Mathematics Instructional Cycle Guide

Place Value 2.NBT.7

Created by Erin Birden, 2014 Connecticut Dream Team teacher

CT CORE STANDARDS

This Instructional Cycle Guide relates to the following *Standards for Mathematical Content* in the *CT Core Standards for Mathematics*:

Use place value understanding and properties of operations to add and subtract.
CCSS.MATH.CONTENT.2.NBT.B.7
Add and subtract **within 1000, using concrete models or drawings and strategies based on place value, properties of operations**, and/or the relationship between addition and subtraction; **relate the strategy to a written method. Understand that in adding** or subtracting **three-digit numbers, one adds** or subtracts **hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds**.

This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

MP.4 Model with mathematics

WHAT IS INCLUDED IN THIS DOCUMENT?

- A Mathematical Checkpoint to elicit evidence of student understanding and identify student understandings and misunderstandings **(page 2)**
- A student response guide with examples of student work to support the analysis and interpretation of student work on the Mathematical Checkpoint **(pages 3-9)**
- A follow-up lesson plan designed to use the evidence from the student work and address the student understandings and misunderstandings revealed **(pages 10-15)**
- Supporting lesson materials **(pages 16-24)**
- Precursory research and review of standard **2.NBT.B.7** and assessment items that illustrate the standard **(pages 25-28)**

HOW TO USE THIS DOCUMENT

1) Before the lesson, administer the **Three-Digit Addition *Mathematical Checkpoint*** individually to students to elicit evidence of student understanding.
2) Analyze and interpret the student work using the ***Student Response Guide***
3) Use the next steps or ***follow-up lesson plan*** to support planning and implementation of instruction to address student understandings and misunderstandings revealed by the Mathematical Checkpoint
4) Make instructional decisions based on the checks for understanding embedded in the follow-up lesson plan

MATERIALS REQUIRED

- **Whiteboard markers and whiteboards for each student**
- **Base-ten blocks: hundreds, tens, and ones for each student**
- **Optional: place value mats**

MATERIALS PROVIDED

- **Three-Digit Addition Mathematical Checkpoint**
- **Checking for Understanding 1**
- **Common Misconception**
- **Extension activity**
- **Open number line master**
- **Exit slip**
- **Getting Started, Developing, and Got It Student Work Samples**

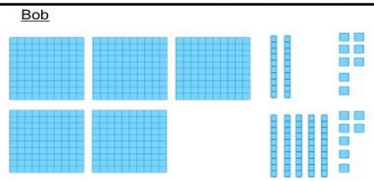
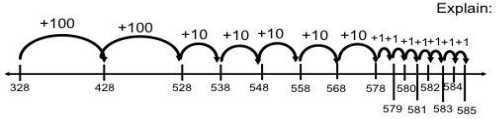
TIME NEEDED

Three-Digit Addition Mathematical Checkpoint administration: **20-30 minutes**
Follow-Up Lesson Plan: **1-2 daily math sessions, 50-60 minutes each**

Timings are only approximate. Exact timings will depend on the length of the instructional block and needs of the students in the class

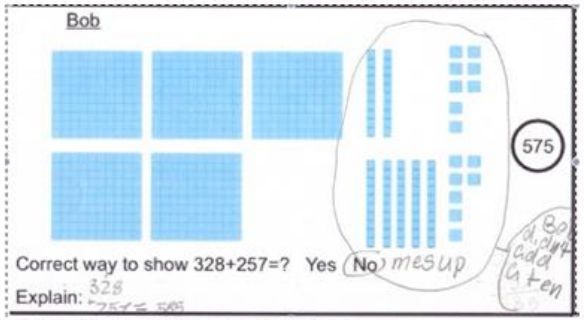
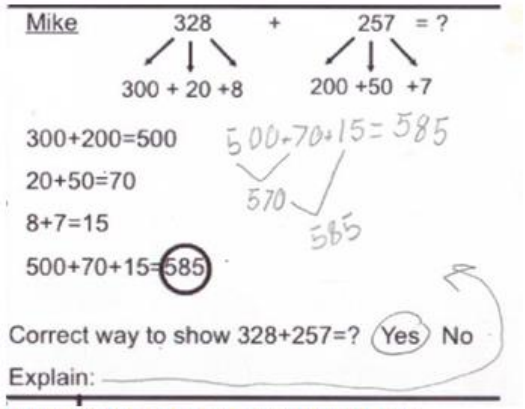
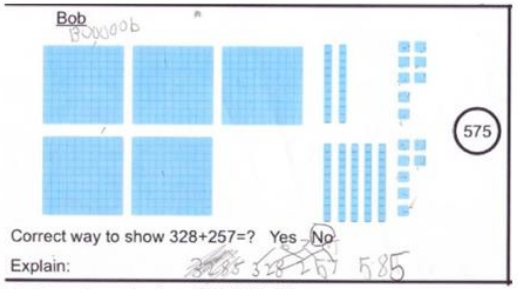
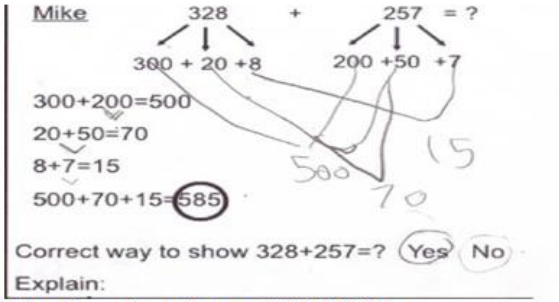
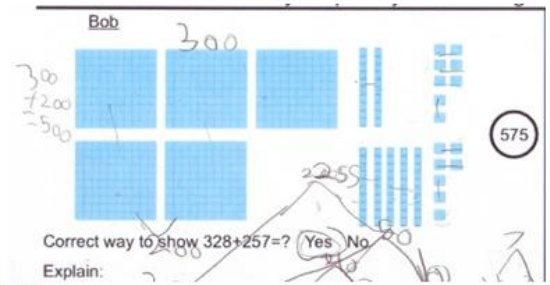
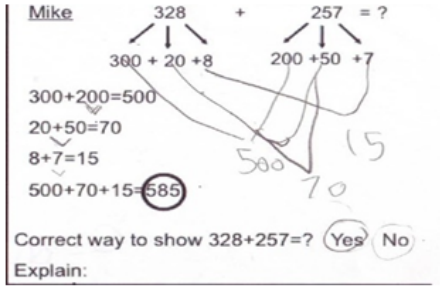
Step 1: Elicit evidence of student understanding

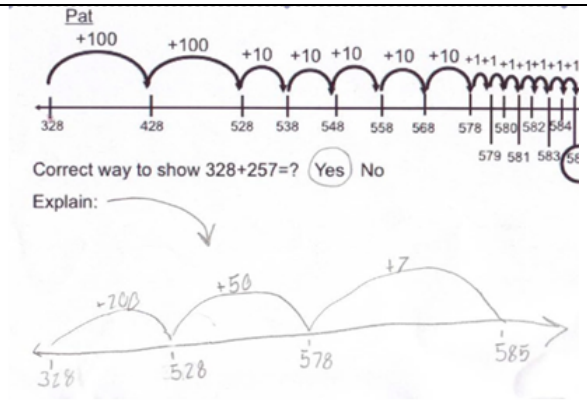
Mathematical Checkpoint

Question(s)	Purpose	
Bob, Pat, Mike and Sally solved this equation: 328+257= ☐ Decide which students solved correctly. Explain your thinking. Bob  Correct way to solve 328+257=☐? Yes No Explain: ☐ = 575 Pat  Correct way to solve 328+257=☐? Yes No Explain: ☐ = 585 Mike 328 + 257 = ☐ 300 + 20 + 8 200 + 50 + 7 Correct way to solve 328+257=☐? Yes No Explain: 300+200=500 20+50=70 8+7=15 500+70+15= 585 ☐ = 585 Sally 328+257= ☐ Correct way to solve 328+257=☐? Yes No Explain: 328+200=628 628+50=678 678+7= 685 ☐ = 685	**CT Core Standard:**	Use place value understanding and properties of operations to add. CCSS.MATH.CONTENT.2.NBT.B.7 **Add** and subtract **within 1000, using concrete models or drawings and strategies based on place value, properties of operations**, and/or the relationship between addition and subtraction; **relate the strategy to a written method**. **Understand that in adding** or subtracting **three-digit numbers, one adds** or subtracts **hundreds and hundreds, tens and tens, ones and ones**; **and sometimes it is necessary to compose or decompose tens or hundreds.** *This lesson is aligned to **adding** within 1,000.
	Target questions addressed by checkpoint:	• Can students add within 1,000 using concrete models, drawings, and strategies based on place value? • Can students relate their strategy to a written method? • Do students understand that they need to attend to place value and compose tens and when appropriate?

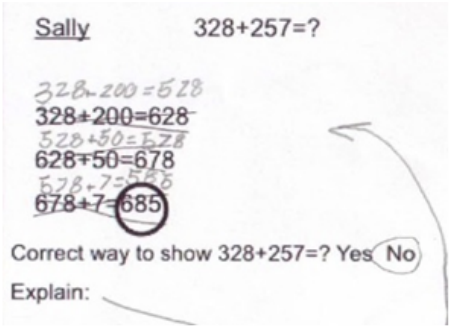
Step 2: Analyze and Interpret Student Work

Student Response Guide

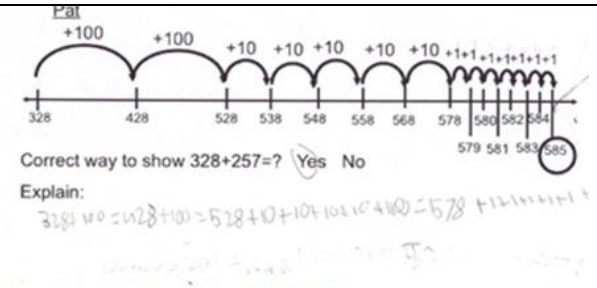
Got It	Developing	Getting Started
 Bob: Correct way to show 328+257? No Explain: Circled the tens and ones in the manipulative representation. Wrote "mesup" and "Bob didn't add a ten." Wrote number sentence: 328+257=585  Mike: Correct way to show 328+257? Yes Explain: 500+70+15=585 500+70=570 570+15=585	 Bob: Correct way to show 328+257? No Explain: The student knew that Bob's sum of 575 was not correct. When asked to explain, the student wrote 328 and 257 next to one another. Above the hundreds in each number, the student drew lines and wrote a 5. Above the tens in each number, the student drew lines and wrote a 7 at the top. Above the ones, the student drew lines and wrote 15. Next to this work, the student wrote 585. Note: Above the pictures of the hundreds blocks, the student wrote "1300000"  Mike: Correct way to show 328+257? Yes Explain: 300+200=500 20+50=70 8+7=15 500+70+15=585	 Bob: Correct way to show 328+257? Yes Explain: Next to the hundreds blocks, this student counted the hundreds on top and bottom and wrote 300 and 200. Then, in the left margin, the student wrote 300+200=500. There are small dash marks on the tens and ones signaling that the student was counting them but there is no further explanatory work provided and the student agreed with this solution, but it was incorrect.  Mike: Correct way to show 328+257? Yes Explain: The student also agreed with this solution, which was correct. The student did some work composing the decomposed numbers. The student composed 300 and 200 by drawing "v" shaped lines below the numbers and wrote 500. The student composed 20 and 50 and wrote 70. The student composed 8 and 7 and wrote 15. The student wrote small "v" shapes under one addend in all of the addition equations in the problem. This is the extent of the student's work on this problem



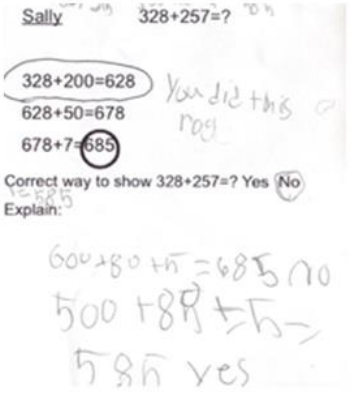
Pat: Correct way to show 328+257? Yes
Explain: Created open number line starting with 328 and ending with 585. Jumped 200 from 328, landed on labeled point 528. Next, added 50 and landed on labeled point 578. Last, jumped 7 and landed on labeled point 585. So the student jumped 257 from 328 to land on 585.



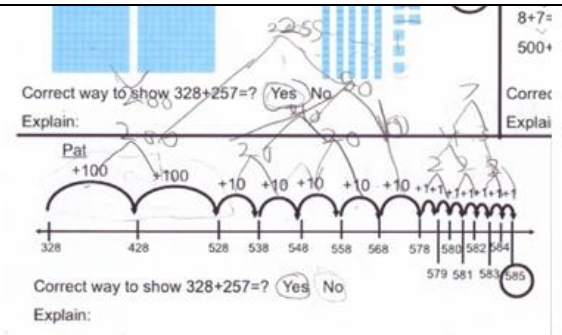
Sally: Correct way to show 328+257? No
Explain: Crossed out each number sentence written by "Sally" in the problem and replaced with following number sentences:
Replaced 328+200=628 WITH 328+200=528
Replaced 628+50=678 WITH 528+50=578
Replaced 678+7=685 WITH 578+7=585



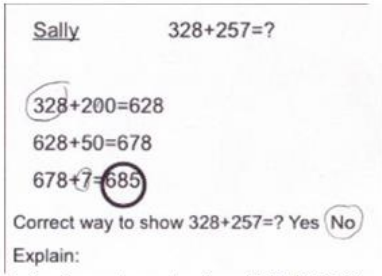
Pat: Correct way to show 328+257? Yes
Explain:
328+100=428+100=528+10+10+10+10+10=578+1+1+1+1+1+1+1
=585



Sally: Correct way to show 328+257? No
Explain: Circled Sally's work "328+200=628" and wrote next to it "you did this wrong." Then wrote 600+80+5=685 no
500+80+5=585 yes

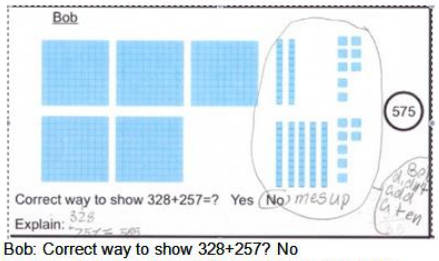


Pat: Correct way to show 328+257? Yes
Explain: The student seemed to begin composing the numbers that we labeled as "jumps" on the number line. For example, above the +100 and +100, the student wrote 200. Then the student did the same type of work above each pair of tens and eventually labeled all the tens as 50. The student also did this work for the ones. In the end, the student has the number "2255" above the number line.

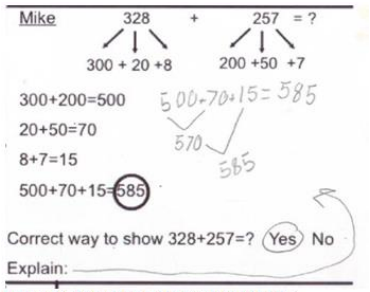


Sally: Correct way to show 328+257? No
Explain: The student circled the number 328. The student circled the number 7.

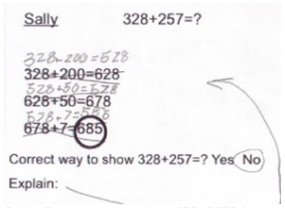
Getting Started	
Student Response Example	**Indicators**



Bob: Correct way to show 328+257? No
Explain: Circled the tens and ones in the manipulative representation. Wrote "mesup" and "Bob didn't add a ten." Wrote number sentence: 328+257=585



Mike: Correct way to show 328+257? Yes
Explain: 500+70+15=585
500+70=570
570+15=585



Sally: Correct way to show 328+257? No
Explain: Crossed out each number sentence written by "Sally" in the problem and replaced with following number sentences:
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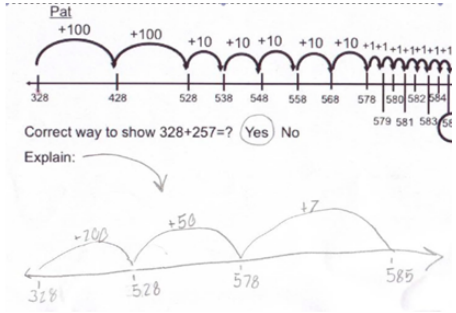


Pat: Correct way to show 328+257? Yes
Explain: Created open number line starting with 328 and ending with 585. Jumped 200 from 328, landed on labeled point 528. Next, added 50 and landed on labeled point 578. Last, jumped 7 and landed on labeled point 585. So the student jumped 257 from 328 to land on 585.

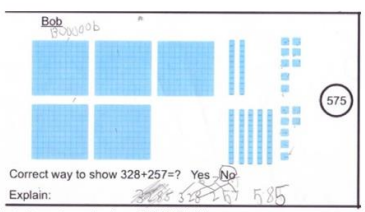
- Student cannot add within 1,000 using concrete models, drawings, and/or strategies based on place value or it is unclear as to whether or not the student can do so.
- Student has not developed a clear understanding of equivalence yet (1 flat= ten rods or 100=10 tens).
- Student cannot decompose numbers into ones, tens, or hundreds (decomposing by using expanded notation).
- Student cannot compose tens or hundreds to arrive at an accurate solution (e.g. in 328+257, regroup the ones to compose a ten in order to arrive at solution).
- Student cannot "trade" ones for tens or tens for hundreds.
- Student does not understand relationship between digits within a number (e.g. in student work sample on number line, the student does not fully understand why the number line started at 328, and then jumped in increments of hundreds, tens, or ones by 257 to arrive at 585).
- Student cannot effectively relate a strategy to a written method in communicating conclusions and mathematical thinking.

In the Moment Questions/Prompts	Closing the Loop (Interventions/Extensions)
Q: Count out ten ones. Can we use another base ten block to show "ten" instead of the ones blocks? Do we still have "ten" when we use this block? What would happen if we had 10 ones? What would we have? (Only if needed) How could we show 10 ones in another way with base ten blocks? Q: In the problem, we need to add 328+257. Underline the ones in each number. Let's focus on adding the ones. Show me with blocks how you'll add the 8 and 7. Q: How can you show 15 using the rods and ones? When we have more than ten ones, we need to trade them for a ten stick/rod. Make 15 with tens and ones. **Q**: Let's look at Pat's work now, paying attention to what he did with the tens. What do you notice about the groups of ten as we count on from 328 to 528? (32 tens, 33 tens, 34 tens, 35 tens, etc.). How can this pattern help you when adding on the open number line?	Use base ten blocks to model equivalency (10 ones=1 ten, 10 tens=1 hundred). Use base ten blocks in conjunction with a place value mat to model regrouping ("trading") in the ones or tens place when addition three-digit numbers. http://learnzillion.com/lessons/2582-add-within-1000-using-base-10-blocks http://learnzillion.com/lessons/2561-add-within-1000-by-regrouping-base-10-blocks http://learnzillion.com/lessons/3693-add-using-expanded-notation http://learnzillion.com/lessons/2630-add-within-1000-using-a-number-line

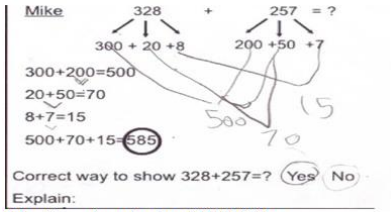
Developing

Student Response Example

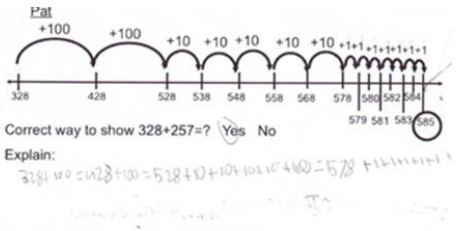
What will a response include from a student who demonstrated some understanding and possibly some misunderstandings or undeveloped understanding?



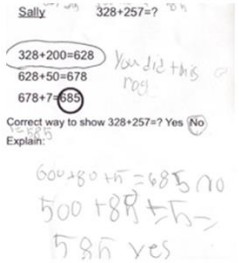
Bob: Correct way to show 328+257? No
Explain: The student knew that Bob's sum of 575 was not correct. When asked to explain, the student wrote 328 and 257 next to one another. Above the hundreds in each number, the student drew lines and wrote a 5. Above the tens in each number, the student drew lines and wrote a 7 at the top. Above the ones, the student drew lines and wrote 15. Next to this work, the student wrote 585.
Note: Above the pictures of the hundreds blocks, the student wrote "1300000"



Mike: Correct way to show 328+257? Yes
Explain: 300+200=500
20+50=70
8+7=15
500+70+15=585



Pat: Correct way to show 328+257? Yes
Explain:
328+100=428+100=528+10+10+10+10+10=578+1+1+1+1+1+1=585



Sally: Correct way to show 328+257? No
Explain: Circled Sally's work "328+200=628" and wrote next to it "you did this wrong." Then wrote 600+80+5=685 no
500+80+5=585 yes

Indicators

- Student can add within 1,000 using concrete models, drawings, and/or strategies based on place value inconsistently.
- Student can *somewhat* relate strategy to written method in communicating conclusions and mathematical thinking, though more clarity is needed.
- Student can attend to place value, e.g. understand that they may need to compose tens to arrive at an accurate solution or hundreds to arrive at an accurate solution but may be inconsistent with regrouping for a hundred.
- Student can add accurately with basic addition.

In the Moment Questions/Prompts

Q: Why do you think (name one of the students in the checkpoint) did a good job using his strategies? What strategies did he use?
Q: Tell me about what Bob did to solve the problem. Why did he do that?
Q. What would have happened if Bob had traded 10 of his ones for a ten stick and crossed the ones he traded out?
Q: What did Sally do well in her work? What does she need some help with?
Q: Why do you think Mike started by placing 328 on his number line?
Q: How would **<u>you</u>** choose to solve 328+257? What strategy would you choose? Why?

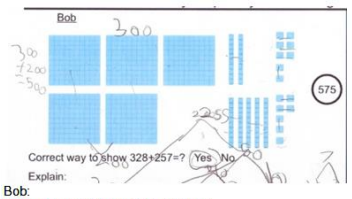
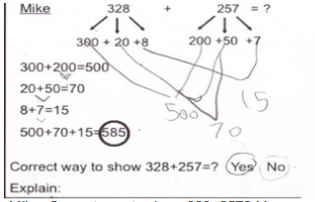
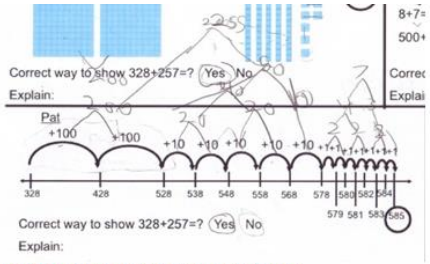
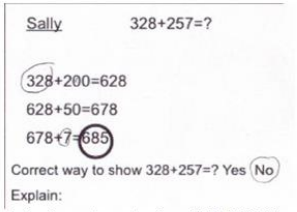
Closing the Loop (Interventions/Extensions)

These videos show different strategies. Select which video would extend student understanding and provide instruction with a strategy the student needs to work on.

http://learnzillion.com/lessons/2582-add-within-1000-using-base-10-blocks

http://learnzillion.com/lessons/3693-add-using-expanded-notation

http://learnzillion.com/lessons/2630-add-within-1000-using-a-number-line

Got it	
Student Response Example	**Indicators**
 Bob: Correct way to show 328+257? Yes Explain: Next to the hundreds blocks, this student counted the hundreds on top and bottom and wrote 300 and 200. Then, in the left margin, the student wrote 300+200=500. There are small dash marks on the tens and ones signaling that the student was counting them but there is no further explanatory work provided and the student agreed with this solution, but it was incorrect.	• Student can add within 1,000 using concrete models, drawings, and/or strategies based on place value with accuracy. • Student can relate strategy to written method in communicating conclusions and mathematical thinking clearly. • Student can understand that they may need to compose tens or hundreds to arrive at an accurate solution. • Students can use equations, concrete models, drawings, or decomposing number methods to solve three-digit addition equations. • Student can regroup for a ten and a hundred when needed.
 Mike: Correct way to show 328+257? Yes Explain: The student also agreed with this solution, which was correct. The student did some work composing the decomposed numbers. The student composed 300 and 200 by drawing "v" shaped lines below the numbers and wrote 500. The student composed 20 and 50 and wrote 70. The student composed 8 and 7 and wrote 15. The student wrote small "v" shapes under one addend in all of the addition equations in the problem. This is the extent of the student's work on this problem	
 Pat: Correct way to show 328+257? Yes Explain: The student seemed to begin composing the numbers that we labeled as "jumps" on the number line. For example, above the +100 and +100, the student wrote 200. Then the student did the same type of work above each pair of tens and eventually labeled all the tens as 50. The student also did this work for the ones. In the end, the student has the number "2255" above the number line.	
 Sally: Correct way to show 328+257? No Explain: The student circled the number 328. The student circled the number 7.	

In the Moment Questions/Prompts	Closing the Loop (Interventions/Extensions)
Q: Why might Sally have chosen to split (decompose) just one of the numbers and not both? (If needed) How might splitting just one of the numbers in an equation be more efficient than splitting both? **Q:** How did Mike and Pat think alike? How are their strategies different? **Q**: Of these four strategies, which strategy is most efficient? Why do you think that? Which strategy is least efficient? Why do you think that?	Ask student to revisit Mike and Pat's work. How could Mike teach a classmate how to use his strategy to solve the problem? How could Pat teach a classmate how to use his strategy to solve the problem? It will be helpful to view the following videos to model clear explanations of mathematical thinking in solving three-digit addition problems using various strategies. http://learnzillion.com/lessons/3118-explain-addition-using-place-value http://learnzillion.com/lessons/3053-explain-addition-by-decomposing-numbers http://learnzillion.com/lessons/3054-choose-appropriate-strategies-to-explain-why-addition-or-subtraction-work-to-solve-word-problems

Steps 3 and 4: Act on Evidence from Student Work and Adjust Instruction	
Lesson Objective:	Add three-digit numbers within 1,000 using concrete models based on place value and relate the strategy to a written method.
Content Standard(s):	Use place value understanding and properties of operations to **add** and subtract. CCSS.MATH.CONTENT.2.NBT.B.7 **Add** and subtract **within 1000, using concrete models or drawings and strategies based on place value, properties of operations**, and/or the relationship between addition and subtraction; **relate the strategy to a written method. Understand that in adding** or subtracting **three-digit numbers, one adds** or subtracts **hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.**
Targeted Practice Standard :	MP4. Model with mathematics • Students can solve three-digit addition problems using various models and show their thinking using various models on paper.

Mathematical Goals	Success Criteria
• Solve three-digit addition problems • Communicate mathematical thinking in written form • Understand when and how to regroup in the tens and hundreds place when adding within 1,000 and why that is necessary at times	• Use base ten block models, open number lines, and drawings to accurately add within 1,000 • Student records solution process clearly to represent thinking • Decompose three-digit numbers and regroup ones and tens when needed in order to add

Launch (Probe and Build Background Knowledge)

Purpose: Engage students in modeling with mathematics to probe and build background knowledge of using concrete representations and/or drawings to solve problems involving three-digit addition

Note: Students need access to base ten blocks and whiteboards/whiteboard markers and/or paper and pencil for this portion of the lesson. Create a visual ahead of time to show the students that poses the following problem. You may consider drawing the base ten blocks for each number in the equation in your visual.

Seat students in a discussion circle with individual whiteboards and markers. Present students with the following problem and model solution process:

At the toy store, the building blocks are very popular! The store already has 223 of the blocks in stock, but they decide to order 122 more. How many toys will they have in all?

Model solving this problem using a think aloud and using base ten blocks. Gather 223 in base ten blocks and 122. Solve by counting the blocks to find sum. Explain to students that it's important for others to be able to follow our thinking in math, so they will need to know how to record their problem solving process on paper. Ask students to watch as you record your process by drawing the base ten blocks for each number, then circle the ones, then the tens, then the hundreds and label them appropriately to arrive at the sum.

Ask students if they can think of other strategies that could have solved this problem. Give think time. Encourage student discussion by holding a turn and talk to share out ideas or facilitate a whole class discussion. You may consider listing the strategies students generate.

Pick 1 or 2 of the suggested strategies and interactively solve the problem and record the process using that strategy (e.g. open number line, decomposing addends).

Checking for Understanding

Purpose: Students use concrete models, drawings, and strategies based on place value to add three-digit numbers.

We just solved a three-digit addition problem using base ten blocks and shared a bit about our process. Some people chose to show their thinking using (drawings of base ten blocks, an open number line, decomposing one or both numbers). There are many strategies we can use to solve three-digit addition problems. Today, you'll try some of these ways. I'd like you to begin to think about which strategies work best for you and why.

Students will need:

- **base ten blocks and (optional) place value charts**
- **whiteboards and markers**
- **open number line master**
- **paper copies of problems**

Engage (Setting Up the Task)

Pose the following problem to students:

Note: Create a visual ahead of time to show the students that poses the following problem. You may consider drawing the base ten blocks for each number in the equation in your visual or have the students model it while introducing the problem.

The toy store has decided to sell toy cars. On Monday, the store received 175 toy cars. On Wednesday, the store received 280 more cars. How many toy cars does the store have available to buy?

Use the following questions to facilitate discussion:

- What equation are we solving?
- Explain to students that in order to solve this problem, one strategy we will all try out is: use objects/base ten blocks to solve.
- Show a partner how many hundreds, tens, and ones you will use to show the number 175.
- Show another partner how many hundreds, tens, and ones you will use to show 280.

Explore (Solving the Task)

1. Work with your partner to solve this toy store problem using base ten blocks and a place value chart.
2. Decide how you and your partner can show your base ten block strategy on paper using pictures, numbers, and/or words.
3. Choose ANOTHER way to solve: open number line, decomposing numbers, just drawing a visual of blocks.
4. Be ready to share your work with the group.

Circulate to observe, support, and gather information on student thinking using some of the possible questions and prompts below. Use an anecdotal notes recording sheet to note any student misconceptions, or strategies valuable to share with the whole group.

Clarifying Questions/Prompts:	Advancing Questions/Prompts:
• Tell me about what you'll do to solve this problem. • Which part of the numbers will you add first? Why? • Talk to me about how you'll add the ten sticks/rods. (If needed: What will you do when you have more than 10 rods/ten sticks? Why?) • What decisions are you making as you figure out how to show your strategy in writing? OR • How will you show your strategy on paper? Can you write an equation to match your picture/your base ten blocks?	• Can you think of another way to solve this problem other than using base ten blocks? • How else could you show your strategy on paper? • How can you prove your solution is correct? • What would happen if I said there the toy store had 175 cars and then ordered 285 more cars? How would that change your solution? How would your blocks look different?

Elaborate (Discuss Task and Related Mathematical Concepts)

Facilitate whole class discussion to elicit evidence of student understanding and support students in making mathematical connections about using concrete models and relating that strategy to a written method in accurately solving three-digit addition problems.

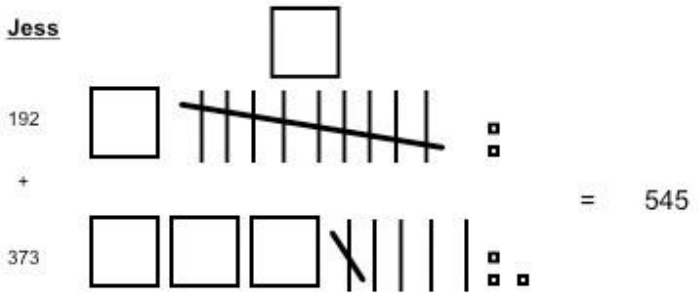
- Talk about how this partnership used the base ten blocks to solve the problem. (Also use this opportunity to address any misconceptions that may surface in a discussion setting; please see common misconceptions section on page 24)
- How did these partners show their thinking? / What could this partnership do to show their thinking in a different way?
- How is this work similar to/different from (another partnership's) work or your work?
- How is our work today similar to adding two-digit numbers? How is it different?
- How is using objects to solve three-digit addition helpful?
- For students who used or drew base ten blocks, and for all students' benefit: Be sure to instruct and elicit from the student work how to clearly show tens or hundreds that need to be composed/regrouped or "traded" in the written strategy. It's important to make that conceptual understanding clearly evident.

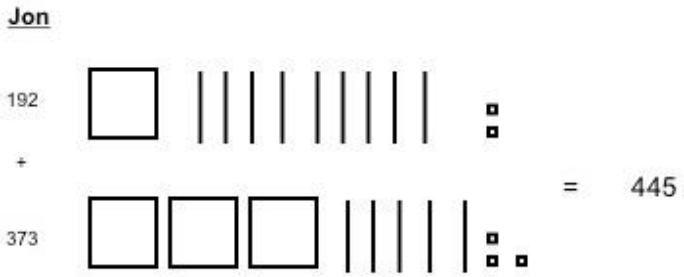
Checking for Understanding

Purpose: Pose this problem to elicit whether students can to solve a three-digit addition problem using a chosen strategy with accuracy and relate it to a written method. It will also reflect whether or not students are attending to place value concepts, which is critical to accuracy as well as underlying understanding of the concept.

Jess and Jon solved this problem. They both used base ten blocks. Decide which student arrived at the correct sum. Help the student who did not. Mark on their work to make it correct.

192+373=?





Tell Jon what tricked him when he was solving the problem.

_____

_____

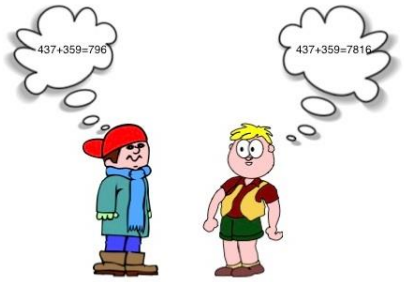
_____

_____

Common Misunderstanding

Purpose: Use the opposing views prompt to engage students in analyzing the use of concrete models and to address the common misunderstanding of regrouping improperly or not at all.

Bob and Mike are both solving this equation: 437+359=?. Bob says the sum is 796. He says his sum is correct because he showed his work using base ten blocks. He noticed right away that he had 16 ones and he could make a ten. He traded ten ones for one ten stick. Then, he had a total of 9 tens and 7 hundreds, so that made 796. Mike says no, I'm going to add the hundreds, then the tens, then the ones in my head. Mike got the sum of 7816. Bob says Mike got confused when he was working in the ones and tens place. How can Bob help Mike understand why 7816 does not make sense?



Possible student responses could include solving the equation using base ten blocks that are labeled with the correct sum and explicitly show that 16 was traded for 1 ten and 6 ones or a verbal or written word explanation could also be possible. Students may be familiar with the decomposing strategy or number line strategy which are other possible and acceptable student responses, as long as they arrive at the consensus that Bob needs to show Mike that although 9+6=16, it is critical to attend to place value and therefore the 10 in 16 needs to be reflected in the tens place, not tacked on as extra digits at the end of the sum.

Checking for Understanding

Purpose: Pose the following problem to elicit evidence of student understanding and use of concrete models to solve three-digit addition accurately.

163+482=?

Give students a choice of using base ten blocks, drawing base ten blocks, drawing an open number line, or decomposing numbers and ask students to solve the problem using objects and write their proposed solution on a white board. For students who have not yet demonstrated understanding of three-digit addition by making use of concrete models, be sure to provide them with a place value mat and instruct them to make use of that structure to help develop conceptual understanding of composing tens when needed ("trading" ones for tens or tens for hundreds). Ask students to reveal responses once students have had a chance to solve. During this time, it is important to circulate and make observations about student understanding of three-digit addition as modeled with concrete objects and therefore evidenced by arriving at an accurate solution.

Closure

Purpose: Provide students an opportunity to monitor and reflect on their own understanding of adding three-digit numbers using concrete models with the following self-assessment.

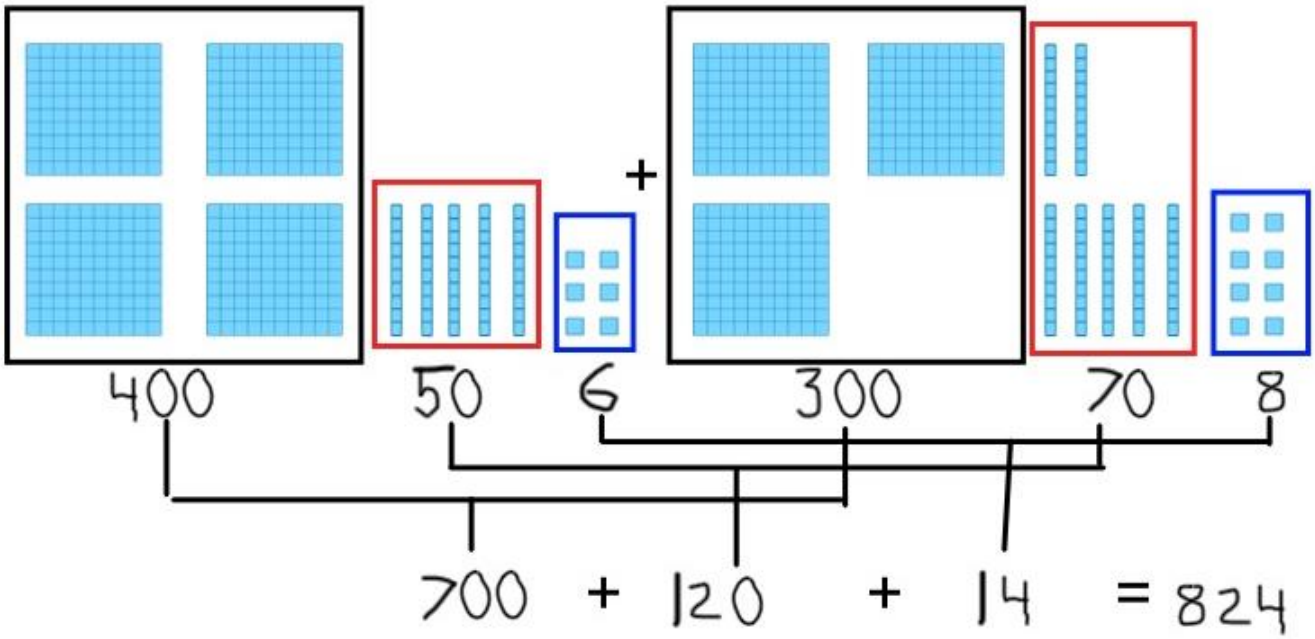
I can use base ten blocks to solve three-digit addition problems correctly.	I can do this with help. 	I can do this by myself . 
I can show my thinking clearly using numbers, pictures, or words on paper.	I can do this with help. 	I can do this by myself. 

Extension Task

Purpose: *Provide an extension task for those students who are ready to deepen their understanding of three-digit addition and build flexibility with strategy usage.*

456+378=☐

Matt made a mistake solving this problem. He does not understand his mistake. Explain what Matt did wrong.

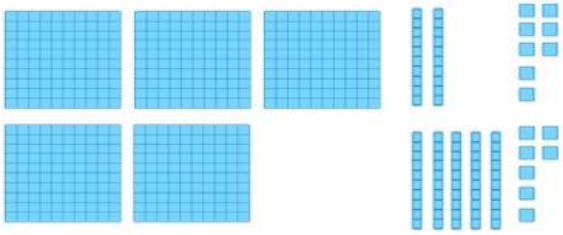


Use pictures, numbers, or words to explain.
Explanation:

Think of a different strategy for Matt to try to solve this problem to help him avoid making this mistake again. Show your way here:

Bob, Pat, Mike and Sally solved this equation: 328+257= ☐ Decide which students solved correctly. Explain your thinking.

Bob

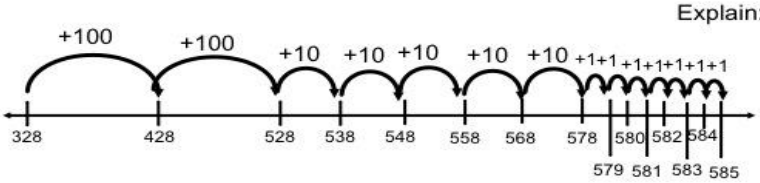


☐ = 575

Correct way to solve 328+257= ☐ ? Yes No

Explain:

Pat



☐ = 585

Correct way to solve 328+257= ☐ ? Yes No

Explain:

Mike 328 + 257 = ☐

300 + 20 + 8 200 + 50 + 7

300+200=500

20+50=70

8+7=15

500+70+15= 585

☐ = 585

Correct way to solve 328+257= ☐ ? Yes No

Explain:

Sally 328+257= ☐

328+200=628

628+50=678

678+7= 685

☐ = 685

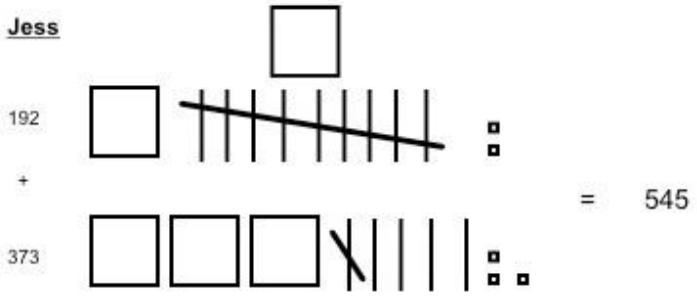
Correct way to solve 328+257= ☐ ? Yes No

Explain:

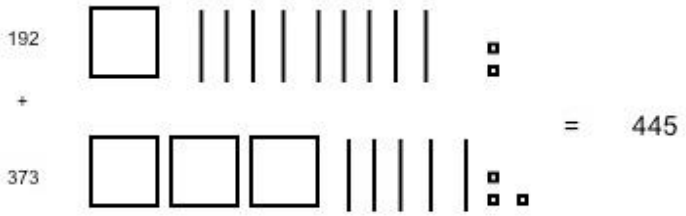
Jess and Jon solved this problem. They both used base ten blocks. Decide which student arrived at the correct sum. Help the student who did not. Mark on their work to make it correct.

192+373=?

Jess



Jon



Tell Jon what tricked him when he was solving the problem.

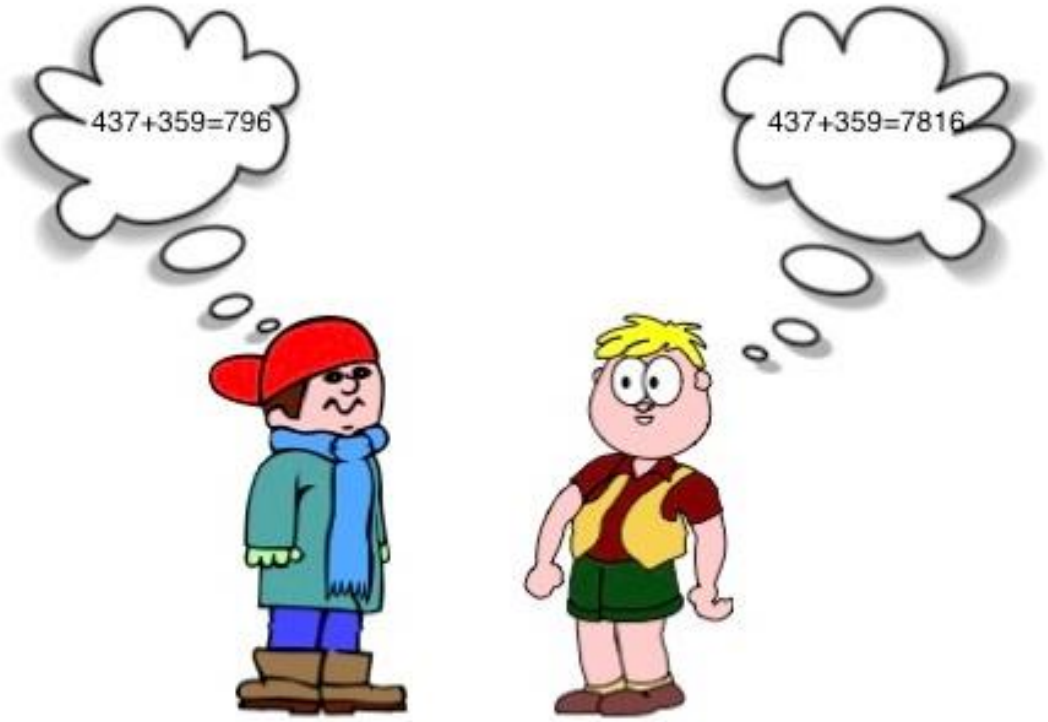
_____

_____

_____

_____

Bob and Mike are both solving this equation: 437+359=?. Bob says the sum is 796. He says his sum is correct because he showed his work using base ten blocks. He noticed right away that he had 16 ones and he could make a ten. He traded ten ones for one ten stick. Then, he had a total of 9 tens and 7 hundreds, so that made 796. Mike says no, I'm going to add the hundreds, then the tens, then the ones in my head. Mike got the sum of 7816. Bob says Mike got confused when he was working in the ones and tens place. How can Bob help Mike understand why 7816 does not make sense?

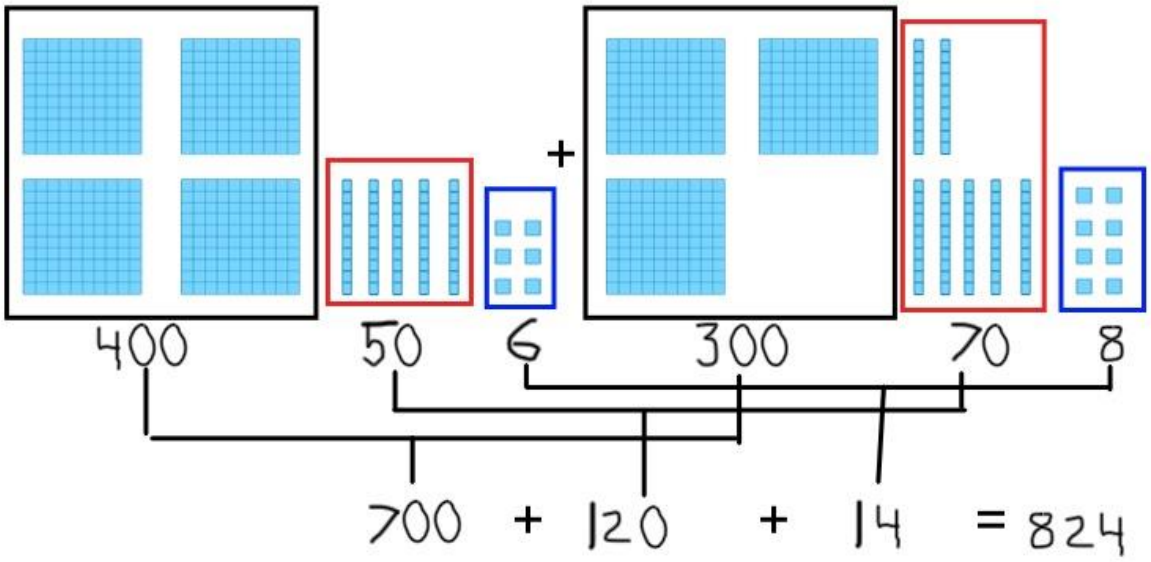


Open Number Line Master

I can use base ten blocks to solve three-digit addition problems correctly.	I can do this with help. 	I can do this by myself. 
I can show my thinking clearly using numbers, pictures, or words on paper.	I can do this with help. 	I can do this by myself. 

456+378=☐

Matt made a mistake solving this problem. He does not understand his mistake. Explain what Matt did wrong.

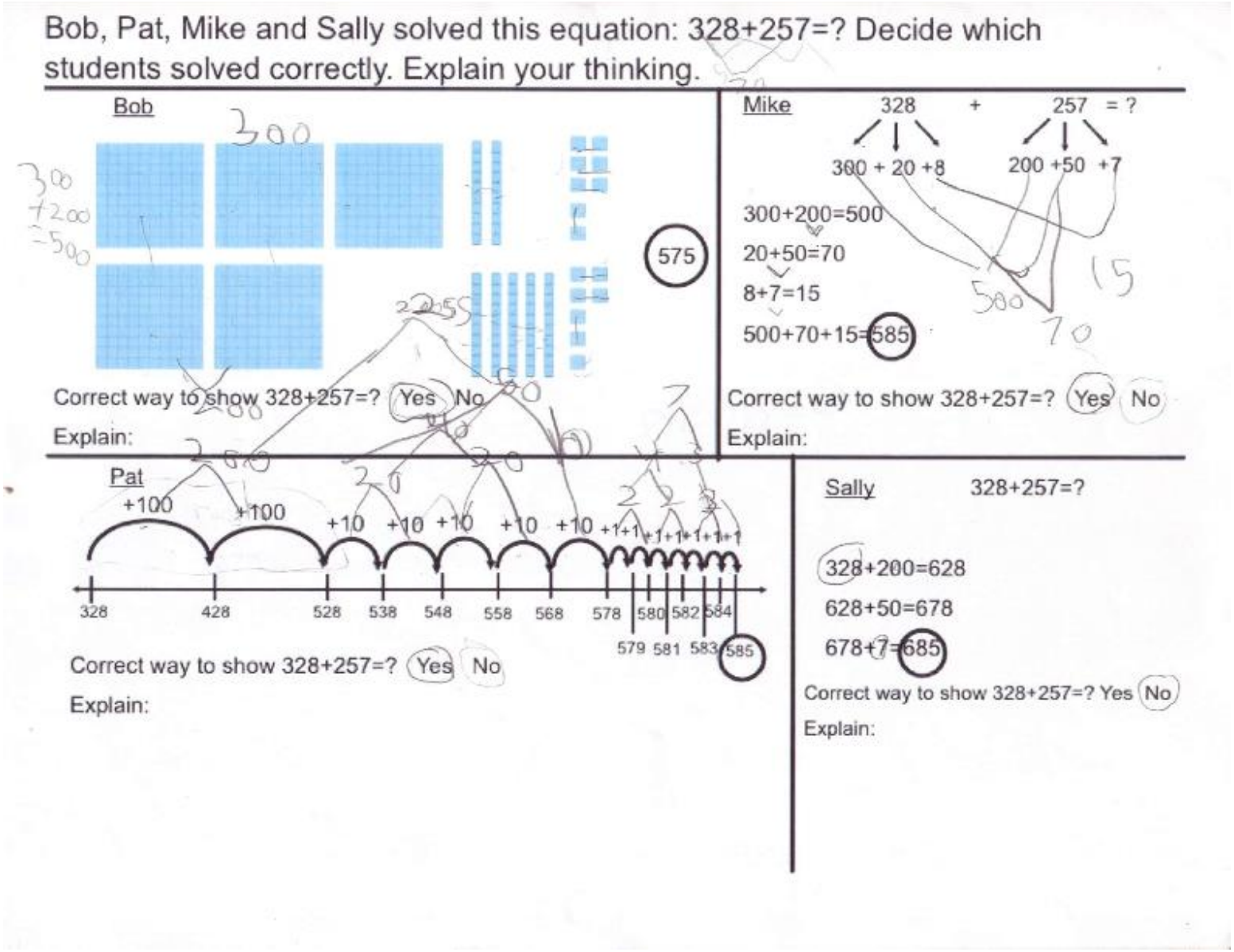


Use pictures, numbers, or words to explain.

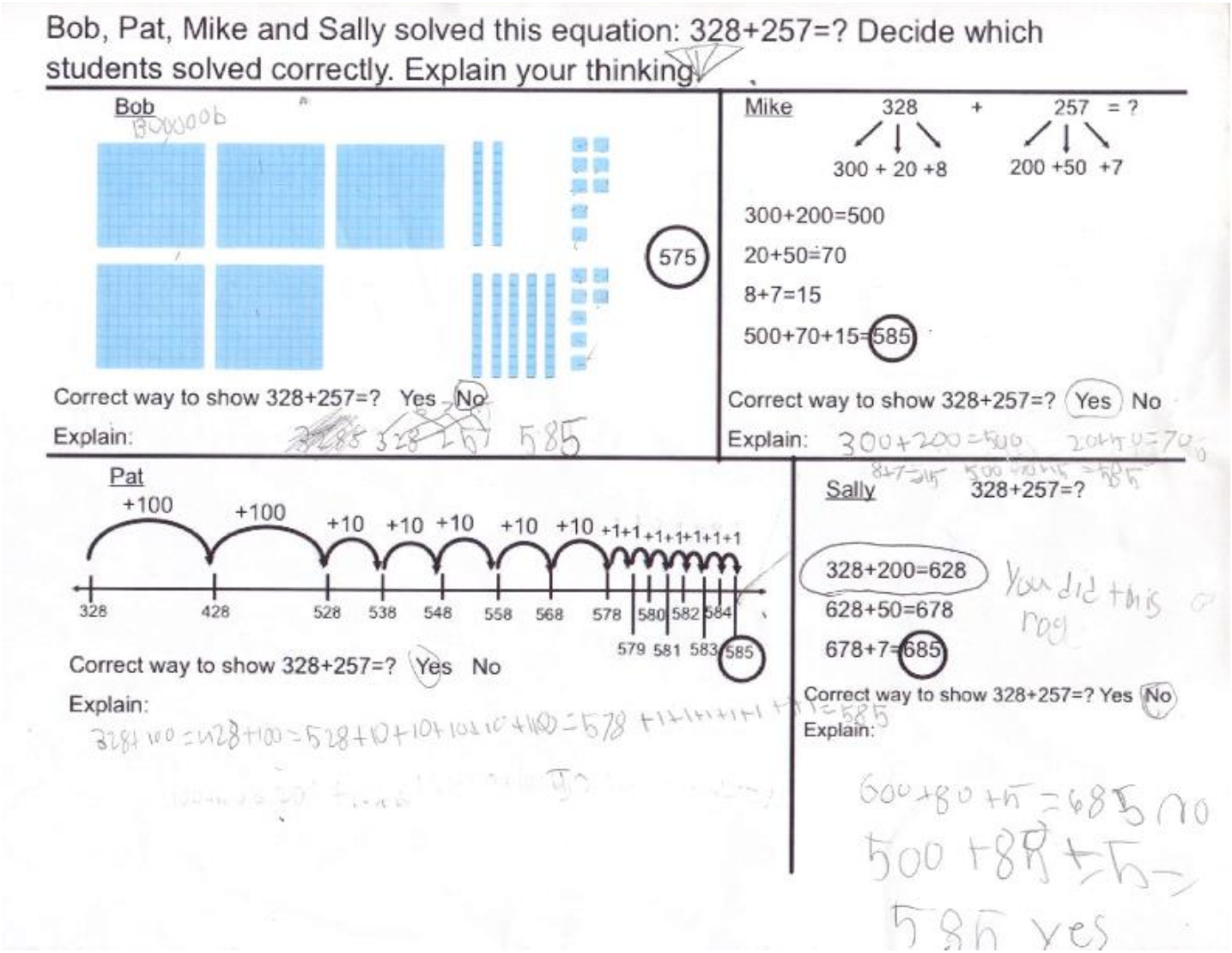
Explanation:

Think of a different strategy for Matt to try to solve this problem to help him avoid making this mistake again. Show your way here:

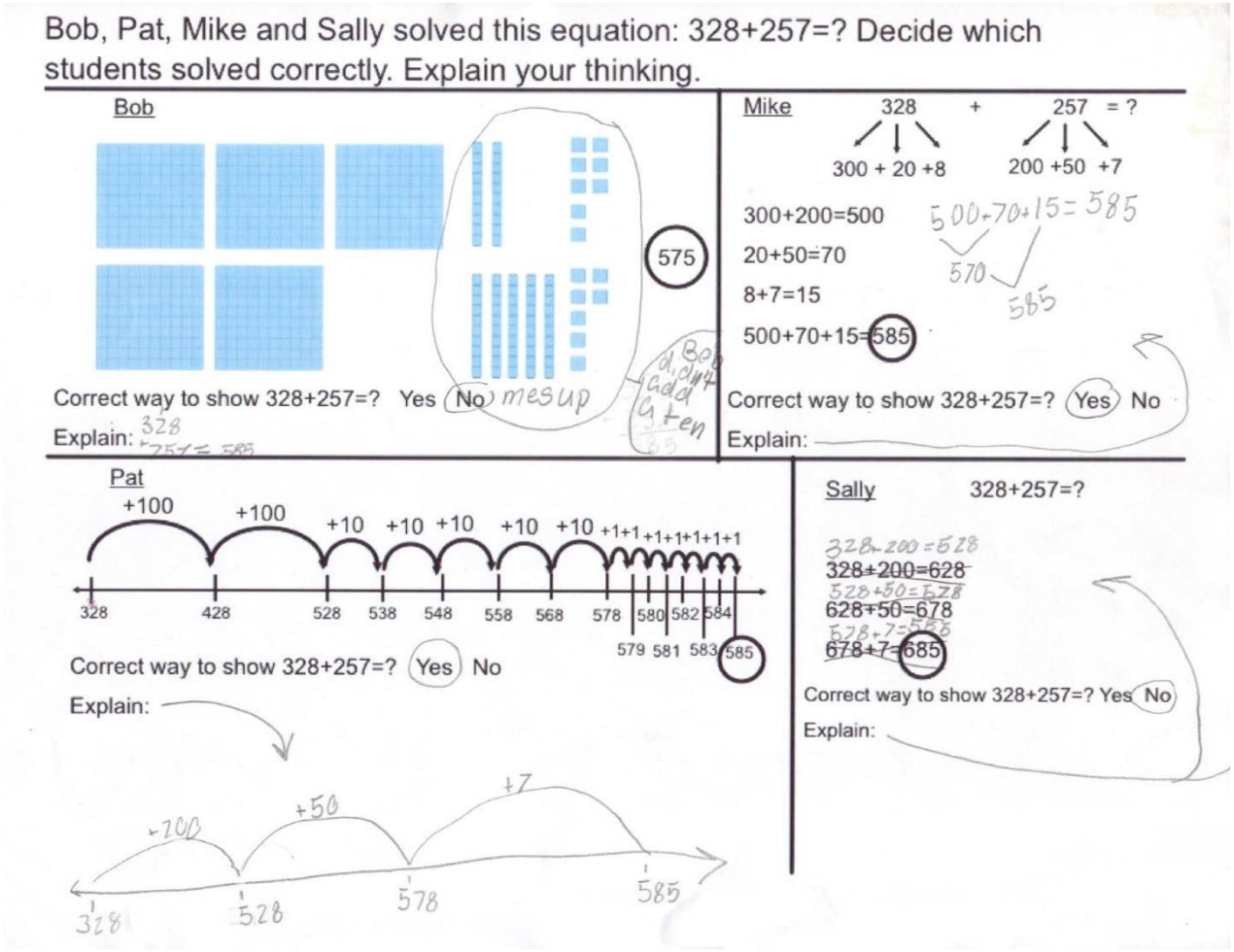
Getting Started:



Developing


Bob, Pat, Mike and Sally solved this equation: 328+257=? Decide which students solved correctly. Explain your thinking.
Bob
575
Correct way to show 328+257=? Yes No
Explain:
Mike
328 + 257 = ?
300 + 20 +8
200 +50 +7
300+200=500
20+50=70
8+7=15
500+70+15=585
Correct way to show 328+257=? Yes No
Explain:
Pat
+100 +100 +10 +10 +10 +10 +10 +1+1 +1+1+1+1+1
328 428 528 538 548 558 568 578 580 582 584
579 581 583 585
Correct way to show 328+257=? Yes No
Explain:
Sally
328+257=?
328+200=628
628+50=678
678+7=685
Correct way to show 328+257=? Yes No
Explain:
600+80+5=685 no
500+85+5=
585 yes

Got It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500+70+15=585
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570
585
Correct way to show 328+257=? Yes No
Explain:
Pat
+100 +100 +10 +10 +10 +10 +10 +1+1 +1+1+1+1+1
328 428 528 538 548 558 568 578 580 582 584
579 581 583 585
Correct way to show 328+257=? Yes No
Explain:
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Sally
328+257=?
328+200=528
328+200=628
528+50=578
628+50=678
578+7=585
678+7=685
Correct way to show 328+257=? Yes No
Explain:

Content Standard(s):	Standard(s) for Mathematical Practice:
What standard was this item designed to assess? (Input cluster heading, standard code, and text) Use place value understanding and properties of operations to add and subtract. 2.NBT.B.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	*What Standard(s) for Mathematical Practice are implicit in this item or content standard?* 4. Model with mathematics
Smarter Balanced Claim	*Smarter Balanced Item (Illustrative Math Item)*
What standard was this item designed to assess? (Input cluster heading, standard code, and text) Use place value understanding and properties of operations to add and subtract. 2.NBT.B.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or	*What Standard(s) for Mathematical Practice are implicit in this item or content standard?* 4. Model with mathematics

subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	
Smarter Balanced Claim	*Smarter Balanced Item (Illustrative Math Item)*
NONE	 224 +132 The students should look over the brainstormed list of solution ways and see if each solution would also apply to solving three digit addition problems. (They all should work for both two and three digit addition problems.) The class can then talk about how their skills for two digit problem solving transfer to three digit problem solving. Commentary The purpose of this task is not to teach or model the addition strategies. Rather the purpose of this task is make explicit different ways students can solve problems so that they will be able to find the most efficient strategy in any given situation and increase their addition fluency. The focus in developing fluency should be more than the internalization of facts. Students should be supported in the natural development of number sense so that students are able to solve computations flexibly and efficiently using their understanding of relationships between numbers. Children's natural development of numbers progress from the concrete to the abstract. This tasks supports that by giving students a space to explicitly talk about the different ways they can solve addition problems. Teachers can also repeat this lesson several times over the course of the year, and can use the same format to discuss a simple subtraction problem, or use an additional problem that requires regrouping. If the teacher would like to introduce this concept first with single digit addition see Many Ways to Do Addition 1. *From Illustrative Math 2.NBT Many Ways to Do Addition 2
CPR Pre-Requisites *(Conceptual Understanding, Procedural Skills, and Representations)* *Look at the Progressions documents, Learning Trajectories, LZ lesson library, unpacked standards documents from states, NCTM Essential Understandings Series, NCTM articles, and other professional resources. You'll find links to great resources on your PLC Platform.*	Conceptual Understanding and Knowledge • What are the conceptual understandings students must have in order to achieve mastery of the standard -Understand place value: -Understand digits represent the amounts of hundreds, tens, and ones -Understand a bundle of ten tens is called one hundred -Understand a bundle of ten ones is called one ten -Understand the relationship between addition and subtraction Procedural Skills • What are the pre-requisite procedural skills and strategic competencies students must have in order to achieve mastery of the standard -Fluently add and subtract two-digit numbers based on place value, properties of operations -Add up to four two-digit numbers using strategies based on place value and properties of operations

	Representational • What representations should students be able to understand and use in order to achieve mastery of the standard -Use concrete models and drawings to solve problems Social knowledge • What terms, definitions, and conventions must students have knowledge of in order to achieve mastery of the standard -Hundreds place, tens place, ones place -Place refers to the location of the digit in a number -Value refers to how much a digit represents -Number line -Decomposing numbers (splitting strategy)

Standards Progression		
Grade(s) below	Target grade	Grade(s) above
1.NBT.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: 1.NBT.B.2.A 10 can be thought of as a bundle of ten ones — called a "ten." 1.NBT.B.2.B The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. 1.NBT.B.2.C The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones). Use place value understanding and properties of operations to add and subtract. 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or	2.NBT.A.! Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: CCSS.MATH.CONTENT.2.NBT.A.1.A 100 can be thought of as a bundle of ten tens — called a "hundred." 2.NBT.A.1.B The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). 2.NBT.B.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. 2.NBT.B.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.	3.NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. 1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.		

Common Misconceptions/Roadblocks
What characteristics of this problem may confuse students? • *The fact that the problem requires students to generalize the understanding of place value to a new "place" may confuse them.* What are the common misconceptions and undeveloped understandings students often have about the content addressed by this item and the standard it addresses? • *Student lacks the concept that regrouping in one place value position directly impacts the next position (e.g. 16+7: the student may know that 6+7 is 13 but may not know how to show this accurately in accommodating for the regrouping).* • *The student may be unable to generalize methods that he/she already knows for adding and subtracting within two-digits to a situation requiring them to add/subtract within three-digits* • *Student lacks concept that sometimes it is necessary to compose tens or hundreds (e.g. 514+491, students would need to regroup in the hundreds place).* What overgeneralizations may students make from previous learning leading them to make false connections or conclusions? • *Recounting: The student tries to overgeneralize immature addition or subtraction methods, instead of developing more effective methods (counting by ones instead of tens).* • *The student may be unable to generalize methods that he already knows for adding and subtracting to a new situation. Student may be perfectly comfortable with addition facts, such as 6 + 7, but he/she does not know how to extend this fact knowledge to a problem, such as 16 + 7.*