Mathematics Instructional Cycle Guide

Represent and solve problems involving addition and subtraction.
Two-Step Word Problems 2.OA.1
Use place value understanding to add and subtract 2.NBT.5
Explain addition and subtraction strategies 2.NBT.9

Created by Jane Giresi, 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*:

Two-Step Word Problems
2.0A.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
2.NBT.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.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.
This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

MP.1 Make sense of problems and persevere in solving them.

- The student makes sense of both parts of the problem by computing the first answer using that answer to perform the second computation that leads to the solution of the problem. The student is able to monitor his or her progress and can change the approach if necessary.
- MP.2 Reason abstractly and quantitatively.
- The student can distinguish the relationship of the quantities and analyze what is given in order to explain to them self the meaning of the problem. The student creates a solution plan and monitors his or her progress and can change his or her approach if necessary.
- MP.3 Construct viable arguments and critique the reasoning of others.
- The student is able to analyze the problem, understand the meaning of the quantities, and compare arguments to determine correct or flawed logic.
- MP.4 Model with mathematics
- The student is able to simplify a complex problem and is able to mathematically represent the situation with an equation.

WHAT IS INCLUDED IN THIS DOCUMENT?

- A Mathematical Checkpoint to elicit evidence of student understanding and identify student understandings and misunderstandings **(Page 3)**
- A student response guide with examples of student work to support the analysis and interpretation of student work on the Mathematical Checkpoint **(Pages 4-8)**
- A follow-up lesson plan designed to use the evidence from the student work and address the student understandings and misunderstandings revealed **(Pages 9 -14)**
- Supporting lesson materials **(Pages 15-19)**
- Precursory research and review of standard **2.OA.1** and assessment items that illustrate the standard **(Page 20-22)**

HOW TO USE THIS DOCUMENT

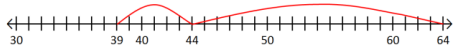
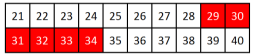
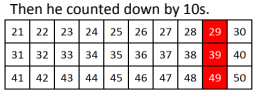
1) Before the lesson, administer the **Balloons *Mathematical Checkpoint*** individually to students to elicit evidence of student understanding.
2) Analyze and interpret the student work using the ***Student Response Guide***
3) Use the next steps or ***follow-up lesson plan*** to support planning and 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

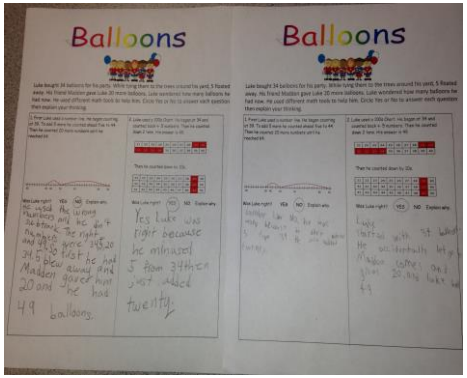
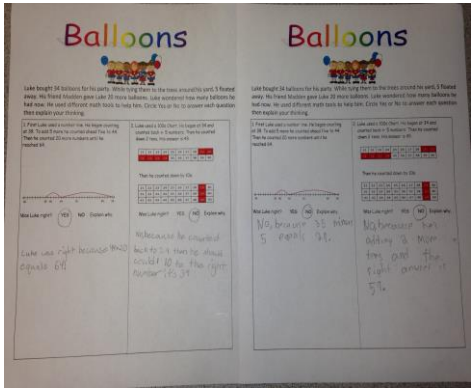
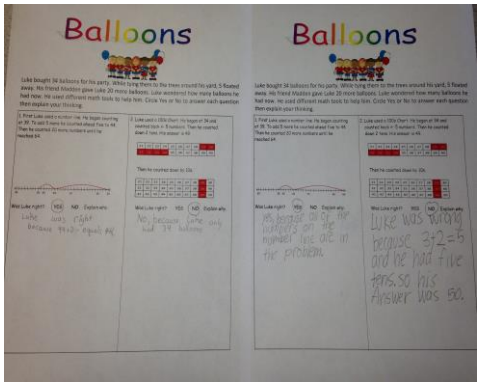
MATERIALS REQUIRED

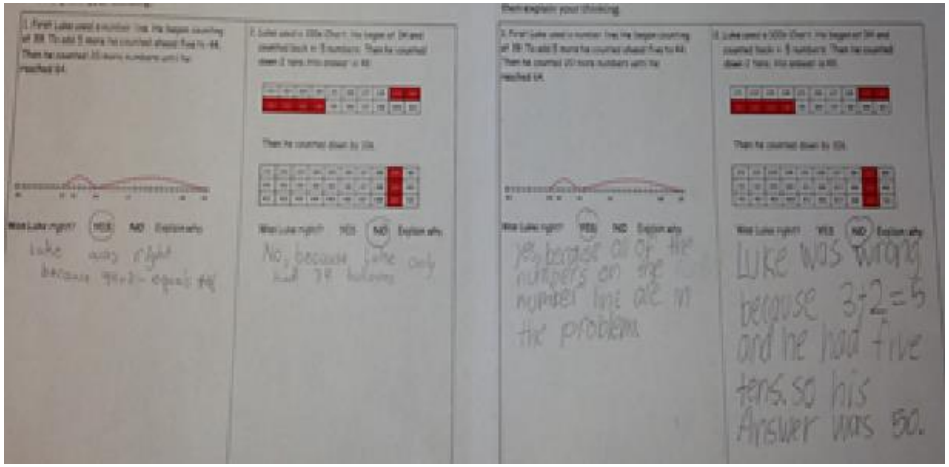
- **Paper and pencil or Math Journal**
- **Classroom Hundred Number Chart and individual Hundred Number Charts for student use page 19**
- **Transparent Counter for each student**
- **10s and 1s page 20**
- **I Can Check My Progress page 21**
- **Exit Ticket page 22**

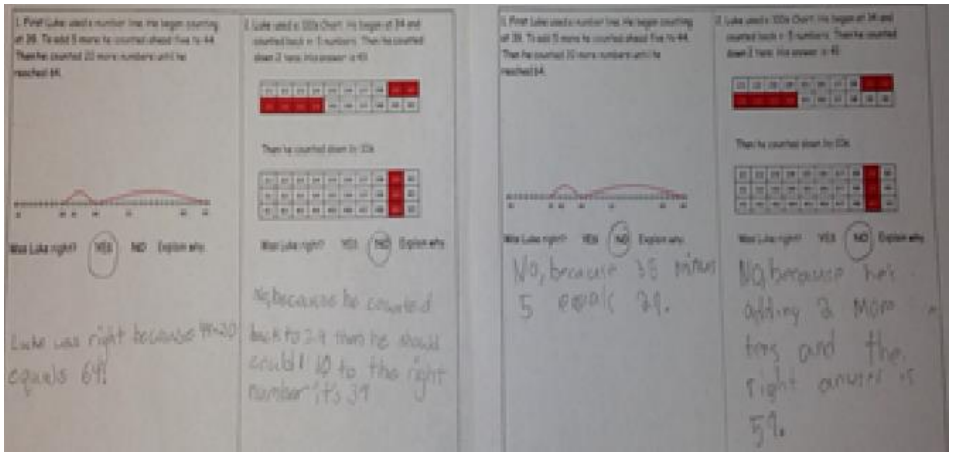
TIME NEEDED

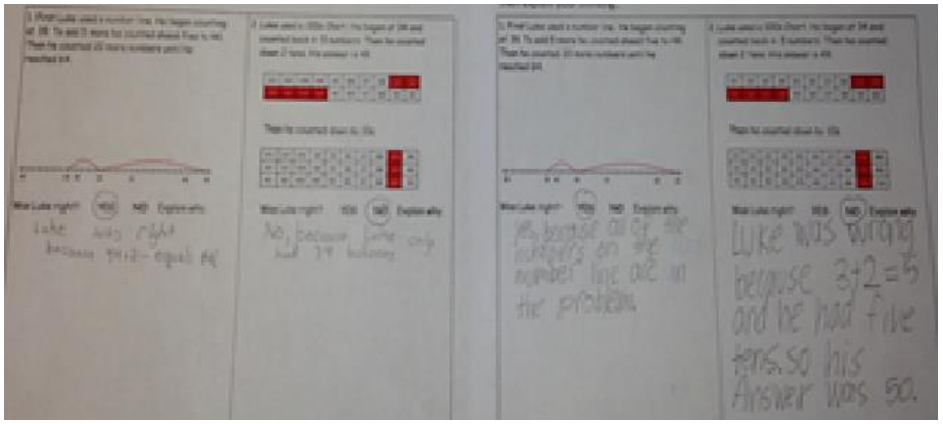
Balloons administration: **20 minutes**
Follow-Up Lesson Plan: **One or two instruction periods depending upon students' previous knowledge and understandings.** ***Timings are only approximate. Exact timings will depend on the length of the instructional block and needs of the students in the class.***

Step 1: Elicit evidence of student understanding		
Mathematical Checkpoint		
Question(s)	**Purpose**	
Luke was having a party. He bought 34 balloons. While tying them to the trees around his yard, 5 floated away. His friend Madden lives next door. She saw what happened so she brought 20 more balloons over to his house. Luke wondered how many balloons he had now. He wanted to be sure he had enough so he used different math tools to help him. Circle Yes or No to answer each question then explain your thinking. 1. First Luke used a number line. He began counting at 39. To add 5 more he counted ahead to 44. Then he counted 20 more until he reached 64.  Was Luke right? **YES** **NO** Explain why? 2. Luke used a Hundred Number Chart. He began at 34 and counted back ← 5 numbers. Then he counted down 2 tens. His answer is 49.  Then he counted down by 10s.  Was Luke right? **YES** **NO** Explain why.	**CT Core Standard:**	2.0A.1 Grade 2 students use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, by using drawings and equations with a symbol for the unknown number to represent the problem. Use place value understanding and properties of operations to add and subtract.
	Target question addressed by this checkpoint:	• Does student understand the question and solve both parts of the problem? • Does student deconstruct the problem to decide which part of the problem needs to be solved first? • Is the student able to justify his or her answer with evidence?

Step 2: Analyze and Interpret Student Work		
Student Response Guide		
Got It	**Developing**	**Getting Started**
Luke was having a party. He bought 34 balloons. While tying them to the trees around his yard, 5 floated away. His friend Madden lives next door. She saw what happened so she brought 20 more balloons over to his house. Luke wondered how many balloons he had now. He wanted to be sure he had enough so he used different math tools to help him. Circle Yes or No to answer each question then explain your thinking.  Number Line: Student 1. He used the wrong numbers and he didn't subtract. The right numbers were 34, 5, 20 and 49. So first he had 34. 5 blew away and Madden gave him 20 and he had 49 balloons after Madden gave him 20 more balloons. Student 2. No, Luke was wrong because he didn't minus 5 from 34. He just added twenty. Hundred Number Chart: Student 1. Yes, Luke was right because he minus(ed) 5 from 34 then just added twenty. Student 2. Yes, he started with 34 balloons. He accidentally let go (of) 5, Madden comes and gives him 20, and Luke had 49. Student 2: Yes, because (he) had his finger on 34 and counted back 5 and then he counted down 2 (10s) and landed on the correct answer.	Luke was having a party. He bought 34 balloons. While tying them to the trees around his yard, 5 floated away. His friend Madden lives next door. She saw what happened so she brought 20 more balloons over to his house. Luke wondered how many balloons he had now. He wanted to be sure he had enough so he used different math tools to help him. Circle Yes or No to answer each question then explain your thinking.  Number Line: Student 1. Luke was right because 44 + 20 equals 64! Student 2: No, because 35 minus 5 equals 29. Hundred Number Chart: Student 1. No, because he counted back to 29 then he counted 10 to the right number 39. Student 2. No, because he's adding 2 more tens and the right answer is 59.	Luke was having a party. He bought 34 balloons. While tying them to the trees around his yard, 5 floated away. His friend Madden lives next door. She saw what happened so she brought 20 more balloons over to his house. Luke wondered how many balloons he had now. He wanted to be sure he had enough so he used different math tools to help him. Circle Yes or No to answer each question then explain your thinking.  Number Line: Student 1: Yes, Luke was right because 44 + 2 equals 46! Student 2: Yes, because all of the numbers on the number line are in the problem. Hundred Number Chart: Student 1: No, because Luke only had 34 balloons. Student 2: No, Luke was wrong because 3 + 2 = 5 and he had five tens. So his answer was 50.

Getting Started	
Student Response Example	**Indicators**
	• Student did not attend to the meaning of the quantities in the word problem. The student is unable to distinguish between the two parts of the problem and interprets the problem as a one-step problem. • Student does not yet understand how to decompose the problem into understandable parts. Student has difficulty chunking the problem into manageable segments. • Student may not yet understand how to use a number lines or a Hundred Number Chart to help solve one- and two-step problems.
In the Moment Questions/Prompts	**Closing the Loop (Interventions/Extensions)**
Q: How many balloons did Luke have at the beginning? Can you show me that number on the number line? On a hundreds Chart? Q: How many balloons floated away? Q: How can we show the balloons that floated away on a number line? On a hundred chart? Q: Should we count back or on to show the balloons that floated away? Q: How do we show the balloons that Madden gave him? Do we count on or back to show these balloons? Do you know any strategies to count these quickly?	• Guide the student in using a number line, Hundred Number Chart, or pictorial representations to model two-step problems using smaller numbers. • Expose the student to a variety of strategies used by his or her peers. This can be done by asking “Got It” students to share their strategies with the class. https://learnzillion.com/student/lessons/2644 https://learnzillion.com/student/lessons/1464

Developing	
Student Response Example	**Indicators**
	• The student distinguishes between the two parts of the problem and determines an appropriate strategy to solve one part but is unable to successfully implement a strategy to solve the second part. • The student solves the problem but cannot explain and justify his or her answer. • The student does not check his or her answer to make sure it makes sense.
In the Moment Questions/Prompts	**Closing the Loop (Interventions/Extensions)**
Q: How many balloons floated away? How could we represent that on a number line? On a Hundred Number Chart? Do we count on or count back to show what happened to the balloons? Q: How many balloons does Luke have now? Q: Can you reread the whole problem? What else happens to the balloons? Q: How many balloons did Madden give Luke? How would we show that on a number line? On a Hundred Number Chart? Do we count on or count back to show what happened to the balloons? Do you know any strategies to count these quickly?	• Help the student re-read the problem and chunk it into manageable parts in order to understand the meaning of the problem. • Guide the student in using a Hundred Number Chart or number line to model both steps of the problem. • Then ask the student to solve a similar problem providing feedback as necessary. https://learnzillion.com/student/lessons/1464

<table>
<tr><th colspan="2">Got it</th></tr>
<tr><th>Student Response Example</th><th>Indicators</th></tr>
<tr><td> 
</td><td>• Student was able to analyze what is given in order to explain and make meaning of the problem.
• Student interpreted and made sense of the problem by deconstructing it and solving the problem step by step.
• The student solves both steps of the problem correctly. The student is able to clearly explain his or her strategy.</td></tr>
<tr><th>In the Moment Questions/Prompts</th><th>Closing the Loop (Interventions/Extensions)</th></tr>
<tr><td>Q: Can you show this problem in any other ways?

Q: What number model could you write to represent the numbers in this problem? Can you write two equations to represent what happened to the balloons at both parts of the problem?</td><td>• Provide opportunities for the student to solve a variety of two-step problems and to explain his or her strategies and solutions.
• Ask the student to explain how the strategies used by one or more other students differ from the way he or she solved the problem, including opportunities for miscue analysis of incorrect responses.
• Have the student determine if the strategies of others are more, less, or equally easy to implement than the strategies he or she used.
• Provide opportunities for the student to solve two-step word problems with larger numbers, particularly ones that will require regrouping.

https://learnzillion.com/student/lessons/3733</td></tr>
</table>

Steps 3 and 4: Act on Evidence from Student Work and Adjust Instruction	
Lesson Objective:	Use number lines and Hundred Number Charts to solve one- and two-step word problems which involve addition and subtraction within 100.
Content Standard(s):	2.OA.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. 2.NBT.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.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.
Targeted Practice Standard:	1. Make sense of problems and persevere in solving them. • Does the child make sense of the two parts of the problem and continue until both parts of the problem are solved? 2. Reason abstractly and quantitatively. • Does the student distinguish the relationship between the quantities and analyze what is given in order to explain the meaning of the problem? 3. Construct viable arguments and critique the reasoning of others. • Is the student able to explain his or her reasoning and compare arguments to determine correct or flawed logic? 4. Model with mathematics. • Is the student able to simplify a complex problem and is he or she able to mathematically represent the situation?

Mathematical Goals	Success Criteria
• Students will solve two-step problems involving addition, subtraction or both addition and subtraction by using a Hundred Number Chart and equations.	• Students will be able to use addition and/or subtraction in a two-step word problem by using a Hundred Number Chart and equations. • Students will solve addition and/or subtraction word problems involving two-steps by computing the first answer and using that answer to perform a second computation that leads to the solution of the problem. • Students will provide evidence for their solutions and critique the reasoning of others.

Launch (Probe and Build Background Knowledge)

Purpose: Engage students in utilizing a Hundred Number Chart to probe and build background knowledge of place value and place value representations.

Display a Hundred Number Chart for the class. Give each student a transparent counter and Hundred Number Chart. Select a starting number. Have students place the counter on the correct number on a Hundred Number Chart as the starting number. Give students directions one at a time using the terms "10 more," "10 less," "1 more," "1 less," "add 10," "subtract 10," "add 1," and "subtract 1." After each clue, give students the opportunity to move their counter to the right, left, up, or down on their chart to the new number. Do the first 3 or 4 together as a class, modeling the correct way to show addition or subtraction on a Hundred Number Chart. Allow students to do the other additions and subtractions independently. When the last direction has been given, ask students what number is under their counter.

Example:

1. Place your counter on 16.

Questions and prompts to guide the discussion could include:

- Where does this number "live" on the Hundred Number Chart?
- What number lives next door?
- What numbers live to the right and left of this number?
- What is 1 more? 1 less? 10 more? 10 less?

2. Add 10. (Students should move their counter to 26.)
3. Subtract 1. (Students should move their counter to 25.)
4. Move ahead 10 more. (Students should move their counter down to 35.)
5. What number is the counter covering? The answer is 35.

Additional examples can be completed as a class:

52 + 1 - 2 37 + 10 - 3 66 - 10 + 2 75 – 10 + 3

Teacher can check for understanding by asking the following:

- Where did you place your counter to begin the problem?
- Where did you place the counter next?
- What strategies (addition or subtraction – moving the counter up/down and right/left) did you use to solve the equation?
- How does this method show counting on or counting back?
- What equations can we write to show what we did?

Instructional Task

Purpose: In this task, students will use Hundred Number Charts to represent addition and subtraction in word problems and use this work to write equations.

We just used Hundred Number Charts to represent addition and subtraction problems. We can use a Hundred Number Chart to represent addition and subtraction in word problems and to help us write equations to show the math.

Engage (Setting Up the Task)

Students will continue to use the Hundred Number Chart and will play "Hundred Number Chart Magic" to solve two-step problems and then write equations to represent these problems. Display this problem:

6 children are jumping rope. 5 children join them. 2 children left. How many children are jumping rope now?

Here are a few questions which could be used in discussion:

- Where should we put the counter to begin the problem?
- What happens next? How can we show that 5 children joined the group?
- Which number are we at now?
- What happens next?
- How do we show the 2 children who left on the Hundred Number Chart?
- What equation can we write to show how we solved this problem? (6 + 5 – 2 = 9)

Model several problems like this as a class.
Explore (Solving the Task)

After modeling a couple of problems together as a class, students continue to represent word problems on a Hundred Number Chart and then write an equation to represent the problems. They may work with a partner.

- 5 children are at the playground. 7 more children arrive. 3 leave. How many children are at the playground now?
- 7 frogs are in the pond. 3 jump in. 4 more jump in. How many frogs are in the pond now?
- I have 6 chocolate chip cookies and 4 Oreo cookies. 1 cookie broke. How many unbroken cookies are there now?
- There are 15 children riding the bus. At the first stop, 10 more children get on the bus. At the next stop, 4 children get off the bus. How many children are on the bus now?

Students check their equations with a partner with the following in mind:

- What equations did each student write? How was your partner's work similar/different than your work?
- Were the equations different? If so, why is that?
- What strategies (moving the counter up/down and right/left) did each partner use to express this amount?

As the students are working, the teacher circulates to assess students' addition and subtraction strategies when moving their counters. As students work with partners to solve and check their answers, students will explain their strategies. These will provide important information concerning number sense and place value understanding. Their explanations of their work and strategies will provide useful information about how to continue the lesson and how to differentiate instruction.

Some students might need additional experiences solving two-step problems with simpler numbers. For those experiencing difficulty, work with small groups of children. The problems listed below are some examples. As you are working with these students observe their strategies as students share their work.

Alternate Problem #1: We are studying butterflies. On Tuesday 9 hatched from their chrysalises. 4 more emerged on Wednesday. On Thursday we let 2 go into the Outdoor Learning Center. How many butterflies do we have now?

Alternate Problem #2: Adam collected 14 seashells at Sherwood Island's beach. Romeo collected 12 seashells. A wave washed 11 away. How many are on the beach now?

Clarifying questions/prompts:
What is this problem asking you?

- What is the first part of the problem? The second part?
- Why is it important to solve the first part of the problem first?

Advancing questions/prompts:

- What strategy did you use to solve the first part of the question?
- Did you check to make sure your answer made sense?
- How did you solve the second part of your answer?
- What equation did you write to represent the numbers in the problem?
- Is your final answer reasonable for the question?
- Could you solve this in another way?
- Could you show your thinking in two different ways?

Elaborate (Discuss Task and Related Mathematical Concepts)

Select students to share their work. Facilitate whole class discussion to elicit evidence of student understanding and support students in making mathematical connections about how we represent two step problems with a Hundred Number Charts and equations:

- How did you solve both parts of the story?
- Can you show us how you used the Hundred Number Chart to solve that part of the story?
- What equation did you write?

Checking for Understanding

Purpose: *Students will practice writing two-step problems which represent an equation in order to demonstrate their understanding of the relationship between equations and real life problems.*

Working in partnerships or small groups, students choose one of the number equations below. Their job is to write a two-step problem representing an equation. Students who finish quickly may write additional stories for other equations.

A. 17 + 34 - 2 = _____	B. 26 - 14 + 3= _____	C. 32 + 14 – 7 = _____
D. 13 + 14 + 6 = _____	E. 55 - 17 + 4 = _____	F. 7 - 5 + 3 = _____

Encourage conversations about the differences in addition/subtraction strategies presented. It is important to discuss how adding and subtracting 10s is more efficient. Helping students to see that adding 12 is faster by adding 10 and then 2 more ones. Working with groups of 10 in this task gives students more practice with understanding benchmarks of 10.

Common Misunderstanding

Purpose: In order to clarify common misunderstandings, students will look at samples of student work and analyze for conceptual understandings/misunderstandings.

Students are taken back to comment on the original checkpoint (page 2). Student samples will be discussed whole class. Points of discussion:

- Did the student take the problem apart to decide which part of the problem needed to be solved first?
- Did the student use that solution to solve the second part?
- Did the student use the right procedures when solving each part?
- Did the student check the solutions to both parts to make sure it made sense in terms of the problem?

Students need to check their work to see if their answer makes sense in terms of the problem situation. They need many opportunities to solve a variety of two-step problems and to develop the habit of reviewing their solution when they have finished.

As you are checking in with partnerships or groups, ask the following questions:

- What happens to a number when we add ten to it? When we subtract ten from it?
- Are you counting by ones when you add on a ten? Why? Why not?

- What does it mean to “skip count” by ten? Why would we want to do this?
- How do you think adding or subtracting by twenty would relate to adding and subtracting by ten?

Checking for Understanding

Purpose: The teacher elicits student understanding through observation, questioning, and dialogue.

Have each student write a problem which represents this equation. 13 + 25 – 21.
Then ask students to show how they would solve it on a Hundred Number Chart.

As you monitor student progress, students should be able to demonstrate the following competencies:

- Write problems involving addition, subtraction, or both addition and subtraction.
    - How does your story begin?
    - What happened next?
    - Does your problem have two steps?
    - What is your question?
- Understand and apply operations and the relationship between addition and subtraction.
    - Will we need to use both addition and subtraction?
- Recognize how the digits 0-9 are used in our place value system to create numbers and manipulate amounts.
    - How will we move our counters to solve your problem?
- Understand how addition and subtraction affect quantities and are related to each other.
    - Is the solution to the problem larger or smaller than the original number in your story? How do you know?
- Know the multiple meanings for addition (combine and count on) and subtraction (take away and count back).
    - Do we need to combine numbers or take away?
    - Do we need to count on or count back to solve this problem?

Closure

Purpose: To help students express their learning and form coherent understandings of the major points of the lesson, students will complete an exit slip.

Students will read the story, use a Hundred Number Chart, explain their thinking and write an equation. See the exit ticket provided with supporting lesson materials.

Extension Task

Purpose: To provide students with opportunities to extend the concepts they have learned in this lesson, students will apply these principles to two-step problems involving missing subtrahends.

Depending on students’ levels of understanding student who can solve two-step problem with ease can apply these principles to problems involving missing subtrahends.

Tell these students the game directions for “Hundred Number Chart Magic” have changed. Explain that you need their help to create directions to get to the number 45 from the number 14. Use the large class Hundred Number Chart to model the directions offered by students.

1. Ask students to suggest directions. Possible scenario may include “Add 10 to 14.” Now where are we? (24)
2. “Add another group of ten.” Where are we now? (34)
3. “Add 10 once more.” (44)
4. “We are almost there, what should I add now?” (1 more)
5. “Where did we end?” (45)

1. Missing subtrahend:
At lunch there are 25 students at the playground.
18 more students come to the playground.

After a few minutes some students leave.
If there are 14 students still at the playground, how many students left?
Write an equation for this problem.
Step 1: Let's use our "Hundred Number Chart Magic" board. Let's begin by putting our counters at 25. Now where should we go to show the 18 students who came to the playground? First, let's break 18 into its 10s and 1s. Then what should we do? Let's move down one row which is 10 more, then move to the right 8 numbers. What number did we land on? (43) This represents the 18 students who came out to the playground. The total number of children at the playground is 43. 25 + 18 = 43.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Step 2: Now starting at 43, I know I have to get to the number 14 which represents the number of students who are at the playground. So I moved up 2 rows to 23 which is 20 less. Then I move to the left until I land on 14. That's 9 spaces. We moved back a total of 29 spots. That means 14 students are at the playground.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Step 3: Equations to represent this situation:

25 + 18 - 29 = 14

Balloons

Luke bought 34 balloons for his party. While tying them to the trees around his yard, 5 floated away. His friend Madden gave Luke 20 more balloons. Luke wondered how many balloons he had now. He used different math tools to help him. Circle Yes or No to answer each question then explain your thinking.

1. First Luke used a number line. He began counting at 39. To add 5 more he counted ahead five to 44. Then he counted 20 more numbers until he reached 64.

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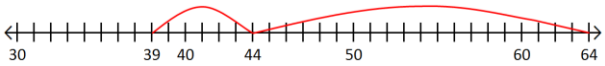


Was Luke right? **YES** **NO** Explain why.

2. Luke used a Hundred Number Chart. He began at 34 and counted back ← 5 numbers. Then he counted down 2 tens. His answer is 49.

21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

Then he counted down by 10s.

21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Was Luke right? **YES** **NO** Explain why.

.

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Hundred Chart Magic

Use your Hundred Chart to solve these problems and then write an equation to represent the problem.

Situation #1:
5 children are at the playground. 7 more children arrive. 3 leave. How many children are at the playground now?

Situation #2:
7 frogs are in the pond. 3 jump in. 4 more jump in. How many frogs are in the pond now?

Situation #3:
I have 6 chocolate chip cookies and 4 Oreo cookies. 1 cookie broke. How many unbroken cookies are there now?

Situation #4:

There are 15 children riding the bus. At the first stop, 10 more children get on the bus. At the next stop, 4 children get off the bus. How many children are on the bus now?

When you are done, discuss your work with your partner. For each situation, here are some questions to help you get started:

- What strategies (moving the counter up/down and right/left) did you use to express this amount?
- What equation did you write
- Were the equations different or the same? Why is that?
- How is my neighbor's work similar to my work? How was it different?

Name _____

Write your own story

A. 17 + 34 - 2 = _____	B. 26 - 14 + 3= _____	C. 32 + 14 – 7 = _____
D. 13 + 14 + 6 = _____	E. 55 - 17 + 4 = _____	F. 7 - 5 + 3 = _____

Name _____

Write your own story

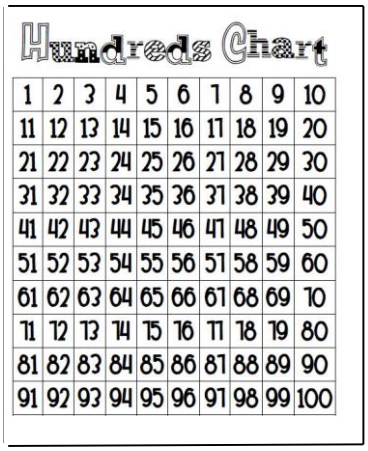
A. 17 + 34 - 2 = _____	B. 26 - 14 + 3= _____	C. 32 + 14 – 7 = _____
D. 13 + 14 + 6 = _____	E. 55 - 17 + 4 = _____	F. 7 - 5 + 3 = _____

Name _____

Exit Ticket

Mrs. Miller's class is in the tech lab. There are 28 children in her class. 25 students in Ms. Smith's room joined them. Five children leave to get a drink of water. How many students are in the tech lab now?

1. Use the Hundred Number Chart to solve this problem.



2. Explain your thinking.

First I _____

_____

_____

Next I _____

_____

_____

My equation is _____

Research and review of standard	
Content Standard(s):	**Standard(s) for Mathematical Practice:**
What standard was this item designed to assess? 2.0A.A.1 Grade 2 students use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, by using drawings and equations with a symbol for the unknown number to represent the problem. Use place value understanding and properties of operations to add and subtract.	*What Standard(s) for Mathematical Practice are implicit in this item or content standard?* 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others.
Smarter Balanced Claim	***Smarter Balanced Item***
CPR Pre-Requisites	**Conceptual Understanding and Knowledge** What are the conceptual understandings students must have in order to achieve mastery of the standard • Students need to be able to count on and back. • Students need to understand part, part, whole relationships and how they connect to addition and subtraction. • Students need to be able to interpret a problem in order to understand the important information they need to solve a problem. • Students need to understand some problems will require one step while others require two steps. • Students need to plan a solution pathway. • Students need to understand that subtraction can be used to compare totals and addition can be used to put objects together. • Students need to be able to explain for their solution. • Students need to justify their answers and critique those of others. **Procedural Skills** What are the pre-requisite procedural skills and strategic competencies students must have in order to achieve mastery of the standard • Students need to check their answers and ask, “Does this make sense?” • Students need to know how to add and subtract. • Students need to know how to use a Hundred Number Chart.

	Representational What representations should students be able to understand and use in order to achieve mastery of the standard • Students need to know how to write an equation to show the path to solutions of a two-step word problem. • Students need to know how to use visual diagrams to represent mathematical relationships in such a way as to accurately solve problems, and to explain their thinking. • Students need to be able to explain and to justify their solutions. **Social knowledge** What terms, definitions, and conventions must students have knowledge of in order to achieve mastery of the standard • Students need to know the meaning of "sum" and "difference" and understand the meaning of addition and minus signs. • Students need to know how to use a Hundred Number Chart to represent problems involved in two-step word problems.

Standards Progression		
Grade(s) below	**Target grade**	**Grade(s) above**
1.0A.1 First grade students use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. 1.0A.5 Model real-life situations that represent the result of counting, combining and separation of sets of objects (addition and subtraction of whole numbers) with objects, pictures, symbols and open sentences. 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.NBT2a 10 can be thought of as a bundle of ten ones called a "ten". 1.NBT2b The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.	2.0A.1 Grade 2 students use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, by using drawings and equations with a symbol for the unknown number to represent the problem. Use place value understanding and properties of operations to add and subtract. 2.NBT.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.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.	3.0A.8 Students will solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

1NBT2c 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). 1.NBT.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 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.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).		

Common Misconceptions/Roadblocks
What characteristics of this problem may confuse students? • Students might only solve part of the problem. • Students might only look at the numbers in the problem instead of taking the problem apart to decide which must be solved first and then second. • Students might not check their solution to be sure it makes sense in terms of the problem's situation. **What are the common misconceptions and undeveloped understandings students often have about the content addressed by this item and the standard it addresses?** • Students refer to a digit by its face value rather than its place value. • Students believe a quantity can be expressed only one way. • Students might see the digits in a multi-digit number as independent of each other. • Students might not fully understand the concept that each place (10's and 1's) has specific value. • Students might misunderstand the question and focus on solving only the first part of the problem. • Students might put numbers together and think they have reached the solution rather than deconstructing the problem to decide which part of the problem needs to be solved first. **What overgeneralizations may students make from previous learning leading them to make false connections or conclusions?** • Student might think the same digit located in a different place in two numbers has the same value. • Students might rely on key words to suggest an operation which in turn might lead to an incorrect solution. • Students might misunderstand the place value to 59 as 5 + 9 instead of 50 + 9. • Students might have difficulty deciding which procedure to use when solving two-step problems with different operations, e.g. students might solve entire problem using only one operation.