**More Story Problems about Place Value**

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| In this lesson students apply place value understanding to play a game and explore problem situations involving two-digit numbers. They work in place value centers playing games and solving problems. |

**NC Mathematics Standard(s):**

**Operations and Algebraic Thinking**

**Represent and solve problems.**

**NC.2.OA.1** Represent and solve addition and subtraction word problems, within 100, with unknowns in all positions, by using representations and equations with a symbol for the unknown number to represent the problem, when solving:

* + One-Step problems:
    - Add to/Take from-Start Unknown
    - Compare-Bigger Unknown
    - Compare-Smaller Unknown
  + Two-Step problems involving single digits:
    - Add to/Take from- Change Unknown
    - Add to/Take From- Result Unknown

**Additional/Supporting Standards:**

**Understand Place Value**

**NC.2.NBT.2** Count within 1,000; skip-count by 5s, 10s, and 100s.

**NC.2.NBT.3** Read and write numbers, within 1,000, using base-ten numerals, number names, and expanded form.

**Use place value understanding and properties of operations.**

**NC.2.NBT.8** Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

**Standards for Mathematical Practice:**

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
4. Model with mathematics
5. Use appropriate tools strategically

**Student Outcomes:**

* I can solve addition and subtraction word problems using strategies related to place value.
* I can communicate how I solved problems to my teacher and classmates.

**Math Language:**

**What words or phrases do I expect students to talk about during this lesson?**

addition, count, count on, group, hundreds, ones, subtraction, tens

**Materials:**

* ten frame cards
* The Game of Tens and Ones: hundred board for each pair of students, spinner, 2 color counters, optional worksheets.
* Plus, Minus Stay the Same: numeral cards 1-9, four of each card for each pair of players, hundred board for each pair of players 2 color counters, base ten blocks.
* Follow-up activities: base ten blocks, hundred board, number cards, counters for game pieces.

**Advance Preparation**:

* Gather materials
* Story problem sheets copied for students

**Launch:**

Quick Images with Two-digit Numbers (8-10 minutes) (Use the ten frame cards.)

Begin with quick images of 2-digit numbers.

Example:

Show 6 ten frames and a frame with 5 dots. Show for 2 seconds, cover, show again and cover. Ask students, “Who can describe the picture to me?” Allow several students to share how they determined the total (65) dots.

Follow up questions:

“How many dots were there? How do you know?”

“Who can think of a number sentence to represent our picture?” 10+10+10+10+10+10+5=65

Do several quick images. Move to numbers in the hundreds if students are ready. After quick images, go over these center activities:

* The Game of Tens and Ones
* Plus, Minus Stay the Same
* Grouping Objects
* Story Problems (Read “Plan for Individual Differences” for an explanation for the number choices.)
* Other place value games previously played in class

**Explore and Discuss**

Centers and Small Groups (50 minutes)

Students can work in centers while the teacher works with small groups or the teacher can observe students as they work in centers, taking notes and questioning students.

Ideas for working with students. These decisions should be based on your observations and data from previous lessons.

* Students who group objects by tens but continue to count by ones—have objects such as cubes and discuss ways to count them. Guide students to group them by tens. These students may not understand that when you count by tens you must have ten objects in each group.
* Students who can orally count by tens from any given number (21, 31, 41, etc.) but do not apply the concept when playing games or solving problems— have them orally count by tens and then show this with objects/cubes or draw pictures to represent what they are counting. Have students solve the problems that are the “add to result unknown” problem. An example is: Tom had 25 pennies. His sister game him 10 more. How many pennies does he have now?
* Students who group objects by tens but do not notate their work in tens and ones— Have them write a 2-digit number and show it with cubes. Then talk about ways to notate this number. Ask, “How would you show this on paper?” As student share strategies talk about which ones are easier to draw. For example, when showing a ten stick to represent 10, it takes a long time to draw ten individual cubes. They may want to draw a rectangle or a stick and label it 10. This may be too abstract for some students who need more time to understand this representation.
* Students who can add 10 or 100 to a 3-digit number—Have these students work on adding larger multiples of 10 to a given number. For example, have them add 56 + 30, 77 + 40. If students easily add these numbers and can explain their strategy, have them add other multiples of 10 to numbers in the hundreds (156 + 30, 177 + 40). Discuss how adding 156 + 30 is like adding 356 + 30. Or discuss how adding 56 + 30 is the same as adding 56 + 10 + 10 +10.

**Center Ideas:**

**Follow-up Story Problems**

Students need number cards. Students select two number cards and make a two-digit number (3 and 6 could be 36 or 63). Students then put that number into a story problem and choose whether they will add or subtract the numbers.

I had \_\_ pieces of candy and my friend (gave me/ gave away) 20 more. How many do I have now? (63 + 20 or 63 - 20).

Students solve several problems that involve adding and subtracting multiples of ten. They can use the ten strips to add and subtract multiples of ten in a story problem. Have students make a representation of the problem in their math journal or on a whiteboard.

Depending on the time of year, students may be ready to add and subtract hundreds or tens from a three-digit number. Students would draw 3 number cards instead of 2 for this activity and put the number within the context of a word problem

**Building Three-Digit Numbers**

Give students number cards and base ten blocks. Students pick three number cards and make a three-digit number: a 5, a 4, and a 3 could be 543, 534 or other possible numbers. Students then build those three-digit numbers with base ten blocks, record the number and a picture of the blocks. They continue to do this during the center.

**Hundred Board Bingo**

Students use number cards and a hundred board. Students pick two number cards, make a two-digit number, and then cover the number up on the hundred board with a game piece. They continue choosing two cards and covering a number. The goal is to cover up 5 consecutive numbers- vertical, horizontal, or diagonal.

**The Game of Tens and Ones:** Student should already be familiar with this game before playing in a center.

**Plus, Minus Stay the Same:** Student should already be familiar with this game before playing in a center.

**Evaluation of Student Understanding**

Informal: The teacher checks student understanding through questioning during small group

instruction. Anecdotal notes or a checklist can be used to collect formative assessment data.

Formal: Activity sheet from the story problem center can be used as a formal assessment.

**Meeting the Needs of the Range of Learners**

Intervention: Work with a small group. Modify numbers to make them smaller. Make sure students are using concrete objects to represent values.

Extension: The teacher works with small groups. Students who go to the story problem center can be assigned different story problems to complete. The teacher can create different story problems based on the student understanding. There are some story problems attached to this lesson that can be used. The stories have numbers in parenthesis. Students (or the teacher) can determine what numbers to use. If the first number in the parenthesis is used, then the first number must be used throughout that problem. For example: I had (13, 45, 167) apples. I ate (10, 22, 67). How many apples do I have now? The student who chooses 13 must also choose 10. The student who chooses 45 must choose 22.

The first story problem sheet has Add to, Result Unknown problems.

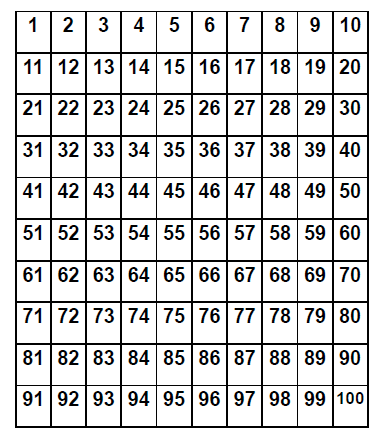
The second story problem sheet has Add to, Change Unknown problems.

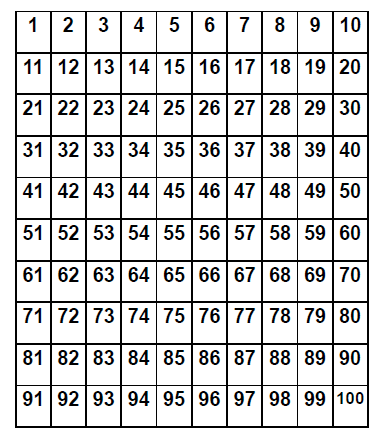
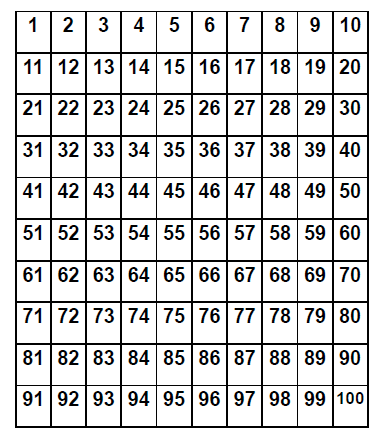
The third story problem sheet has both Add to, Result Unknown and Add to, Change Unknown problems.

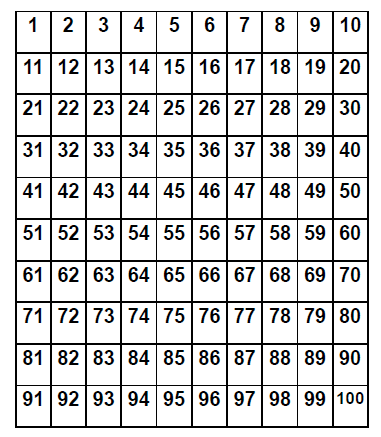
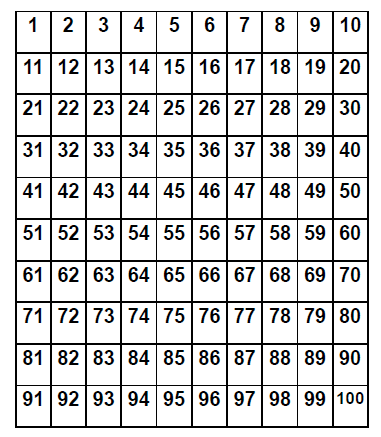
**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| Students may struggle adding or subtracting by multiples of 10. | Work with smaller numbers (50 or less) and provide them with base ten blocks or ten frame cards to support their work. |
| Students may struggle determining whether to add or subtract. | Students need concrete objects such as base ten blocks or ten strips. Use smaller numbers and have students discuss with classmates and you about the action of the problem to determine whether they should add or subtract. |

**Hundreds Board**





Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Solve each problem and show how you solved it. Use numbers, pictures or words to explain your strategy.

1. I saw (15, 67, 145) butterflies in the garden. (10, 20, 100) joined them. How many butterflies are now in the garden?
2. My class took a walk to collect leaves. The children collected (18, 41, 117) leaves. The teacher collected (10, 30, 100) more. How many leaves were collected?
3. Our class is collecting money for our field trip. On Monday we collected (25, 66, 131) dollars. On Tuesday we collected (10, 20, 50) dollars. How much money have we collected?
4. Wow, yesterday I went to the State Fair! I saw (16, 72, 278) cows. Then I saw (10, 20, 40) chickens. How many animals did I see?

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Solve each problem and show how you solved it. Use numbers, pictures or words to explain your strategy.

1. (15, 45, 121) bunnies were sitting in the grass. Some more bunnies hopped there. Then there were (25, 65, 141) bunnies. How many bunnies hopped over to join the bunnies in the grass?
2. My mother and I were collecting seashells. We collected (13, 66, 179) seashells on Monday. On Tuesday we collected some more. Then we had (23, 86, 199) seashells. How many seashells did we collect on Tuesday?
3. My basketball team scored (13, 41, 61) points in the first half. During the second half we scored more points. At the end of the game we had (33, 71, 101) points. How many points did we score in the second half?

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Solve each problem and show how you solved it. Use numbers, pictures or words to explain your strategy.

1. Our class is raising butterflies. On Monday (12, 34, 129) butterflies emerged from their chrysalises. Then on Tuesday some more hatched. We now have (32, 54, 149) butterflies flying in the butterfly house. How many butterflies hatched on Tuesday?
2. We were observing our tadpoles. We had (18, 65, 234) tadpoles. Then Tom brought (20, 30, 50) more to our class. How many tadpoles do we have now?
3. We collected (20, 78, 231) seashells in the morning. During the afternoon we found some more seashells. Now we have (50, 98, 291) seashells. How many did we find in the afternoon?
4. There were (21, 45, 92) children on the playground. Then (20, 40, 30) more children ran to the playground. How many children are now on the playground?

Dot Sticks



**Plus-Minus Stay the Same**

**Materials**

100 chart to share between 2 players

Deck of numeral cards 1-9, four of each numeral Distinct markers for each player

**Players**: 2

Directions

* Decide which player will go first. The first player chooses 2 numeral cards from the deck. Determine which card is the tens digit and which card is the ones digit. For example, if 2 and 4 are drawn the player can use these cards as 24 or 42.
* Player one must decide whether to add 10 to this number, subtract 10 from this number or keep the number the same. After the decision is made, player 1 covers the number on his/her chart. For example, if the player decides to use 42 the player can cover 42, 32, or 52.
* Player two chooses two numeral cards from the deck, determines the number, and decides whether to add 10 to the number, subtract 10 from the number or stay with the number. Player 2 covers the number on the 100 chart.
* Players continue to play.
* The winner is the first player to cover 3 numbers in a row. Rows can be vertical, horizontal or diagonal. Players can try to cover 4 or 5 numbers in a row.

**The Game of Tens and Ones**

**Materials**

100 chart or 0-99 chart one per pair of students 2 game markers

Spinner (or die) labeled +10, +10, -10, -10, +1, -1

Directions

* Each player places a marker on the zero (or off the board if using a 100 chart) the 0-99 chart. Players take turns spinning.
* Player One spins and moves a marker according to the roll.
* Player 2 checks the move and agrees.
* Player 2 follows the same steps as Player 1.
* The winner is the first person to move his or her marker to 99 (or 100 if using the 100 chart).
* Players can record number sentences to match the moves.

Example: Player 1 spins +10 and moves to the 10 place. She records 0 + 10=10. On the next move she spins +1 and records 10+ 1 = 11.

Version 2

Players do not have to land exactly on 99 (or 100) to win the game. Play the game until time is up. The winner is the person who has landed on the larger number.

Version 3

Players play on a 200 or 300 chart. Start at 100 or 200.

Adapted from: [www.mathsolutions.com](http://www.mathsolutions.com/) Marilyn Burns Education Associates.

Spinner for The Game of Tens and Ones

