**Solving Story Problems**

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| In this lesson students use place value strategies to solve story problems related to addition, subtraction, and place value. |

**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~~

**Number and Operations in Base Ten**

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

**NC.2.NBT.5** Demonstrate fluency with addition and subtraction, within 100, by:

* Flexibly using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
* Comparing addition and subtraction strategies, and explaining why they work.
* Selecting an appropriate strategy in order to efficiently compute sums and differences

**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 count forward and backward by 10s for any number between 10-99.
* I can add or subtract multiples of 10 while solving story problems.
* I can count forward and backward by 10s for any number between 100-999.
* I can add or subtract multiples of 100 while solving story problems.

**Math Language:**

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

add, count, group, join, multiples, ones, subtract, take away, tens, hundreds

**Materials:**

* activity sheet, hundred blocks, ten sticks, hundred boards, number cards marked 1-9 (four of each numeral), counters, cubes, two color counters

**Advance Preparation**:

* Gather materials

**Launch:**

Dot Sticks (10-15 minutes)

Display dot sticks (attached) or place value blocks and some ones.

Ask students, “How many are there?” “How do you know?”

Example: The teacher places 4 sticks of ten and 3 ones and ask students, “How many dots do you see?” Then ask, “How did you figure it out?”



Students might say, “I saw 4 sticks of ten and knew that was 40 and then added three more; 41, 42, 43.” Or “I saw 2 tens and knew that was 20. Then I saw 2 more tens and knew that was 20 more. 20 + 20 is 40. 40 plus the 3 ones is 43.”

Have a student write the numeral 43 on the board.

The teacher should do 2-3 of these examples, paying attention to whether students understand how to count the tens and ones and correctly determine the total quantity.

**Explore:**

**Story Problems with Two-Digit Numbers** (20 minutes)

Read a story problem to students and have them talk with a partner about how to solve this problem or have them solve it on paper or their white board. Then share their strategies. Before posing the problems think about the number combinations that will work well for the strategy of adding 10 or 100 to a number. Also think about the different types of addition situations (add to, put together or compare).

Examples of problems are below:

The number in parentheses is a suggestion if you want students to use numbers greater than 99. You may want to write these problems on chart paper or the board. Record strategies for showing how the problem was solved. Examples of recording strategies are shown for the first problem.

Possible problems:

Add to Result Unknown:

1. 28 (128) children were standing in the cafeteria line. 10 children joined them. How many children are in the line?

Possible strategies:



10 20 21 22 23 24 25 26 27 28



38

Students may also mentally reason about 28 plus by saying things such as:

“I put 28 in my head and added 10 more which makes 38.”

“20 plus 10 is 30 and then add 8 more. It’s 38.” or

“28 plus one more ten is 38.”

1. I had 56 (256) rocks in my collection. I walked in the woods and collected 10 (100) more. How many rocks do I now have?

Put Together Total Unknown

1. 45 red pencils were on the counter. I put 10 (100) blue pencils on the counter. How many pencils were on the counter?
2. 35 angel wing seashells were on the beach. The waves washed 10 (100) Scotch bonnet seashells on the sand. How many seashells were on the sand?

While you are incrementing or decrementing by 10s or 100s ask, “How does this counting by tens help you add 10 or 100 to a number?”

Explore (Part 2)

Solving Story Problems in Partners or Small Groups (13-15 minutes)

Have students solve the problems on the activity sheet. Students may want to use ten strips to help them solve the problems. They also could use Unifix cubes in sticks of ten to solve the problems.

There are three versions of the worksheet. The first worksheet has students add or subtract tens. The second worksheet has students add or subtract multiples of ten. The third worksheet is more challenging and has students work with numbers beyond 99. Students add or subtract multiples of 10.

As students work on the problems observe students. Look for students who

* struggle to interpret the problems
* struggle with recording their strategy but can mentally solve the problem
* easily solve the problems and record strategies
* cannot add on to a given number

When students finish the worksheet, have them work with another student to play Plus-Minus-Stay the Same (introduced in earlier lesson). Remind the students that this game relates to mentally skip counting by multiples (10 or 100).

**Discuss:**

Discussion Problem Solving Strategies (8-10 minutes)

After most students have finished the worksheet, choose 2-3 students to share strategies used to solve the problems. When students share strategies ask questions to emphasize and focus on how counting on by tens helps solve the problems, as opposed to having to count all. For example, “When you added 35 plus 10 how did you know you could start at 35 instead of counting from zero?”

Help students with recording and notating their strategies as you facilitate the discussion. Many students can mentally solve the problems but have difficulty showing their strategy on paper.

If there is a particular strategy that is shared that you would like students to focus on, conclude the discussion by giving students a follow-up problem to practice that strategy.

**Additional Activities (20-30 minutes)**

**Follow-up Story Problems**

Students need number cards. Students select two number cards and make a two-digit number (2 and 6 could be 26 or 62). Students then put that number into a story problem and choose whether they will add or subtract the numbers.

I had 62 pieces of candy and my friend (gave me/ gave away) 20 more. How many do I have now? (62 + 20 or 62 - 20).

Students solve several problems that involve adding and subtracting multiples of ten to help students connect this game and the ten strips to adding and subtracting multiples of ten in a story problem. Have students make a representation of the problem in their math journal or on a whiteboard.



10

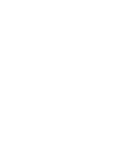
10

10

1 0

10

10



10

10

10 20 30 40 50 60 61 62 72 82

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.

**Place Value with Three Digit Numbers (teacher-led small group)**

If students have demonstrated success with two-digit numbers you can move them into mentally adding/subtracting 10 or 100 to/from a given number between 100 and 999.

After most students are fluent adding and subtracting by tens, display 9 tens and 2 ones (value of 92). Ask, “What is the total and how do you know?” “If we added 1 more ten how many would we have?” Do this a few more times with numbers ranging from 91 to 98.

Display a 100 block, 1 ten and 2 ones. Add 100 blocks and have the students determine the value of the blocks. Continue to add 100s until you get to 512. Ask students to tell you how they determined the value of the blocks. Record the value of the numbers so students can help to make sense of the pattern-

112

212

312

412

Help students discover that the hundreds place increases by one each time and the number of tens and ones stays constant. If needed do this with a few more starting numbers between 111 and 119.

**Play “Plus, Minus Stay the Same.”** This game has been introduced in a previous lesson.

**Evaluation of Student Understanding**

Informal Evaluation:

Observe the students during various activities to see how they are solving story problems with a focus on whether they are able to count on or count back or if they need to count their entire set of objects.

Formal Evaluation/Exit Ticket:

Activities during the lesson can be used as a formal evaluation. If you would like an exit ticket consider giving students the task, “I have 35 pencils. If my friend gives me 20 more pencils how many pencils do I now have?”

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

**Intervention:** For those who are struggling work with smaller numbers below 50. Also have conversations such as, “If you have 51 dots and I give you a ten strip, how many dots would you have?”

Those who can add one and subtract one from a given number but cannot fluently count by tens may need to practice in a small group with the ten strips. He/she may also need to build two-digit numbers with the Unifix cubes “bundling” the sticks of ten.

If a child cannot respond quickly ask, “If you have 61 and I give you 1 more how many would you have?” If a child cannot respond quickly to this question he/she needs more practice with counting one more/less.

**Extension:** Students who can easily add or subtract by 10s can use this knowledge to add 20s, 30s and other multiples of ten to a given number.

**Possible Misconceptions/Suggestions:**

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| **Possible Misconceptions** | **Suggestions** |
| Students may reverse a number, e.g., stating that 32 is 2 tens and 3 ones. | Provide either place value blocks or ten frame cards to help students make sense of the idea that a ten is a group of ten ones. |
| 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. |

Solving Story Problems

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Solve each problem. Show how you solved it using words, pictures or numbers.

1. 29 children were sitting on the bus. 10 more children got on the bus. How many students are on the bus now?
2. 83 pebbles were in the fish tank. Mrs. Jones took some out to clean the fish tank. Now there are 73 pebbles in the tank. How many did she take out?
3. 45 red apples and 10 green apples are on the table. How many apples are on the table?
4. 91 students are in the media center looking for books. 10 students leave the media center. How many students are now in the media center?
5. 36 seashells are on the beach. A wave washes away 10 seashells. How many are now on the beach?
6. There were 33 children in the cafeteria. 10 children got hotdogs. The rest got hamburgers. How many got hamburgers?

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Solve each problem. Show how you solved it using words, pictures or numbers.

1. 29 children were sitting on the bus. 30 more children got on the bus. How many students are on the bus now?
2. 83 pebbles were in the fish tank. Mrs. Jones took some out to clean the fish tank. Now there are 43 pebbles in the tank. How many did she take out?
3. 45 red apples and 50 green apples are on the table. How many apples are on the table?
4. 91 students are in the media center looking for books. 70 students leave the media center. How many students are now in the media center?
5. 36 seashells are on the beach. A wave washes away 20 seashells. How many are now on the beach?
6. There were 63 children in the cafeteria. 30 children got hotdogs. The rest got hamburgers. How many got hamburgers?

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Solve each problem. Show how you solved it using words, pictures or numbers.

1. 129 children were sitting on the bus. 20 more children got on the bus. How many students are on the bus now?
2. 283 pebbles were in the fish tank. Mrs. Jones took some out to clean the fish tank. Now there are 173 pebbles in the tank. How many did she take out?
3. 345 red apples and 40 green apples are on the table. How many apples are on the table?
4. 191 students are in the media center looking for books. 30 students leave the media center. How many students are now in the media center?
5. 336 seashells are on the beach. A wave washes away 100 seashells. How many are now on the beach?
6. There were 533 children in the cafeteria. 200 children got hotdogs. The rest got hamburgers. How many got hamburgers?

Dot Sticks



## Plus-Minus Stay the Same

Materials

100 chart to share between 2 players

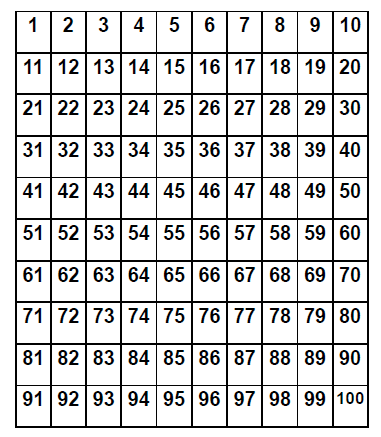
Deck of numeral cards 1-9, four of each numeral

Distinct markers for each player

**Players**: 2

Directions

1. 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.
2. Player one must decide whether to keep the number the same and mark it, add 10 to this number, or subtract 10 from this number. 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.
3. 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.
4. Players continue to play.
5. The winner is the first player to cover 3 numbers in a row. Rows can be vertical, horizontal or diagonal. The game can be made more difficult by having students cover 4 or 5 numbers in a row.

**Hundreds Board**