mrs. Jones is wrapping presents for her son's birthday. She used 36 inches of ribbon for one present. She used 56 inches of ribbon for the other present. How many inches of ribbon did she use in all?

$$30 + 50 = 80 \quad \begin{array}{r} 36 \\ + 56 \\ \hline 80 \\ + 12 \\ \hline 92 \end{array} \quad 6 + 6 = 12 \quad \begin{array}{r} 1 \\ 36 \\ + 56 \\ \hline 92 \end{array}$$

**Students** *With the first way, you have to do a lot more writing.*

*I like the first way because you can really understand the numbers, but I like the new way because you don't have to write as much.*

*I think the new way is like a short cut.*

*It's not new for me. My dad showed me how to add that way.*



## The Ribbon Problem

Mrs. Jones is wrapping presents for her son's birthday. She used 36 inches of ribbon for one present. She used 56 inches of ribbon for the other present. How many inches of ribbon did she use in all?



# Addition Board

Tens	Ones										
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# Set A9 ★ Activity 2



## ACTIVITY

### Recording the Standard Algorithm for Double-Digit Addition

#### Overview

Students solve several double-digit addition problems with base 10 pieces. Then they record the process numerically as the teacher continues to model with the pieces at the overhead. Finally, students write and solve a double-digit story problem of their own.

#### Skills & Concepts

- ★ add whole numbers accurately using the standard regrouping algorithm
- ★ solve contextual problems involving adding of whole numbers and justify the solutions
- ★ estimate sums to predict solutions to problems or determine reasonableness of answers
- ★ solve simple word problems involving length

#### You'll need

- ★ Addition Board transparency from Activity 1
- ★ Length and Distance Problems (page A9:17, run 1 copy on a transparency)
- ★ Addition Problems (page A9:18, run a class set)
- ★ students' addition boards from Activity 1
- ★ overhead base ten pieces
- ★ set of base ten pieces for each pair of students
- ★ a piece of paper for masking portions of the overhead


#### Instructions for Recording the Standard Algorithm for Double-Digit Addition

1. Let students know that you are going to do some more work with the regrouping method for adding 2-digit numbers today. Then display the first of the Length and Distance Problems on the overhead. Read the problem out loud with the class and ask students to restate the question in their own words. Work with their input to underline any information that will help solve the problem. Ask students to pair-share estimates, and call on a few volunteers to share their thinking with the class.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

#### Length and Distance Problems

1 Miguel was doing an art project. He used 27 inches of string. Then he used 53 more inches of string. How many inches of string did he use in all?



2. Work with input from the class to record an equation for the problem on the board. Then place the Addition Board on display at the overhead while helpers distribute boards and base ten pieces to pairs of students. Set out the two quantities (27 and 53) on your board as students do so on theirs.

**Activity 2** Recording the Standard Algorithm for Double-Digit Addition (cont.)

3. Remind students that when people use this method, they start with the 1s instead of the 10s. Ask students to add  $7 + 3$  mentally. Will there be enough units to trade in for a 10-strip? How do they know? Then ask students to move all the units down to the bottom row on their board as you do so on yours. Count the units with the children to confirm that the total is 10.

$$\begin{array}{r} 27 \\ +53 \\ \hline \end{array}$$

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Addition Board**

Tens	Ones

4. Ask students what to do next. Work with their input to trade the 10 units in for a strip. Move the strip over to the 10s column at the overhead as they do the same on their boards. Then record the action in numeric form at the board, and have students explain.

$$\begin{array}{r} 1 \\ 27 \\ +53 \\ \hline 0 \end{array}$$

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Addition Board**

Tens	Ones

**Activity 2** Recording the Standard Algorithm for Double-Digit Addition (cont.)

**Students** *We had to make a strip because all the boxes on the ones side were full. Every time you get 10, you have to trade them in and move them over. That little 1 really means 10.*

5. Ask students to add  $10 + 20 + 50$  mentally and report the results. Then combine the strips to confirm that the total is 80, and record the results to complete the problem. Does the answer make sense? Why or why not?

$$\begin{array}{r} 1 \\ 27 \\ + 53 \\ \hline 80 \end{array}$$

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline. Run 1 copy on a transparency.

### Addition Board

Tens	Ones																																																																																										
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6. Ask children to clear their boards and get ready for a new problem. Then remove the Addition Board from the overhead and show the second story problem. Read the problem with the students, and work with them to underline the relevant information. Ask them to pair-share estimates, and call on a few volunteers to share and explain their thinking.

7. Work with input from the class to record an equation on the board. Then call a volunteer up to the overhead to lead the class in setting up the problem on their boards and working it, as you record each step with numbers at the board.

**Activity 2** Recording the Standard Algorithm for Double-Digit Addition (cont.)

2 Someone almost stepped on Little Spider! She was so scared, she ran to the nearest tree. She crawled 59 centimeters up the side of the tree. Then she crawled 28 more centimeters to the nearest branch where she could rest. How many centimeters did she crawl in all?



$$\begin{array}{r} 1 \\ 59 \\ + 28 \\ \hline 87 \end{array}$$

8. Write  $65 + 16$  on the board as children clear their addition boards. Ask students to pair-share story problems that match this equation. Then call on a volunteer to share his or her problem with the class. Have students estimate the solution. Then ask them to work the problem with base 10 pieces on their addition boards as a classmate leads at the overhead, and you record each step with numbers at the board.

9. Give students each a copy of the Addition Problems sheet. Explain that you are going to work some problems with the base ten pieces at the overhead while they record each step with numbers on their worksheet. Set 4 strips and 8 units into the first row of the Addition Board at the overhead and have students record that number on their worksheet. Then set 2 strips and 6 units into the second row as students record the number.

Ask:

- What two numbers are we adding?
- Will we need to trade in 10 ones for a strip to solve this problem? How do you know?
- What is your estimate of the total?

Set A9 Number & Operations: More Multi Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Addition Board**

Tens	Ones

Set A9 Number & Operations: More Multi Digit Addition & Subtraction Blackline Run a class set

NAME Filipe DATE April 3

**Addition Problems**

Tens	Ones
4	8
+	2
	6

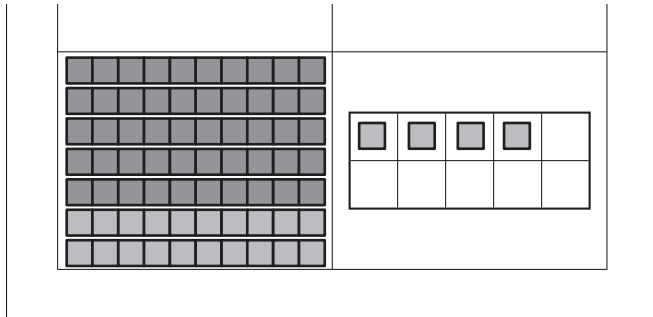
Tens	Ones

Tens	Ones

10. Move the units down to the bottom row and confirm that the total is 14. Work with input from the class to trade 10 units for a strip and move it to the tens column as students record the process with numbers on their worksheets. Move the strips down to the bottom row to complete the problem.



**Activity 2** Recording the Standard Algorithm for Double-Digit Addition (cont.)



Set A9 Number & Operations: More Multi Digit Addition & Subtraction Blackline Run a class set  
 NAME Filipe DATE April 3

**Addition Problems**

Tens	Ones
4	8
+	2 6
7	4

Tens	Ones
+	

Tens	Ones
+	

11. Repeat steps 9 and 10 with the following combinations:

$$\begin{array}{r} 35 \\ + 64 \\ \hline \end{array}$$

$$\begin{array}{r} 73 \\ + 28 \\ \hline \end{array}$$

12. Finally, write the combination  $47 + 19$  on the board. Ask students to write their own story problem to match, and then record and solve the problem at the bottom of their worksheet. Encourage them to use their base 10 pieces and addition boards if necessary.

Set A9 Number & Operations: More Multi Digit Addition & Subtraction Blackline Run a class set  
 NAME Filipe DATE April 3

**Addition Problems**

Tens	Ones
4	8
+	2 6
7	4

Tens	Ones
3	5
+	6 4
9	9

Tens	Ones
7	3
+	2 8
1	0 1

My Story Problem:  
 I had 47 marbles. I got 19 more marbles at the store. How many marbles do I have in all?

Tens	Ones
4	7
+	1 9
6	6

## Activity 2 Recording the Standard Algorithm for Double-Digit Addition (cont.)

### Extensions

- In order to provide students additional opportunities to develop fluency with the standard algorithm for multi-digit addition, see Supplement Set A5, Activity 4.
- Look for related work with multi-digit addition in the Grade 2 Bridges Practice Book.
- Encourage students to continue using their addition boards and base ten pieces to model double-digit addition problems until they gain confidence working with the numbers only.

### Independent Worksheets

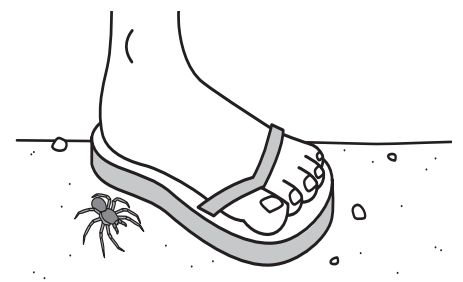
See Set A9 Independent Worksheets 1–3 and 7–9 for more practice with the standard algorithm for 2-digit addition.

## Length and Distance Problems

**1** Miguel was doing an art project. He used 27 inches of string. Then he used 53 more inches of string. How many inches of string did he use in all?



**2** Someone almost stepped on Little Spider! She was so scared, she ran to the nearest tree. She crawled 59 centimeters up the side of the tree. Then she crawled 28 more centimeters to the nearest branch where she could rest. How many centimeters did she crawl in all?



NAME \_\_\_\_\_

DATE \_\_\_\_\_

# Addition Problems

Tens	Ones

Tens	Ones

Tens	Ones

My Story Problem:

---

---

---

---

---

---

---

---

---

---

Tens	Ones

# Set A9 ★ Activity 3



## ACTIVITY

### Introducing the Open Number Line

#### Overview

As a prelude to teaching the standard algorithm for double-digit subtraction, the open number line is introduced and developed in Activities 3 through 5. The open number line gives students another informal strategy for dealing with multi-digit computation, and is especially useful in solving problems that involve missing addends and subtrahends. The open number line also helps children understand how addition and subtraction are related, and enables them to estimate the results of multi-digit subtraction more effectively than they might be able to otherwise.

#### Skills & Concepts

- ★ show the number that is ten more or ten less than any number 10 through 90
- ★ develop fluency with two-digit addition and subtraction
- ★ find the distance between numbers on the number line
- ★ use the mathematical relationship between addition and subtraction and properties of addition to model and solve problems
- ★ find missing values in open sentences

#### You'll need

- ★ Open Number Line Problems (page A9.23, run 1 copy on a transparency)
- ★ Open Number Line Record Sheet (page A9.24, run a class set)
- ★ a piece of paper to mask portions of the overhead


#### Instructions for Introducing the Open Number Line

1. Display the first story problem from Open Number Line Problems on the overhead and read it out loud. Have students follow along with you. Ask them to pair-share ideas about what the problem is asking, and how they would go about solving it.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

### Open Number Line Problems

1 Josh and his dad are driving to the city. It is 75 miles away. They have already gone 38 miles. How many more miles do they have to drive?



2. After a minute or so, ask for a few volunteers to share with the class.

**Andre** You have to figure out how much farther they have to drive. You could keep going, like count up from 38 to 75.

**Brianna** You could go maybe go backwards from 75 down to 38.

**Activity 3** Introducing the Open Number Line (cont.)

3. Students will probably have a variety of ideas for solving the problem, including counting on from, or adding to 38 to reach 75, or counting backwards from 75 to find out how many miles remain. Summarize both approaches by writing the following equations below the story problem at the overhead:

$$38 + \square = 75 \qquad 75 - \square = 38$$

**Teacher** *Andre said we should just keep going from 38 up to 75, so I wrote  $38 + \text{box} = 75$ . What does the box mean in this equation?*

**Students** *It means the part you have to figure out.*

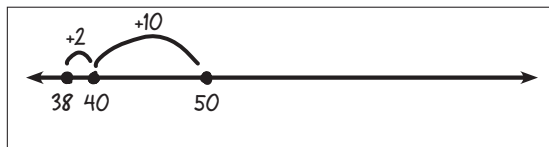
*It's where you write the answer.*

*It's like the problem you have to solve. 38 plus how many more to get to 75?*

*On that other one, it's like you're finding out how far you have to go backwards to get down to 38.*

4. Acknowledge students' ideas and explain that today you are going to share a new tool for solving problems like these. Then draw a horizontal line across the whiteboard. Include an arrow on either end to show that the number line continues indefinitely in both directions. Record the smaller number by marking and labeling a dot on the far left side. Then propose to move along the number line by hops greater than 1 to find the difference between 38 and 75.

**Teacher** *What if Josh and his dad drive 2 more miles? How far will they be then? I'm going to show it on our line like this. And then what if they drove 10 more miles after that? How far would they be?*



**Students** *Now they're up to 50 miles!*

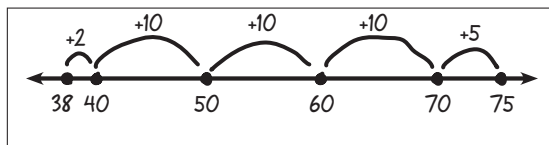
*They have gone 12 miles after the 38 because  $2 + 10$  is 12.*

*I know how many more miles they have to go to get to 75!*

5. Ask students to suggest additional hops you could take along the number line to get to 75.

**Students** *You could keep going by tens, like 60 and then 70.*

*And then you could take just one more little hop up to 75. It's just 5 away from 70.*



6. Work with students to summarize the information on the open number line. Ask:

- How much farther did Josh and his dad have to drive to get to the city?
- How do you know? Can you show us on the open number line?
- Does this give us the answer to the problem?
- Did we add or subtract to find the answer?

**Activity 3** Introducing the Open Number Line (cont.)

**Students** They had to go 37 more miles because if you add up all the hops, it's 10, 20, 30, then 32 plus 5, and that's 75.

It's right because 38 and 37 really is 75, I checked it.

But why are we adding when it should be take away?

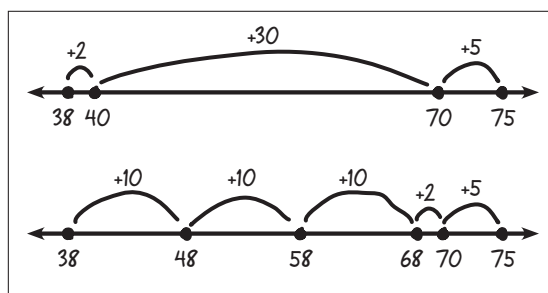
You can add to find the answer to a subtract problem, like  $14 - 7$  is 7 because  $7 + 7$  is 14.

7. Draw two more lines on the board, and invite volunteers to share different ways to hop from 38 to 75. Draw and label the hops as they describe their ideas.

**Teacher** Who has another way? Are there different hops you can use to get from 38 to 75?

**Dontrelle** I would just go from 38 to 40. Then I would just make one big hop up to 70 because 40 plus 30 is 70. Then it's 5 more to 75.

**Sarah** I would do 10s right away, like 48, 58, 68, then it's 2 more to 70, and then 5 more to get up to 75.



8. Discuss the different strategies with the class. Is the answer (37) the same each time? What does the number 37 tell you? (How many miles Josh and his dad had to drive to get to the city.) Where does 37 belong in the equations you wrote?

$$38 + \underline{37} = 75$$

$$75 - \underline{37} = 38$$

9. Give each student a copy of the Open Number Line record sheet. Ask them to record the two equations at the top of the first box, and then show how they would make hops to get from 38 to 75 on the number line. Tell them that they can copy one of the solutions on the board, or make up their own. Remind them to label their work.

10. Display the second word problem on the overhead and read it together. Ask students what the problem is asking, and then work with their input to record two different equations to match the situation.

**2** Maria Jose wants to buy a bike that costs 72 dollars. So far, she has saved 26 dollars. How much more money does she need to save?



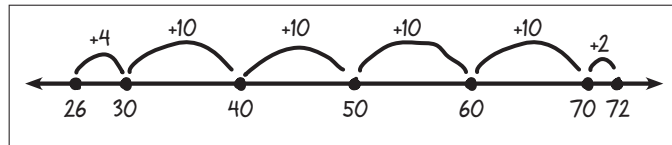
11. Erase the board and draw another horizontal line. Mark and label a dot at the far left-hand side for 26. Work with input from students to make labeled hops along the line from 26 to 72. Then ask them to

**Activity 3** Introducing the Open Number Line (cont.)

record the equations at the top of the second box on their sheets, and work in pairs to solve the problem. Tell them that they can copy one of the solutions on the board, or make up their own. Remind them to label their work.

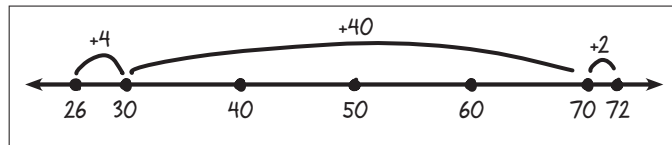
12. While students are working, draw several open number lines on the board, and ask three different pairs of students to come up to the board to share and explain their work.

**Juan and Joe** We started at 26 and went 4 up to 30. Then we hopped by tens to get up to 70. After that, it was just 2 more to get up to 72. It all added up to 46, so the girl needs to save 46 more dollars to get the bike.



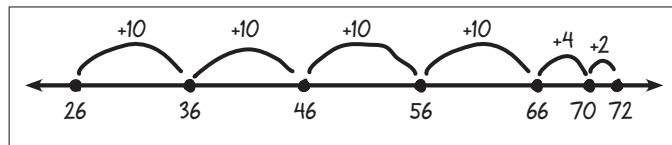
$$4 + 10 + 10 + 10 + 10 + 2 = 46$$

**Sara and Rob** We did it kind of the same, but we took one giant hop from 30 up to 70. We got the same answer, 46 more dollars.



$$4 + 40 + 2 = 46$$

**Sophia and James** We just went by tens as far as we could and added on 4 more and then 2 more to get up to 72. It's 46.



$$10 + 10 + 10 + 10 + 6 = 46$$

13. Repeat steps 10 through 12 with the last story problem on the overhead.



## Open Number Line Problems

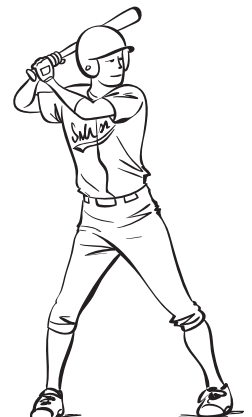
**1** Josh and his dad are driving to the city. It is 75 miles away. They have already gone 38 miles. How many more miles do they have to drive?



**2** Maria Jose wants to buy a bike that costs 72 dollars. So far, she has saved 26 dollars. How much more money does she need to save?



**3** Pablo had 39 baseball cards. He got some more baseball cards for his birthday. Now Pablo has 63 baseball cards. How many baseball cards did Pablo get for his birthday?




NAME \_\_\_\_\_

DATE \_\_\_\_\_


# Open Number Line Problems

Show how you solve the story problems below.


Problem 1

Problem 2

Problem 3

# Set A9 ★ Activity 4



## ACTIVITY

### Height & Length Problems

#### Overview

In this activity, students are shown a story problem involving length comparison, and asked to compare and contrast three different solutions. Students then work in pairs or individually to solve two related story problems using the open number line.

#### Skills & Concepts

- ★ show the number that is ten more or ten less than any number 10 through 90
- ★ develop fluency with two-digit addition and subtraction, using efficient, accurate, and generalizable strategies, and describe why the procedures work
- ★ find the distance between numbers on the number line
- ★ use the mathematical relationship between addition and subtraction and properties of addition to model and solve problems
- ★ find missing values in open sentences
- ★ solve simple word problems involving length

#### You'll need

- ★ David's Problem (page A9.28, run 1 copy on a transparency)
- ★ Length Problems on the Open Number Line (page A9.29, run 1 copy on a transparency and a class set)
- ★ a piece of paper to mask portions of the overhead
- ★ a cloth measuring tape marked in inches from the Bridges kit
- ★ individual chalkboard/whiteboard, chalk/pen, and eraser for each student

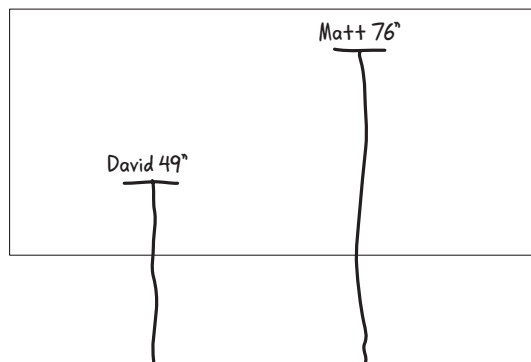
#### Instructions for Height & Length Problems

1. Tell students that you are going to share a story problem with them. Display the problem at the top of the first transparency, keeping the rest of the sheet covered for now. Read the problem with the students, and ask a volunteer to explain what the problem is asking them to figure out. Have students help you measure and mark both heights, 49 and 76 inches, on the board.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Backline Run 1 copy on a transparency

#### David's Problems

David is 49 inches tall. His big brother, Matt, is 76 inches tall. How many inches will David have to grow to be as tall as his big brother?



**Activity 4** Height & Length Problems (cont.)

2. Ask students to pair-share estimates as to how many inches David will have to grow to catch up with his brother. Then have a few volunteers share their estimates with the class.

**Students** *If David grew 10 inches, he would be up to 59.  
I think it's 26 because 50 plus 25 is 75, and one more is 76.  
It's more than 20 because  $49 + 20$  is only 69.*

3. Work with students' input to record two equations on the transparency that reflect the situation.

**Teacher** *I think we all agree that this problem is asking us to figure out how many inches David has to grow to catch up with Matt. What equations can we write that will show what we have to do?*

**Anna** *We have to go up from 49 to 76, so we could do one like 49 plus box equals 76.*

**Teacher** *Any other ideas? Would it work if we went the other way? What about 76 minus box equals 49?*

**Jensen** *I think it would be the same. You can jump up or jump down, it's still the same number of inches between David and Matt.*

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**David's Problems**

David is 49 inches tall. His big brother, Matt, is 76 inches tall. How many inches will David have to grow to be as tall as his big brother?

Equations:

$$49 + \square = 76 \quad 76 - \square = 49$$

4. Now explain that you are going to show some solutions to the problem from other second graders. Reveal the first solution. Give students a few moments to study it quietly, and then ask a volunteer to explain the work.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**David's Problems**

David is 49 inches tall. His big brother, Matt, is 76 inches tall. How many inches will David have to grow to be as tall as his big brother?

Equations:

$$49 + \square = 76 \quad 76 - \square = 49$$

**Solution 1**

**Marco** *That kid hopped up to 50. Then he went 10 more and 10 more to get up to 70. Then he took one more hop. In all, it's 27 inches for David to get up to his brother.*

**Activity 4** Height & Length Problems (cont.)

5. Give students each a whiteboard/chalkboard, pen/chalk, and an eraser. Have them copy the equation  $1 + 10 + 10 + 6 = 27$  at the top of their boards. Then ask them why the second grader who solved the problem wrote this equation. (You have to add up the hops to get the answer.)

6. Reveal each of the other two solutions, one at a time. In each case, ask students to write an equation that shows the hops, and then add them to find the answer. Then have them compare and contrast the equations on their boards. How are the three equations alike? How are they different? Guide children to the observation that the order in which two numbers are added [commutative property] and how the numbers are grouped in addition [associative property] will not change the sum.

$1 + 10 + 10 + 6 = 27$ $10 + 10 + 1 + 6 = 27$ $1 + 25 + 1 = 27$
---

**Students** *They all make 27.*

*David has to grow 27 more inches.*

*The one at the top and the next one have the same numbers, but they're mixed up.*

**Teacher** *Is that okay?*

**Students** *It still turns out the same every time. You can switch numbers, like  $2 + 3$  is the same as  $3 + 2$ .*

*Sometimes it's easier to switch the numbers around. Like on the first one, you have to go  $1 + 10$  is 11. Then  $11 + 10$  is 21, and then plus 6 is 27. The other one is just 10 and 10 is 20, plus 7 is 27.*

**Teacher** *What about the last equation?*

**Juan** *Well, it's weird, but it works. It's kind of like if you chop a 5 out of the 6, and give it over to the 2 tens, you have 25, and then 2 more. No matter how you add up the numbers, you still get the same answer.*

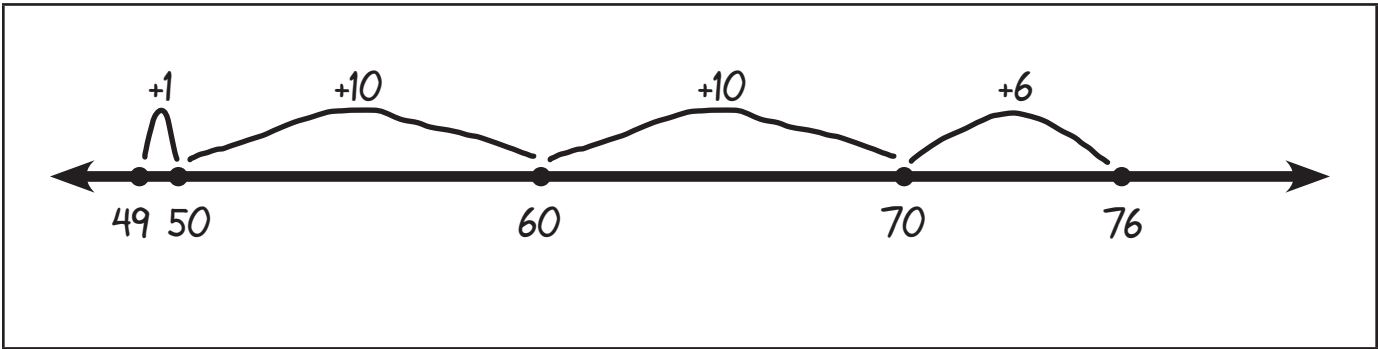
7. Collect the boards, chalk or pens, and erasers. Give students each a copy of Length Problems on the Open Number Line. Display the corresponding sheet at the overhead, and read both problems with the students. Give students the option of solving the problems individually or in pairs, and invite those children who need more support to work with you. Ask early finishers to share and compare their solutions with at least one other person, and then turn the sheet over to write their own open number line problem for a partner to solve.

## David's Problems

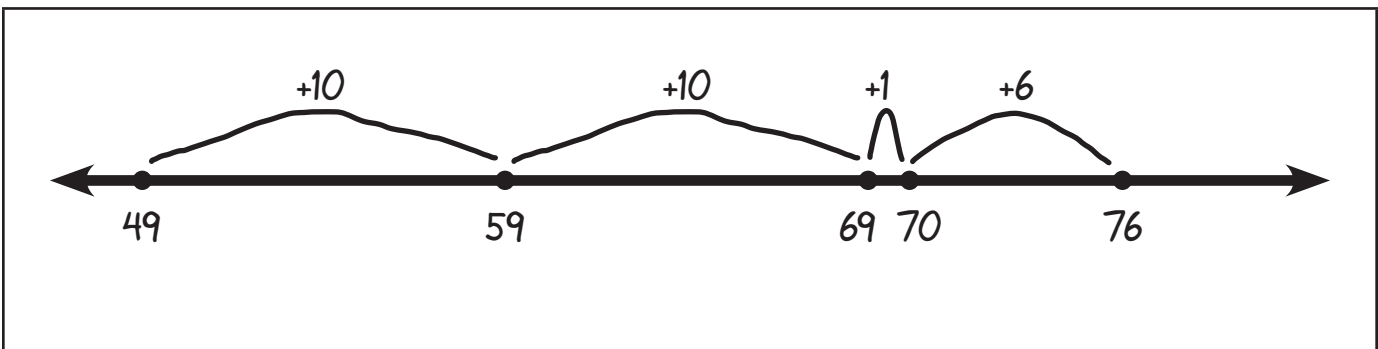
David is 49 inches tall. His big brother, Matt, is 76 inches tall. How many inches will David have to grow to be as tall as his big brother?

Equations:

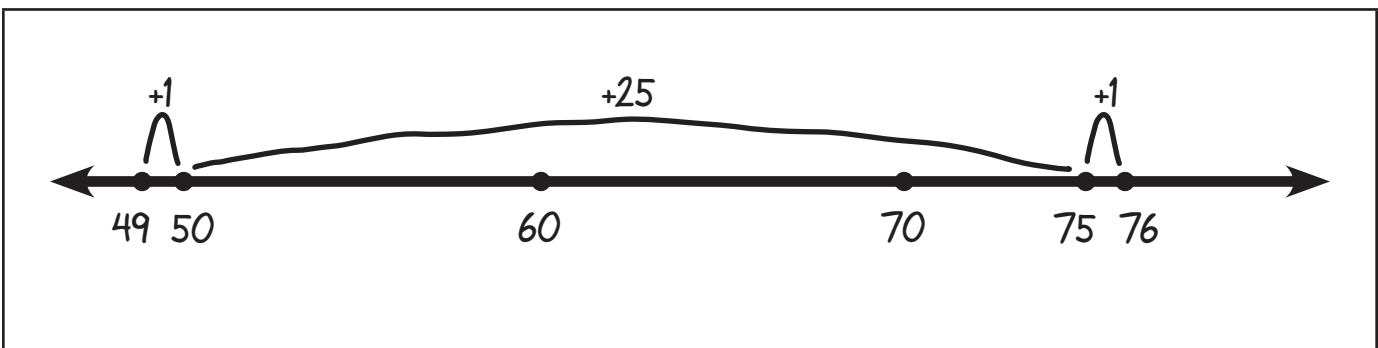
### Solution 1



### Solution 2



### Solution 3



NAME \_\_\_\_\_

DATE \_\_\_\_\_

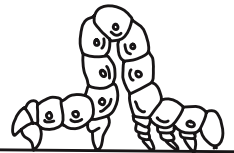
## Length Problems on the Open Number Line

Use the open number line to solve each of these problems. Be sure to label your work and show the answer.

- 1** Little Inch Worm is going to visit her grandma. Her grandma lives 82 inches away. Little Inch Worm has already crawled 47 inches. How many more inches does she have to crawl?



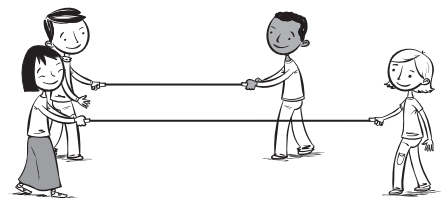
Little Inchworm has to crawl \_\_\_\_\_ more inches.



- 2** We have 2 jump ropes. The red one is 120 inches long. The blue one is only 84 inches long. How many inches longer is the red rope than the blue rope?



The red jump rope is \_\_\_\_\_ inches longer than the blue jump rope.







# Set A9 ★ Activity 5



## ACTIVITY

### Greatest Difference Wins

#### Overview

This activity features a game in which students practice finding the difference between double-digit numbers. Each team takes a turn to spin two double-digit numbers and find the difference between them. The team that gets the greatest difference wins.

#### Skills & Concepts

- ★ read, write, compare, and plot whole numbers on a number line
- ★ show the number that is ten more or ten less than any number 10 through 90
- ★ develop fluency with two-digit addition and subtraction, using efficient, accurate, and generalizable strategies, and describe why the procedures work
- ★ find the distance between numbers on the number line
- ★ use the mathematical relationship between addition and subtraction and properties of addition to model and solve problems
- ★ find missing values in open sentences

#### You'll need

- ★ Greatest Difference Wins (page A9.34, see Advance Preparation)
- ★ individual chalkboard/whiteboard, chalk/pen, and eraser for each student

**Advance Preparation** Follow the instructions below to attach an “arrow” to each of the spinners on the transparency. (You can use a transparent double spinner overlay instead if you have one.)

1. Poke a brass fastener through a  $\frac{1}{4}$ " length of drinking straw and a paperclip. Be sure to insert the brad and straw into the large end of the paperclip, as shown.
2. Keeping the straw and the paperclip on the brass fastener, insert it into the midpoint hole of the spinner. Once it has been pushed through to the backside, bend each side of the fastener flap against the underside of the transparency. The section of straw should serve as a spacer so the brad doesn't push the paperclip flat against the transparency and prevent it from spinning.
3. Give the paperclip a test spin to see if it works.



#### Instructions for Greatest Difference Wins

1. Tell students that they are going to play a game today that will give them more practice at finding the difference between 2 double-digit numbers. Place the game transparency on display at the overhead, and give students a few moments to examine it quietly.
2. Invite several volunteers to share observations about the transparency with the class. Then explain that you are going to play as Team 1, and the class is going to play against you as Team 2. Spin the top two spinners and work with students' input to record the total. Repeat this with the lower two spinners. Then explain that your job is to find the difference between the two numbers, but first you need to record two different equations to show the problem. Ask children's advice.

## Activity 5 Great Difference Wins (cont.)

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

### Greatest Difference Wins

Spin 1

Spin 2

Team 1

$\square + \square = \square$        $\square - \square = \square$

**Students** Put the little number on the line and make hops to get to the big one. Go up from the smaller number. It's easy on that line. It's like going 29 plus what equals 93. Yeah, you can just hop up to 30, and then it's easy.

**Teacher** So, I'm going to write 29 plus box equals 93 for my first equation. What should I write for the second equation? What two numbers am I finding the difference between?

**Hannah** 93 and 29, so you should write 93 minus 29 equals box. But I think it's way easier to add up from 29 to 93 than to subtract those two numbers.

**Derek** Me too, but you can hop backwards on the line too. It comes out the same.

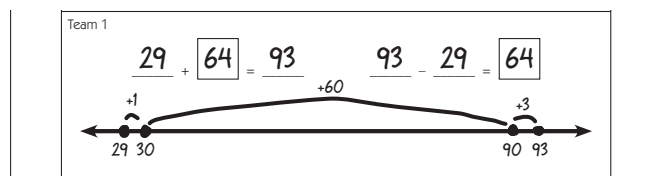
3. When you have recorded an addition and a subtraction equation to represent the problem, give students each a whiteboard/chalkboard, pen/chalk, and an eraser. Ask them to draw an open number line on their board, and follow along with you as you find the difference between the two numbers you spun.

**Teacher** Okay, I want to make this really easy, so I'm going to take one hop from 29 up to 30. Then I think I'll make one giant hop from 30 up to 90. How far is that? Right, it's 60. Then all I need is one more hop up to 93. What do I need to do next?

**Students** Add up the hops!  
You have to add the numbers to see how far it is from 29 to 93.

**Teacher** Okay, write the equation with me on your boards.  $1 + 60 + 3 = 64$ . The difference between 29 and 93 is 64. I'll write that in my equation boxes.

## Activity 5 Great Difference Wins (cont.)

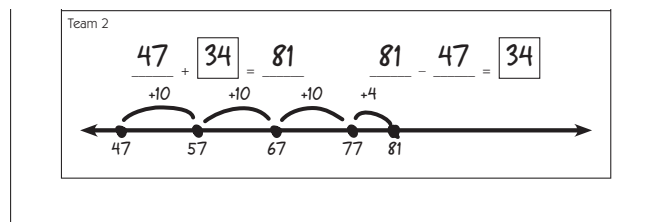


4. Ask children to erase their boards. Call a student up to spin for the class, and write the equations with help from his or her classmates. Have children pair-share ideas about whether their difference will be greater than or less than yours.

**Anna** We got 47 and 81. I don't think it's very far from 47 up to 81 because you just hop up 3 to 50, and then go 30 more to get to 80. I think our difference is going to be less.

**Marco** Yeah, 81 minus 47 doesn't sound like it's going to be as big as  $93 - 29$ . I think you have to get a really big number on the first spin and a really little number on the second spin to win.

5. Then ask students to each draw an open number line on their board and find the difference between the two numbers. Remind them to add up their hops to find the difference between the two numbers they spun. As they finish, have them share and compare strategies and solutions with the people sitting nearest them. Then invite one student up to share and explain his or her work to the class by drawing on the transparency.



**Joanie** I like going by tens, so I just went 57, 67, 77, and then I counted to get to 81 because it's only 4 more. We only got 34 and Mrs. Peck got 64. She won this time.

6. Write the scores on the board as students do so on their boards. Then have them insert the correct sign ( $<$ ,  $=$ , or  $>$ ) to show the relationship between the two numbers.

$$64 > 34$$

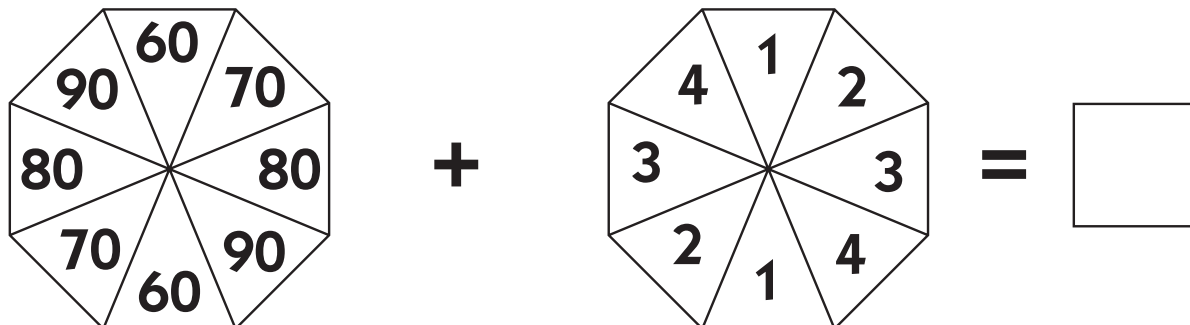
7. Erase the transparency and play a second and even third round of the game as time allows.

## Extensions

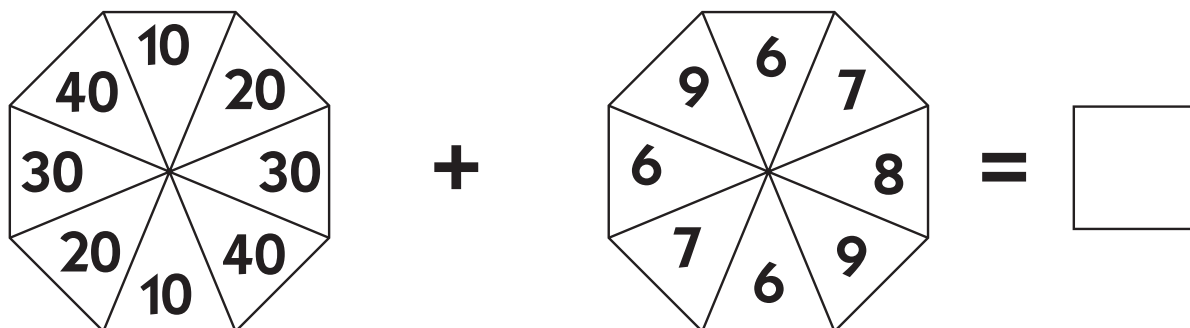
- Play a round of Greatest Difference Wins every so often with your class.
- Run and laminate 3 copies of Greatest Difference Wins on cardstock, and place them in a tub long with overhead markers and wet wipes to add to your current set of Work Places.
- Look for related work with the open number line in the Grade 2 Bridges Practice Book.

# Greatest Difference Wins

Spin 1



Spin 2



Team 1

$\underline{\quad\quad} + \square = \underline{\quad\quad}$ 
 $\quad\quad - \quad\quad = \square$



Team 2

$\underline{\quad\quad} + \square = \underline{\quad\quad}$ 
 $\quad\quad - \quad\quad = \square$



# Set A9 ★ Activity 6



## ACTIVITY

### Modeling the Standard Algorithm for Multi-Digit Subtraction

#### Overview

Students work in pairs to solve a double-digit subtraction story problem. They share their strategies with the entire class while the teacher records each method in the form of a poster. The teacher then presents the standard algorithm and has the whole class practice using it to solve a variety of 2-digit subtraction problems.

#### Skills & Concepts

- ★ subtract whole numbers accurately using the standard regrouping algorithm
- ★ estimate differences to predict solutions to problems or determine reasonableness of answers
- ★ understand the mathematical relationship between addition and subtraction

#### You'll need

- ★ Andrew's Book (page A9.40, run one copy on a transparency)
- ★ Subtraction Board (page A9.41, run one copy on a transparency)
- ★ Ten Frames (page A9.9, see Advance Preparation)
- ★ 3–4 pieces of 12" × 18" white drawing or construction paper
- ★ 9" × 12" light blue construction paper (1 sheet for each pair of students)
- ★ copy or lined paper (1 sheet per student)
- ★ 3–4 blank overhead transparencies
- ★ overhead base ten pieces
- ★ set of base ten pieces for each pair of students
- ★ glue sticks (half-class set)

.....  
**Advance Preparation** Run several copies of the Ten Frames sheet and cut the frames apart along the heavy lines. Each pair of students will need 1 ten frame.  
 .....

#### Instructions for Modeling the Standard Algorithm for Multi-Digit Subtraction

1. Display the word problem on the overhead. Read the problem out loud with the class and ask students to restate the question in their own words. Work with their input to underline any information that will help solve the problem. Then ask students to pair-share estimates, and call on a few volunteers to share their thinking with the class.

Set A9 Number & Operations: More Multi-Digit Addition & Subtract on Blackline Run 1 copy on a transparency

#### Andrew's Book

Andrew's book has 72 pages. He has read 28 pages so far. How many pages does Andrew have left to read?

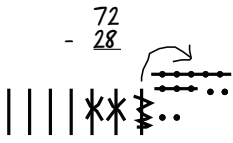
2. Give students each a blank piece of paper. Have them work in pairs to solve the problem. Ask them to record all of their work, along with the solution, on their own paper. Remind them that they can use sketches and numbers, and that the base 10 pieces are available as well. Circulate to observe and talk

**Activity 6** Modeling the Standard Algorithm for Multi-Digit Subtraction (cont.)

with students as they're working. Pass out blank transparencies to at least 3 students, each of whom has used a different strategy, and ask them to copy their work onto the transparency to share with the class.

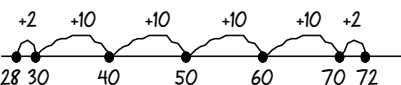
3. When most pairs are finished, ask the students you selected to share their solutions and explain their strategies at the overhead. Record each strategy on a separate piece of 12" x 18" paper labeled with the student's name. Ask the contributing students to work with the rest of the class to name their strategies.

Jason's Sketch, Cross-Out & Count Method



1. Draw 7 strips and 2 units for 72.
2. Cross out 2 strips.
3. Split up another strip into 10 units, and cross out 8 of them.
4. Count what's left. 44 pages

Lupe's Number Line Method



$$2 + 10 + 10 + 10 + 10 + 10 + 2 = 44$$

He has to read 44 more pages.

Ryan's Negative Number Method

$$\begin{array}{r} 72 \\ - 28 \\ \hline \end{array}$$

$$70 - 20 = 50$$

$$2 - 8 = -6$$

$$50 - 6 = 44 \text{ pages}$$

Yolanda's Borrowing Way

$$\begin{array}{r} 6 \\ \cancel{7}12 \\ - 28 \\ \hline 44 \text{ pages} \end{array}$$

If you don't use negative numbers, you can't do  $2 - 8$ . Move a 10 over from the 10's column and split it into 1s. Now you have 12 there.

$$12 - 8 = 4$$

$$60 - 20 = 40$$

So it's 44 pages

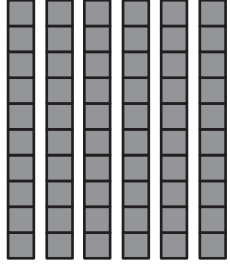
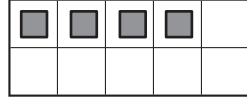
4. Acknowledge everyone's strategies. If none of the students shared a "borrowing" algorithm, contribute one to the collection yourself by creating a poster similar to Yolanda's above as students watch. Explain that this strategy is called the regrouping method, and adults often use it for solving multi-digit subtraction problems.

5. Now model the "borrowing" algorithm step-by-step with a new combination,  $64 - 27$ . First, place the Subtraction Board on display at the overhead, and record the combination on the lower part of the sheet. Ask students to estimate the answer and pair-share their ideas. Then have several volunteers share their estimates and reasoning with the class. Next, build 64 with the base 10 pieces on the board, as shown below.

**Activity 6** Modeling the Standard Algorithm for Multi-Digit Subtraction (cont.)

Set A9 Number & Operations: More Multi Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Subtraction Board**

Tens	Ones
	

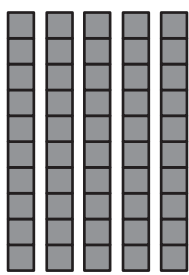
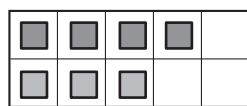
$$\begin{array}{r} 64 \\ -27 \\ \hline \end{array}$$

6. Explain that when people use this method, they start with the 1s instead of the 10s. Ask students to consider the answer to  $4 - 7$ . Some may say that it is impossible to subtract 7 from 4. Others may volunteer an answer of negative 3, and some may believe the answer is 3. If negative numbers come up in the discussion, explain that this method doesn't include the use of negative numbers. If some students are convinced that the answer is 3, have students hold up 4 fingers. Is it possible to subtract 7 from this collection?


7. As students watch, move one of the strips over to the 1s side and exchange it for 10 ones to create a collection of 14. Ask students to compute the answer to  $14 - 7$  mentally. Then remove 7 units from the board and move them to the lower part of the sheet. Confirm with students that 7 units still remain on the board. Record your action in numeric form. Have students explain what you've done so far. Ask:

- Why did I move a strip over and exchange it for 10 ones?
- Why did I change the 4 to 14?
- Why did I cross out the 6 on the ten's side and write a 5 instead?

**Subtraction Board**

Tens	Ones
	

$$\begin{array}{r} \overset{5}{\cancel{6}}4 \\ -27 \\ \hline 7 \end{array}$$



**Activity 6** Modeling the Standard Algorithm for Multi-Digit Subtraction (cont.)

**Students** You took one of the strips and made it into 1s because you didn't have enough over there to take away 7.

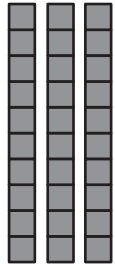
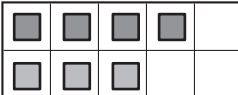
You crossed out the 6 because you took one of the strips and turned it into 1s.

Writing the little 1 by the 4 makes it into 14. It's like moving a strip over.

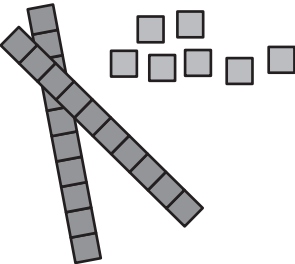
8. Work with input from the class to subtract 2 strips from the collection, and record the results. Draw students' attention to the pieces at the bottom of the sheet. Did you really subtract 27? How many were left afterwards? What would happen if you put the 27 you just moved back onto the subtraction board?

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Subtraction Board**

Tens	Ones
	

$$\begin{array}{r} 5 \\ 64 \\ - 27 \\ \hline 37 \end{array}$$



**Students** Yep, you took off 27!

There are still 37 left on the board.

If you put the 27 back on the board, it would get you back up to 64!

9. Erase the problem and remove the pieces from the transparency. Then explain that the children will work in pairs to create their own subtraction boards. Give each pair of students a piece of 9" x 12" light blue construction paper and one paper 10 frame. Ask them to work together to fold the construction paper in half, write "Tens" at the top of the left-hand column, and write "Ones" at the top of the right-hand column. Then have them glue the ten frame into place on the right-hand side of the paper, so their subtraction board looks like yours. Ask them to put their names on the back.



**Activity 6** Modeling the Standard Algorithm for Multi-Digit Subtraction (cont.)

Tens	Ones												
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10. As students finish making their subtraction boards, have helpers distribute base 10 pieces to each pair. Repeat Steps 5 through 8 with the combinations below. As you record each combination at the overhead, have children estimate a solution to the problem and explain their estimates. Then have them work in pairs on their subtraction boards to model each action with the base 10 pieces as you work with the overhead pieces and record each step with numbers.

$$\begin{array}{r} 85 \\ - 37 \\ \hline \end{array} \quad \begin{array}{r} 48 \\ - 22 \\ \hline \end{array} \quad \begin{array}{r} 50 \\ - 18 \\ \hline \end{array} \quad \begin{array}{r} 61 \\ - 16 \\ \hline \end{array}$$

11. Collect students' subtraction boards for use in the next activity, and have them put their base ten pieces away. Place the transparency of Andrew's Book on display at the overhead. Read the problem with the students. Then work with their input to solve the problem using the open number line strategy and the standard algorithm. Ask the children to compare and contrast the two methods. How are they alike? How are they different?

Set A9 Number & Operations: More Multi Digit Addition & Subtract on Blackline Run 1 copy on a transparency

**Andrew's Book**

Andrew's book has 72 pages. He has read 28 pages so far. How many pages does Andrew have left to read?

$10 + 10 + 10 + 10 + 4 = 44$

$$\begin{array}{r} 72 \\ - 28 \\ \hline 44 \text{ pages} \end{array}$$

**Students** *I like the number line way, but it's more work.*

*I think it's easier to add up than do take away.*

*I think the other way is cool. It's really fast.*

*That's the way my uncle showed me.*

## Andrew's Book

Andrew's book has 72 pages. He has read 28 pages so far. How many pages does Andrew have left to read?



# Subtraction Board

Tens	Ones										
	<table border="1"><tbody><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>										



# Set A9 ★ Activity 7



## ACTIVITY

### Recording the Standard Algorithm for Double-Digit Subtraction

#### Overview

Students solve several double-digit subtraction problems with base 10 pieces. Then they record the process numerically as the teacher continues to model with the pieces at the overhead. Finally, students write and solve a double-digit story problem of their own.

#### Skills & Concepts

- ★ subtract whole numbers accurately using the standard regrouping algorithm
- ★ estimate differences to predict solutions to problems or determine reasonableness of answers
- ★ use the mathematical relationship between addition and subtraction to solve problems

#### You'll Need

- ★ New Playground Equipment (page A9.48, run 1 copy on a transparency)
- ★ Subtraction Problems (page A9.49, run a class set)
- ★ Subtraction Board transparency from Activity 6
- ★ students' subtraction boards from Activity 6
- ★ overhead base ten pieces
- ★ set of base ten pieces for each pair of students
- ★ a piece of paper for masking portions of the overhead


#### Instructions for Recording the Standard Algorithm for Double-Digit Subtraction

1. Let students know that you are going to do some more work with the regrouping method for subtracting 2-digit numbers today. Then display the first word problem of New Playground Equipment on the overhead. Read the problem out loud with the class and ask students to restate the question in their own words. Work with their input to underline any information that will help solve the problem. Ask students to pair-share estimates, and call on a few volunteers to share their thinking with the class.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency.

### New Playground Equipment

1 The parents at Oak Grove School are putting up some new rope swings on the playground. They started with 84 feet of rope. They have used up 36 feet of rope so far. How many feet of rope do they have left?



2. Place the Subtraction Board on display at the overhead and work with input from the class to write an equation to represent the problem on the lower part of the transparency. Then have helpers distribute

**Activity 7** Recording the Standard Algorithm for Multi-Digit Subtraction (cont.)

subtraction boards and base ten pieces to pairs of students. Set out 8 strips and 4 units on your board as students do so on theirs.

3. Remind students that when people use this method, they start with the 1s instead of the 10s. Ask students to consider the number of units on the ones side of the board and decide whether or not they need to trade in a strip for 10 units. Why or why not?

4. After a bit of discussion, move a strip from the tens to the ones side, trade it in for 10 units, and arrange the units to show there are 14 on your board as students do so on theirs. Record the action in numeric form below the subtraction board, and have students explain.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Subtraction Board**

Tens	Ones

$$\begin{array}{r} 84 \\ -36 \\ \hline \end{array}$$

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Subtraction Board**

Tens	Ones

$$\begin{array}{r} 7 \\ 84 \\ -36 \\ \hline \end{array}$$

**Students** *We had to get some more ones because you can't go 4 take away 6. You crossed out the 8 because we moved over a strip and traded it in for ones. Now we have 14, so we can take away 6. That little 1 you wrote next to the 4 makes it like 14 instead of 4.*

5. Work with input from the class to subtract 6 units from the ones side and 3 strips from the tens side. Move these pieces to the lower part of the transparency, as students replicate your actions on their own boards.

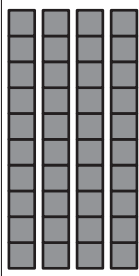
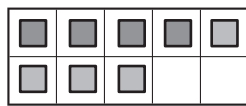
Ask:

- Why did we remove 6 ones from the board?
- Why did we remove 3 tens from the board?
- How many did we subtract in all?
- How many are left on our board?
- How many feet of rope did the parents have left to make more swings?
- What would happen if we added the 3 strips and 6 units back to the collection on our board?

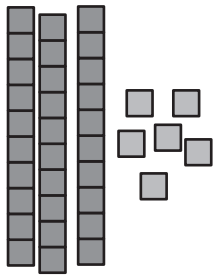
**Activity 7** Recording the Standard Algorithm for Multi-Digit Subtraction (cont.)

Set A9 Number & Operations: More Multi Digit Addition & Subtraction Blackline Run 1 copy on a transparency

### Subtraction Board

Tens	Ones
	

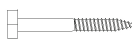
$$\begin{array}{r} 84 \\ - 36 \\ \hline 48 \end{array}$$



6. Ask children to clear their boards and get ready for a new problem. Remove the pieces from the Subtraction Board, erase it, and remove it from the overhead. Then display the second story problem. Read the problem with the students, and work with them to underline the relevant information. Ask them to pair-share estimates, and call on a few volunteers to share and explain their thinking.

7. Work with input from the class to record an equation on the board. Place the Subtraction Board back on display at the overhead. Then call a volunteer up to the overhead to lead the class in setting up the problem on their boards and working it, as you record each step with numbers at the board.

**2** The parents are also building a new climbing structure for the play ground. They are using lag bolts to hold the big pieces of wood together. They started with 96 bolts. They only have 49 bolts left. How many bolts have they used so far?



$\begin{array}{r} 8 \\ 96 \\ - 49 \\ \hline 47 \end{array}$
---

8. Next, write  $75 - 29$  on the board as children clear their subtraction boards. Ask students to pair-share story problems that match this equation. Then call on a volunteer to share his or her problem with the class. Have students estimate the solution. Then ask them to work the problem with base 10 pieces on

**Activity 7** Recording the Standard Algorithm for Multi-Digit Subtraction (cont.)

their subtraction boards as a classmate leads at the overhead, and you record each step with numbers at the board.

9. Give students each a copy of the Subtraction Problems sheet. Explain that you are going to work some problems with the base ten pieces at the overhead while they record each step with numbers on their worksheet. Set 5 strips and 3 units onto the board at the overhead and have students record that number on their worksheet. Then explain that you are going to take away 19, and have students record the information. (If you frame this as a story problem, it may help some of your students. An example in this case might be, "There were 53 apples on the tree. 19 of them fell on the ground. How many were left in the tree?")

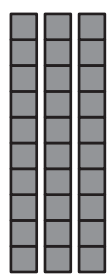
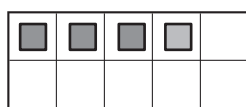
Ask:

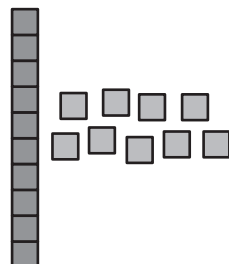
- What is our starting number?
- How many are we going to take away?
- Will we need to move a strip to the ones side and trade it in for 10 ones to solve this problem? How do you know?
- What is your estimate of the answer?

10. Work with input from the class to perform the needed actions with the base 10 pieces as student record the process with numbers on their worksheets.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run 1 copy on a transparency

**Subtraction Board**

Tens	Ones
	



Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run a class set

NAME Dawn DATE April 12

**Subtraction Problems**

Tens	Ones
4 5	13
- 1	9
3	4

Tens	Ones

Tens	Ones

11. Repeat steps 9 and 10 with the combinations shown below. As you work, discuss the fact that if you add the pieces that have been removed back into the collection on the board, the total is the number you



**Activity 7** Recording the Standard Algorithm for Multi-Digit Subtraction (cont.)

started with. Ask children to add the subtrahend and the difference to see if this holds true in each case. Explain that this is one way people check their work to make sure they have the correct answer.

$$\begin{array}{r} 69 \\ - 42 \\ \hline \end{array} \qquad \begin{array}{r} 70 \\ - 26 \\ \hline \end{array}$$

12. Finally, write the combination  $93 - 48$  on the board. Ask students to write their own story problem to match, and then record and solve the problem at the bottom of their worksheet. Encourage them to use their base 10 pieces and subtraction boards if necessary.

Set A9 Number & Operations: More Multi-Digit Addition & Subtraction Blackline Run a class set

NAME Dawn DATE April 12

**Subtraction Problems**

Tens	Ones
<del>4</del>	13
1	9
<hr/>	
3	4

Tens	Ones
6	9
4	2
<hr/>	
2	7

$$\begin{array}{r} 27 \\ + 42 \\ \hline 69 \end{array}$$

Tens	Ones
<del>6</del>	10
2	6
<hr/>	
4	4

$$\begin{array}{r} 1 \\ 44 \\ + 26 \\ \hline 70 \end{array}$$

My Story Problem:

I had 93 legos. I gave 48 of the legos to my brother.  
How many legos do I have left?

Tens	Ones
<del>9</del>	13
4	8
<hr/>	
4	5

$$\begin{array}{r} 1 \\ 45 \\ + 48 \\ \hline 93 \end{array}$$
**Extensions**

- In order to provide students additional opportunities to develop fluency with the borrowing algorithm for multi-digit subtraction, see Supplement Set A5, Activity 4.
- Look for related work with multi-digit subtraction in the Grade 2 Bridges Practice Book.
- Encourage students to continue using their subtraction boards and base ten pieces to model double-digit subtraction problems until they gain confidence working with the numbers only.

**Independent Worksheets**

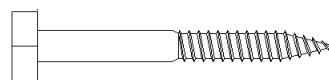
See Set A9 Independent Worksheets 4–8 for more practice with the standard algorithm for 2-digit subtraction

## New Playground Equipment

**1** The parents at Oak Grove School are putting up some new rope swings on the play ground. They started with 84 feet of rope. They have used up 36 feet of rope so far. How many feet of rope do they have left?



**2** The parents are also building a new climbing structure for the play ground. They are using lag bolts to hold the big pieces of wood together. They started with 96 bolts. They only have 49 bolts left. How many bolts have they used so far?



NAME \_\_\_\_\_

DATE \_\_\_\_\_

# Subtraction Problems

Tens	Ones

--	--

Tens	Ones

--	--

Tens	Ones

--	--

My Story Problem:

---



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---



---



---



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---



---

Tens	Ones

--	--



NAME \_\_\_\_\_

DATE \_\_\_\_\_

# Set A9 ★ Independent Worksheet 1



## INDEPENDENT WORKSHEET

### PJ Panda's Regrouping Method for Addition



When PJ Panda adds big numbers, he adds the units first. If he gets more than 10, he puts 10 in a group and trades them in for a strip. Then he adds the strips to finish the problem.

		$\begin{array}{r} 1 \\ 36 \\ + 38 \\ \hline 74 \end{array}$
--	--	---

Use PJ's regrouping method to solve these problems.

<p><b>1</b></p>		$\begin{array}{r} 45 \\ + 26 \\ \hline \end{array}$
<p><b>2</b></p>		$\begin{array}{r} 39 \\ + 25 \\ \hline \end{array}$



NAME \_\_\_\_\_

DATE \_\_\_\_\_

# Set A9 ★ Independent Worksheet 2



## INDEPENDENT WORKSHEET

### Adding with PJ Panda



**1** When PJ Panda adds big numbers, he adds the ones first. If he gets more than 10, he puts 10 in a group and moves them over to the tens column. Then he adds the tens to get the total. Use PJ's method to solve these problems.

**ex**

Tens	Ones
1	7
5	
+	
2	5
-----	
8	2

**a**

Tens	Ones
4	6
+	
3	9
-----	

**b**

Tens	Ones
1	8
+	
6	2
-----	

**c**

Tens	Ones
3	6
+	
4	8
-----	

**d**

Tens	Ones
1	4
+	
8	2
-----	

**e**

Tens	Ones
3	6
+	
5	7
-----	

**f**

Tens	Ones
8	7
+	
	9
-----	

**g**

Tens	Ones
4	5
+	
4	5
-----	

**2** Solve these problems by adding the numbers in your head.

$80 + 3 = \underline{\quad}$

$30 + 9 = \underline{\quad}$

$40 + 13 = \underline{\quad}$

$70 + 12 = \underline{\quad}$

$$\begin{array}{r} 70 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 40 \\ + 12 \\ \hline \end{array}$$

$$\begin{array}{r} 10 \\ + 6 \\ \hline \end{array}$$

$$\begin{array}{r} 50 \\ + 17 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ + 7 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ + 18 \\ \hline \end{array}$$

$$\begin{array}{r} 40 \\ + 19 \\ \hline \end{array}$$

$$\begin{array}{r} 22 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 32 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 42 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 52 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 132 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 452 \\ + 5 \\ \hline \end{array}$$

$$\begin{array}{r} 672 \\ + 5 \\ \hline \end{array}$$





NAME \_\_\_\_\_

DATE \_\_\_\_\_

# Set A9 ★ Independent Worksheet 3



## INDEPENDENT WORKSHEET

### More Panda Problems

**1** When PJ Panda adds big numbers, he adds the ones first. If he gets more than 10, he puts 10 in a group and moves them over to the tens column. Then he adds the tens to get the total. Use PJ's method to solve these problems.

**ex**

Tens	Ones
1	9
4	7
+	
7	6

**a**

Tens	Ones
2	4
1	8
+	

**b**

Tens	Ones
7	4
2	0
+	

**c**

Tens	Ones
5	5
3	2
+	

**d**

Tens	Ones
5	8
4	7
+	

**e**

Tens	Ones
4	0
6	3
+	

**f**

Tens	Ones
6	2
1	8
+	

**g**

Tens	Ones
4	6
4	6
+	

**2** PJ ate 36 pounds of bamboo in the morning. He ate 29 more pounds of bamboo in the afternoon. How many pounds of bamboo did he eat in all? Show your work.







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# Set A9 ★ Independent Worksheet 4



## PJ Panda's Regrouping Method for Subtracting

When PJ Panda subtracts big numbers, he starts with the units first. If he doesn't have enough, he trades in a strip for 10 units. After that, he subtracts the ones and then the tens to get the answer.

Step 1: Look	Step 2: Trade a strip if you need to	Step 3: Subtract
$\begin{array}{r} 56 \\ - 29 \\ \hline \end{array}$	$\begin{array}{r} 4\overset{1}{5}6 \\ - 29 \\ \hline \end{array}$	$\begin{array}{r} 4\overset{1}{5}6 \\ - 29 \\ \hline 27 \end{array}$

Use PJ's method to solve these problems.

$\begin{array}{r} 45 \\ - 18 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ - 18 \\ \hline \end{array}$	$\begin{array}{r} 45 \\ - 18 \\ \hline \end{array}$
$\begin{array}{r} 51 \\ - 34 \\ \hline \end{array}$	$\begin{array}{r} 51 \\ - 34 \\ \hline \end{array}$	$\begin{array}{r} 51 \\ - 34 \\ \hline \end{array}$



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# Set A9 ★ Independent Worksheet 5



## INDEPENDENT WORKSHEET

### Subtracting with PJ Panda



**1** When PJ Panda subtracts big numbers, he looks at the ones first. If he doesn't have enough ones, he trades in a ten for 10 ones. After that, he subtracts the ones and then the tens. Use PJ's method to solve these problems.

**ex**

Tens	Ones
5	17
<del>5</del>	
2	9
<hr/>	
3	8

**a**

Tens	Ones
8	2
1	8
<hr/>	

**b**

Tens	Ones
9	8
5	3
<hr/>	

**c**

Tens	Ones
5	6
2	9
<hr/>	

**d**

Tens	Ones
9	0
5	5
<hr/>	

**e**

Tens	Ones
7	1
2	6
<hr/>	

**f**

Tens	Ones
7	7
	9
<hr/>	

**g**

Tens	Ones
6	0
1	7
<hr/>	

**2** Subtract these numbers in your head.

$84 - 3 = \underline{\quad}$

$39 - 6 = \underline{\quad}$

$45 - 10 = \underline{\quad}$

$70 - 5 = \underline{\quad}$

$$\begin{array}{r} 85 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} 45 \\ - 10 \\ \hline \end{array}$$

$$\begin{array}{r} 17 \\ - 6 \\ \hline \end{array}$$

$$\begin{array}{r} 58 \\ - 10 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ - 3 \\ \hline \end{array}$$

$$\begin{array}{r} 36 \\ - 20 \\ \hline \end{array}$$

$$\begin{array}{r} 67 \\ - 17 \\ \hline \end{array}$$

$$\begin{array}{r} 27 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} 37 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} 47 \\ - 5 \\ \hline \end{array}$$

$$\begin{array}{r} 52 \\ - 12 \\ \hline \end{array}$$

$$\begin{array}{r} 132 \\ - 12 \\ \hline \end{array}$$

$$\begin{array}{r} 452 \\ - 12 \\ \hline \end{array}$$

$$\begin{array}{r} 672 \\ - 12 \\ \hline \end{array}$$



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# Set A9 ★ Independent Worksheet 6



## INDEPENDENT WORKSHEET

### Check Your Answers with PJ



**1** PJ checks his subtraction answers by adding the number he subtracted and the answer he got. If they add up to the starting number, he knows he got the right answer. Use PJ's strategy to check your answers.

**ex**

Tens	Ones
7	1
<del>8</del>	<del>1</del>
4	7
<hr/>	
3	4

Add to Check
$\begin{array}{r} 1 \\ 34 \\ + 47 \\ \hline 81 \end{array}$

**a**

Tens	Ones
5	2
1	6
<hr/>	

Add to Check

**b**

Tens	Ones
9	9
2	5
<hr/>	

Add to Check

**c**

Tens	Ones
6	0
3	2
<hr/>	

Add to Check

**d**

Tens	Ones
7	7
1	9
<hr/>	

Add to Check

**e**

Tens	Ones
5	8
3	1
<hr/>	

Add to Check

**2** Subtract these numbers in your head.

$78 - 18 = \underline{\quad}$

$47 - 17 = \underline{\quad}$

$56 - 16 = \underline{\quad}$

$82 - 12 = \underline{\quad}$





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# Set A9 ★ Independent Worksheet 7



## INDEPENDENT WORKSHEET

### Addition & Subtraction Practice

**1** Add the numbers. Use the regrouping method.

$$\begin{array}{r} 60 \\ + 4 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ + 47 \\ \hline \end{array}$$

$$\begin{array}{r} 47 \\ + 35 \\ \hline \end{array}$$

$$\begin{array}{r} 67 \\ + 18 \\ \hline \end{array}$$

$$\begin{array}{r} 75 \\ + 25 \\ \hline \end{array}$$

$$\begin{array}{r} 36 \\ + 36 \\ \hline \end{array}$$

$$\begin{array}{r} 37 \\ + 45 \\ \hline \end{array}$$

$$\begin{array}{r} 290 \\ + 9 \\ \hline \end{array}$$

$$\begin{array}{r} 340 \\ + 20 \\ \hline \end{array}$$

$$\begin{array}{r} 569 \\ + 25 \\ \hline \end{array}$$

$$\begin{array}{r} 345 \\ + 15 \\ \hline \end{array}$$

$$\begin{array}{r} 629 \\ + 45 \\ \hline \end{array}$$

$$\begin{array}{r} 325 \\ + 426 \\ \hline \end{array}$$

$$\begin{array}{r} 238 \\ + 527 \\ \hline \end{array}$$

**2** Use pictures, numbers, and/or words to add the numbers in each box. Show your work.

<p><b>a</b> <math>37 + 29 =</math></p>    	<p><b>b</b> <math>338 + 222 =</math></p>    
--	--

**3** Subtract the numbers. Use the regrouping method.

$$\begin{array}{r} 49 \\ - 9 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ - 15 \\ \hline \end{array}$$

$$\begin{array}{r} 67 \\ - 23 \\ \hline \end{array}$$

$$\begin{array}{r} 43 \\ - 25 \\ \hline \end{array}$$

$$\begin{array}{r} 75 \\ - 29 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \\ - 15 \\ \hline \end{array}$$

$$\begin{array}{r} 100 \\ - 75 \\ \hline \end{array}$$

**4** Choose one of the problems below. Circle it. Then solve it. Show your work.

$45 - 16 =$

$51 - 25 =$

$93 - 49 =$

$276 - 69 =$



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# Set A9 ★ Independent Worksheet 8



## INDEPENDENT WORKSHEET

### Equations & Expressions

1 Fill in the missing numbers to solve these addition equations.

<b>a</b> $50 + 40 + 10 = \square$	<b>b</b> $60 + 4 + \square = 74$	<b>c</b> $50 + \square + 9 = 79$
<b>d</b> $80 = 40 + 30 + \square$	<b>e</b> $20 + \square + 20 = 60$	<b>f</b> $\square + 30 + 20 = 100$

2 Fill in the missing numbers to solve these subtraction equations.

<b>a</b> $60 - \square = 40$	<b>b</b> $75 - \square = 25$	<b>c</b> $120 - 60 = \square$
<b>d</b> $100 - 30 = 20 + \square$	<b>e</b> $90 - 40 = 25 + \square$	<b>f</b> $\square - 40 = 20 + 30$

3 Write a story problem to match this expression. Then solve the problem. Show your work.

$$\boxed{83 - 25 =}$$

My story problem:

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My work:



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# Set A9 ★ Independent Worksheet 9



## INDEPENDENT WORKSHEET

### Combining Numbers to Make 100

1 Circle all the additions that combine to 100 in red. Next, circle all the additions that do not make 100 in blue. Then take a pencil and go back and do them.

$\begin{array}{r} 70 \\ + 30 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ + 60 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ + 80 \\ \hline \end{array}$	$\begin{array}{r} 75 \\ + 25 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ + 50 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ + 0 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ + 40 \\ \hline \end{array}$
$\begin{array}{r} 60 \\ + 70 \\ \hline \end{array}$	$\begin{array}{r} 96 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 95 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ + 80 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ + 40 \\ \hline \end{array}$	$\begin{array}{r} 93 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 0 \\ + 100 \\ \hline \end{array}$
$\begin{array}{r} 100 \\ + 100 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ + 90 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ + 60 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ + 75 \\ \hline \end{array}$	$\begin{array}{r} 92 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ + 80 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ + 90 \\ \hline \end{array}$

2 Add these strings of numbers. Use combinations of 100 to help.

<b>ex a</b> $30 + \textcircled{60} + 20 + \textcircled{40} = \underline{150}$ 	<b>ex b</b> $\textcircled{80} + \textcircled{50} + \textcircled{20} + \textcircled{50} + 40 = \underline{240}$ 
<b>a</b> $30 + 70 + 90 + 10 = \underline{\quad}$	<b>b</b> $20 + 60 + 40 + 20 = \underline{\quad}$
<b>c</b> $90 + 50 + 50 + 30 + 70 = \underline{\quad}$	<b>d</b> $80 + 20 + 50 + 20 + 50 = \underline{\quad}$
<b>e</b> $20 + 98 + 80 + 2 + 43 = \underline{\quad}$	<b>f</b> $96 + 92 + 4 + 8 + 59 = \underline{\quad}$

