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| Problem Solving using Addition and Subtraction Situations |
| Mathematics, Grade 2  (Updated February 2019) |
| The following unit contains nine lessons and one Curriculum Embedded Performance Assessment. It addresses the common core math standards 2.OA.A.1, 2.MD.B.5 and 2.MD.B.6. In this unit, student talk is encouraged to further develop problem-solving skills through real life word problems presented in a variety of situations. Student will be required to represent word problems using models and equations with an unknown in any position. They will also solve problems that involve length and represent whole numbers on a number line in order to show addition and subtraction. This unit assumes that students have had experience modeling simple addition and subtraction problems on a number line.  *These Model Curriculum Units are designed to exemplify the expectations outlined in the MA Curriculum Frameworks for English Language Arts/Literacy and Mathematics incorporating the Common Core State Standards, as well as all other MA Curriculum Frameworks. These units include lesson plans, Curriculum Embedded Performance Assessments, and resources. In using these units, it is important to consider the variability of learners in your class and make adaptations as necessary.*  This document was prepared by the Massachusetts Department of Elementary and Secondary Education. Mitchell D. Chester, Ed.D., Commissioner  The Massachusetts Department of Elementary and Secondary Education, an affirmative action employer, is committed to ensuring that all of its programs and facilities are accessible to all members of the public. We do not discriminate on the basis of age color, disability, national origin, race, religion, sex, or sexual orientation.  © 2015 Massachusetts Department of Elementary and Secondary Education (ESE).ESE grants permission to use the material it has created under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License. Additionally, the unit may also contain other third party material used with permission of the copyright holder. Please see Image and Text Credits for specific information regarding third copyrights.  Image and Text Credits:  The contents of this Model Curriculum Unit were developed under a grant from the U.S. Department of Education. However, those contents do not necessarily represent the policy of the U.S. Department of Education, and you should not assume endorsement by the Federal Government.  Massachusetts Department of Elementary and Secondary Education, 75 Pleasant St, Malden, MA 02148-4906. Phone 781-338-3300, TTY: N.E.T. Relay 800-439-2370, [www.doe.mass.edu](http://www.doe.mass.edu)  Table of Contents  [Unit Plan 4](#_Toc373843623)  [Lesson 1: Using Visualization, Acting Out, and Retelling to Interpret Problem Solving Situations](#_Toc373843625) 7  [Lesson 2: Solving Add to Situations 12](#_Toc373843626)  [Lesson 3: Solving Take from Situations 18](#_Toc373843627)  [Lesson 4: Solving Put Together/Take Apart Situations 25](#_Toc373843628)  [Lesson 5 Solving Comparison Situations 30](#_Toc373843629)  [Lesson 6: Writing One Step Story Problems 34](#_Toc373843630)  [Lesson 7: Solving Two-Step Word Problems (Part 1) 48](#_Toc373843631)  [Lesson 8: Solving Two-Step Word Problems (Part 2) 55](#_Toc373843632)  [Lesson 9: Writing Two-Step Word Problems 59](#_Toc373843633)  [CEPA #1: Toy Store 65](#_Toc373843634)  [CEPA #2: Playground Development Project 66](#_Toc373843635)  CEPA Rubric 68  Unit Resources 70 |

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| Stage 1 Desired Results | | |
| **ESTABLISHED GOALS G**  Operations and Algebraic Thinking 2.OA  2.OA.A Represent and solve problems involving addition and subtraction.  **2.OA.A.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.[[1]](#footnote-1)  Measurement and Data 2.MD  2.MD.B Relate addition and subtraction to length.  **2.MD.B.5** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.  **2.MD.B.6** Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2 and represent whole-number sums and differences within 100 on a number line diagram.  SMP1 – Make sense of problems and persevere in solving them.  SMP2 – Reason abstractly and quantitatively.  SMP3 – Construct viable arguments and critique the reasoning of others.  SMP4 – Model with mathematics.  SMP5– Use appropriate tools strategically.  SMP 6 – Attend to precision.  SMP7**--** Look for and make use of structure. | ***Transfer*** | |
| ***Students will be able to independently use their learning to…* T**  Apply mathematical knowledge to analyze and model mathematical relationships in the context of a situation in order to make decision, draw conclusions, and solve problems. | |
| ***Meaning*** | |
| **UNDERSTANDINGS U**  ***Students will understand that…***  U1 Solving word problems requires an understanding of the situationand the question to be answered.  U2Addition and subtraction problems can be modeled and solved using various representations.  U3A number shown on a number line represents a distance, in equally spaced units, from a starting point of zero. | **ESSENTIAL QUESTIONS Q**  Q1How can pictures or tools, including number lines, help us solve word problems?  Q2 What does it mean to understand a problem?  Q3 How do you know when to add or subtract? |
| ***Acquisition*** | |
| ***Students will know…* K**  K1 There is more than one way to represent and solve word problems.  K2 The unknown can take any position in an equation and be represented with a symbol.  K3 There are different types of addition and subtraction problem situations.  K4 Number lines, with equally spaced points corresponding to whole numbers, can be used as a problem solving tool.  K5 Academic Vocabulary: part, whole, add, sum, addition sentence, plus, equals, join, subtract, difference, subtractions sentence, minus, separate, compare, more , fewer, fact family, equation, unit, number line, length. | ***Students will be skilled at…* S**  S1 Retelling a word problem in their own words.  S2 Solving one- and two-step addition and subtraction word problems.  S3 Writing an addition or subtraction equation or model for any word problem situation.  S4 Explaining their thinking orally or in writing using precise mathematical language.  S5 Representing whole number sums and differences within 100 on a number line diagram. |
| Stage 2 - Evidence | | |
| **Evaluative Criteria** | **Assessment Evidence** | |
| Interpretation: Represent whole-number sums and differences within 100 on a number line diagram  Explanation: Show the equation they constructed to solve the problem  Application: Solve word problems | **CURRICULUM EMBEDDED PERFORMANCE ASSESSMENT (PERFORMANCE TASKS)**  **CEPA #1**  Goal: Your task is to decide how to spend a $100 gift card at a toy store.  Product: A written explanation showing your math, including an equation and a number line model, to help your parent understand your reasoning for how you can or can’t buy three toys instead of two.  Criteria for Success: Your work will be judged by the attached rubric.  **PT**  **CEPA #2 Playground Development Project**  Goal: To design a new playground for the town.  Product: A written explanation describing how to help the inspector figure out the missing value and if his walking path is the correct length.  Criteria for Success: The inspector will be reading your explanation and checking your map to determine if your work is accurate. | |
|  | **OTHER EVIDENCE: OE**  Check-ins, formative assessment | |
| Stage 3 – Learning Plan | | |
| ***Summary of Key Learning Events and Instruction***  **Lesson 1**: Students will use visualizing, acting out and retelling to interpret word problems. (Emphasize the idea of what the problem is asking, *not* coming up with a solution).  **Lesson 2:** Students will solve one step word problems within 100 involving “add to” situations with *result unknown, change unknown* and *start unknown*.  **Lesson 3**: Students will solve one step word problems within 100 involving “add to” and “take from” situations” *with result unknown, change unknown and start unknown.*  **Lesson 4**: Students will solve one-step word problems involving “put together/take apart” with total unknown, addend unknown and both addends unknown (within 100).  **Lesson 5**: Students will solve one step comparison word problems with difference unknown, bigger unknown and smaller unknown (within 100).  **Lesson 6**: Students will apply their understanding of addition and subtraction situations to create and solve their own one-step word problems.  **Lesson 7:** Students will use a number line to model and solve simple two step word problems. Problems will involve working with the same operation in both steps as well as opposite operations within the problem. They will work with numbers up to 20.  **Lesson 8:** students will continue to model and solve two-step word problems. Problems will involve working with the same operation in both steps as well as opposite operations within the problem. They will work with numbers up to 20.  **Lesson 9:** Students will create two-step word problems. Problems may involve working with the same operation in both steps or opposite operations within the problem. They will work with numbers up to 20.  **Curriculum Embedded Performance Assessment (CEPA) #1: Teacher Instructions**  **CEPA #1: Student Instructions**  **CEPA #2: Instructions** | | |
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Lesson 1: Using Visualization, Acting Out, and Retelling to Interpret Problem Solving Situations

**Brief Overview:** In this lesson, students will use visualization, acting out and retelling to interpret problem solving situations. The focus is interpretation of the situation rather than coming up with a solution. As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required**

* Familiarity with the common addition and subtraction problem solving situations from first grade (p. 183 in 2011 MA Curriculum Framework for Mathematics)
* Ability to identify what is happening, or the actions, that occur in a problem solving situation
* Identify the unknown in a situation

**Estimated Time:** 1 hour

**Resources for Lesson:**

* Poster or chart paper
* Story problem situations for each group
* Picture to represent the story problem that teacher reads to class
* Poem: *My Neighbor's Dog is Purple* by Jack Prelutsky or other poem for visualization

**Unit:** Problem Solving using Addition & Subtraction Situations

**Time:** 60 minutes

**Lesson 1:** Using visualization, acting out, and retelling to interpret problem solving situations

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.

SMP1 Make sense of problems and persevere in solving them

SMP2 Reason abstractly and quantitatively

SMP3Construct viable arguments and critique the reasoning of others.

**Essential Question addressed in this lesson:**

What does it mean to understand a problem?

**Objective:**

* Students will know and be able to retell problems in their own words.

**Anticipated Student Preconceptions/Misconceptions:**

* Students may not understand that certain key words or phrases (e.g. “all together,” “more”) indicate addition.
* Students may not understand what “action” means in the context of a word problem. Help them think about this as “what is happening” in the problem.

**Instructional Tips/Strategies/Suggestions:**

* Certain key words or phrases limit students’ thinking regarding how to approach a problem, e.g. difference can be solved as a missing addend equation. Focus on interpreting the story as a whole rather than the use of key words.
* *My Neighbor’s Dog is Purple*, Poem by Jack Prelustsky. It can be found at:

[**https://www.scholastic.com/content/dam/teachers/blogs/sharon-taylor/migrated-files/my\_neighbors\_dog\_is\_purple.pdf**](https://www.scholastic.com/content/dam/teachers/blogs/sharon-taylor/migrated-files/my_neighbors_dog_is_purple.pdf)

**Pre-Assessment:**

Complete a picture walk (preview a math-related story by looking at and discussing the pictures and making predictions about the events in the story). Have students do this with a partner by taking turns. Look for students who are able to articulate the events in the story based on the pictures.In this pre-assessment, students are making sense of quantities and relationships and representing situations by decontextualizing tasks into numbers and symbols (SMP 2 *Reason abstractly and quantitatively*)

**Lesson Details**

**Lesson Opening**

Activate prior knowledge (formative assessment) (10 minutes)

* Inform students of the day’s objective: Today we will see what it means to understand word problems and how reading helps us with math. Before we talk about this skill, let’s talk about what we know about addition and subtraction, and also talk about a list the words we associate with addition (then subtraction). Write student answers on chart paper or on the board. If an answer does not make sense, probe with questions about why the student associates that word with addition (or subtraction).
* Now we are going to think about how sometimes words tell math stories. We call these story problems or word problems. Sometimes we have number problems like 3 + 2 = 5 and sometimes we have word problems. When we try to solve a word problem we need to understand what is happening, or the *action*, in the problem, and use both our reading and our math skills to solve it.
* One of the reading skills we can use in math is visualizing. What does visualizing mean (mental images)? How do we use it in reading? How can we use it in math?

**During the Lesson**

Focus Lesson – “I Do” (10 minutes)

* With your copy of Jack Prelustsky’s poem, My Neighbor’s Dog is Purple, say: *Today I will read a poem and model how I visualize it by drawing a picture that represents the mental images I made in my head* (or use any book or poem to model visualization).
* Model the visualization and thinking using words from the poem to explain his/her drawing.
* Ask students to find the sentences that they believe the teacher used to draw his/her picture.

Guided Instruction– “We Do It “(15 minutes)

* Now we are going to listen to a story problem. I would like everyone to listen to the problem. Our focus today is not solving the problem. Instead; it will be seeing the action of the problem. Who knows what the word action means? After students share their thoughts, say: the *action* in the problem is *what is happening* in the problem. We will act it out and see the “action” of the word problem.
* I would like everyone to close his or her eyes and listen to the word problem. I will say it twice. Remember we will not be thinking about an answer, only the action, or what is happening, in the word problem. Read slowly:

It is recess for Grade 2. Ms. Smith’s class is lined up at the swings. There are 8 children in line at the swings. Mr. Rogers’ second grade class comes out to play too. They decide to play on the jungle gym. There are 9 children on the jungle gym. How many children are at the playground?

* Now open your eyes. What did you visualize when I was reading the word problem? What did you see in your mind? (If students have a hard time visualizing the problem, guide them with questions while their eyes are still closed: Can you see the swings in your mind? Can you see the Mrs. Smith’s class of children at recess? How many can you see? Can you see Mr. Roger’s students coming out to play at the jungle gym? How many children are at the jungle gym?
* Can anyone retell the word problem in his or her own words? Have students think-pair-share (t-p-s) what they think is happening in this word problem.

*Note:* Establish that think-pair-share means that they will have 1-2 minutes to think and write or draw quietly about the problem. After that time has passed, they will turn to a partner and share their thoughts for 1-2 minutes. Each will take a turn speaking while the other listens. The listener should paraphrase or comment on the speaker’s explanation. Students should be explicitly informed that at this stage they should use a critical eye to examine their partner’s work and comment on any misconceptions they see whether on their part or on the part of their partner. They should use evidence from what the partner said or showed in writing to support their comments. The listener then takes a turn speaking and the roles reverse. This should take 3-6 minutes in total. Times may vary depending on the task at hand. A written product showing what was discussed may or may not be required depending on the task. Pairs may be called upon to share with the whole group. This think-pair-share protocol provides practice for SMP 3- *Construct viable arguments and critique the reasoning of others.*

If this is being established for the first time with students, the teacher should model what this looks like by demonstrating what a conversation around a mathematical problem looks like. If another adult is not available for this role play, the teacher could show and comment on math work. After the teacher has modeled this and students have practiced, have a student pair model for the class also. Emphasis should be placed on listening, commenting using mathematical reasoning, rephrasing what your partner said, being polite, and respectfully agreeing or disagreeing. Partners should rotate so students have the opportunity to discuss mathematics with fellow students. A chart with sentence stems could help students who are new to or have difficulty with these conversations. This is also a nice scaffold for English Language Learners. Periodically monitor conversations to make sure students are following these guidelines. As students become comfortable with these types of conversations, they may occasionally be called upon to share their conversation with the whole class.

* Popcorn share (choose a few students around the room to share answers) short answers about something they visualized. Then choose one or two students to retell the word problem for the whole group.
* After the retell, select children to act out what is happening in the word problem. Have the children look at the list of words they listed for addition. Which word best describes what happens in this word problem?
* Show the picture you made in your head while visualizing this word problem.

Collaborative “You Do It” (15 minutes)

* Say: You will now work in your groups to create a picture (representation) of a word problem. Each group will receive a word problem. As a group, decide how to represent what is happening in the word problem with a picture or pictures. Read the word problem silently first. Then one member of the group will read the word problem out loud, but softly. Next, as a group, discuss and decide how best to represent what is happening in the word problem. Make sure everyone has a turn contributing to the ideas of the group about how to represent the word problem. Each group is responsible for representing their thinking on one poster; then each group will share their work with the class.

**Lesson Closing**

Reflection (10 minutes)

* Bring the class back together. Have each group share their poster with the class, explaining how their picture represents the problem solving situation. Have them explain how visualization helped them with this activity and make comparisons between visualizing a mathematical story/word problem and visualizing a story they have read (What is different? What is the same?).
* Through this sharing, students make sense of the meaning of the task and find an entry point for the task (SMP 1 - *Make sense of problems and persevere in solving them;* SMP3- *Construct viable arguments and critique the reasoning of others*).

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# Lesson 2: Solving Add to Situations

**Brief Overview:** Students will solve one-step word problems involving “add to situations” with *result unknown, change unknown* and *start unknown* (within 100). As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required** Familiarity with the common addition and subtraction situations from first grade; ability to identify the actions that occur in a problem; able to draw from a variety of strategies developed in first grade for solving problems, including an understanding of properties of operations for addition and subtraction; understand the meaning and process of measurement including the concept of iterating; be able to add and subtract; prior experience with using a number line to model addition and subtraction problems.

**Estimated Time:** 1 hour

**Resources for Lesson**

Addition word problems (end of the Lesson)

Chart of “Add To” situations (end of Lesson)

**Unit:** Problem Solving using Addition & Subtraction Situations

**Content Area/Course:** Math

**Time:** 60 minutes

**Lesson 2: Solving *Add to* Situations**

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.

SMP1 – Make sense of problems and persevere in solving them

SMP2 – Reason abstractly and quantitatively

SMP4 – Model with mathematics

SMP5– Use appropriate tools strategically

**Essential Questions addressed in this lesson:**

Q1 How can pictures or tools, including number lines, help us solve word problems?

Q2 What does it mean to understand a problem?

**Objectives:** Students will know and be able to:

* Solve and represent problems in more than one way.
* Solve one-step addition problems.

**Instructional Tips/Strategies/Suggestions:**

* Certain key words or phrases limit students’ thinking regarding how to approach a problem. Students’ reading ability may limit their ability to work with word problems. Accommodations should be made to remove this barrier if necessary by reading aloud or other supports.
* Copy the word problems at the end of the Lesson for students.

**Lesson Details**

**Lesson Opening**

Activate prior knowledge (formative assessment) (10 minutes)

* Say: Let’s think back to the reading skill that we talked about yesterday that helped us see what was happening in word problems. Does anyone remember the word we used for “what happens” in the word problem? (action) Does anyone remember what reading skill we used? (visualize). What does visualizing mean?
* Today we are going to read and *solve* addition word problems. Knowing that we will be working on addition problems what are some things we can expect? (There will be number words or numerals in the problems, there will be action which tells us that we need to add…)

**During the Lesson**

Focus Lesson – “I Do It” (10 minutes)

* Model how to read a word problem and explain the mental images you see. Model what you visualize and how to determines the operation by the action (or what is happening) in the word problem. Show the *unknown* and discuss what *unknown* means and how to represent the *unknown* (with?, a letter, or a symbol, such as a square).

8 children were playing at the playground. Some other children joined them. There are now 21 children at the playground. How many children are now at the playground?

**8 children playing8 children playing**

**\_\_\_\_\_\_\_\_ ? Children join** (I’m using a question mark here because I don’t know how many children joined.)

**a line of 21 children**

**21 children 8 + ? = 21**

* You could model this problem on a number line, although students are not required to use a number line in this lesson.

Guided Instruction -- “We Do It” (10 minutes)

* Say: We are going to listen to a word problem. Our focus today will be a little different than yesterday. First we will listen and visualize the word problem, and then we will solve it.
* I would like everyone to close his or her eyes and listen to the story, which we call a word problem in mathematics. I will read it twice. Like yesterday, we first visualize the problem, and then we will talk about what the action is in the word problem.

Second Grade went on a field trip to the Boston Public Gardens. The students saw 15 ducks swimming in the pond. They also saw a family of 6 ducks on the side of the pond. How many ducks did the students see at the pond?

* Now let’s open our eyes. Can anyone retell the word problem in his or her own words? (Select 2 children to retell the word problem).
* After the retell, select children to act out what is happening (the “action,” of the word problem). What is the action of this word problem? Unlike yesterday I will not be showing you a picture of what I visualized because it is not efficient (this is a good time to review what “efficient” means in 2nd grade).
* I need to find a way to represent what I visualized from the word problem with numbers. Can anyone tell me what operation we will use to solve this word problem?
* After children share their thoughts, ask: How can we represent what the word problem tells us and asks us in an equation (review meaning of equation by asking the children, or briefly defining it)? (15 + 6 = ?)
* If students suggest 15 + 6, discuss what the word “equation” means and encourage students to use a symbol for the unknown quantity. This may be a ? or a letter which represents the unknown that we are finding (i.e., t = total ducks). Emphasize the concept of equality and that the = means both sides of the equation must be equal. It does not mean *the answer is coming.* (SMP4 – Model with mathematics). Be sure the equation accurately matches the problem context.
* Provide students sufficient quiet thinking time to solve the problem and then explain how they solved it. You may use this opportunity to model solving this problem on a number line.

Collaborative “You Do It” (20 minutes)

* Give students one of the addition word problem worksheet with a variety of addition word problems involving “add to situations,” with result unknown, change unknown and start unknown (within 100). *(SMP1**– Make sense of problems and persevere in solving them; SMP2 – Reason abstractly and quantitatively; SMP4 -Model with mathematics).*
* Have children work with a partner to look at their word problems and discuss what they notice about the problems. Emphasize that students are reading, visualizing and discussing each problem before solving it.

**Lesson Closing**

Reflection (10 minutes)

* After students have completed a sheet of three problems, gather them together, and ask what they notice about how the problems were the same and how they were different. Also discuss strategies and tools used to solve the word problems (SMP5– Use appropriate tools strategically).
* Circulate as children work to observe different approaches to modeling and solving the story problems.
* Pick three students to share – make sure each word problem shared represents a different situation (result unknown, change unknown, and start unknown).
* Name the addition situations (result unknown, start unknown, and change unknown) to help students understand what *result, change, start,* and *unknown* mean, focusing not on memorizing the names of the problem situations, but on understanding that there are different problem situations.

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|  | **Result Unknown** | **Change Unknown** | **Start Unknown** |
| **Add To** | I have 3 cookies.  My mom gave me 5 more.  How many cookies do I have now?  3 + 5 = ? | I have 3 cookies. My mom gave me some more. I now have 8 cookies. How many cookies did my mom give me?  3 + c = 8 | I had some cookies. My mom gave me 5 more cookies. I now have 8 cookies. How many cookies did I start with?  + 5 = 8 |

* Homework: a worksheet of addition word problems that include each situation, two of each type.

Addition Word Problems

*A Day at the Shore*

 a person sitting at the beach

Luis collected 17 shells at the beach. His sister, Ava collected 12 shells. How many shells do they have all together?

Ava found some hermit crabs. Luis found 13 hermit crabs. They now have 22 hermit crabs. How many did Ava find?

Luis made seven sand castles. Ava built some more. Now there are 18 sand castles. How many did Ava build?

*A Day at the Farm*

Farmer Juan has 15 pigs and 24 cows. How many animals does he have on his farm?

Farmer Juan has chickens in his coop. Farmer Joe gives him 32 chickens. Famer Juan now has 48 chickens. How many chickens did Farmer Juan to start?

28 wild turkeys wandered into Farmer Juans farm. They joined the turkeys he alread had at the farm. Farmer juan now has 47 turkeys. How many turkeys did he own before the wild turkeys arrived?

# Lesson 3: Solving Take from Situations

**Brief Overview:** Students will solve one step word problems involving “take from” situations with result *unknown, change unknown* and *start unknown* (within 100). As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required:** ability to identify the actions that occur in a problem; able to draw from a variety of strategies solving problems, including an understanding of properties of operations for addition and subtraction and the inverse relationship of addition and subtraction; understand the meaning and process of measurement including the concept of iterating.

**Estimated Time:** 1 hour

**Resources for Lesson** (at end of lesson)

Subtraction word problems

Chart of “Take From” situations

**Unit:** Problem Solving using Addition & Subtraction Situations

**Content Area/Course:** Math

**Time:** 60 minutes

**Lesson 3:** Solving *Take from* Situations

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.

SMP1 – Make sense of problems and persevere in solving them

SMP2 – Reason abstractly and quantitatively

SMP4 – Model with mathematics

SMP5 – Use appropriate tools strategically

**Essential Questions addressed in this lesson:**

Q1 How can pictures or tools, including number lines, help us solve word problems?

Q2 What does it mean to understand a problem?

Q3 How do you know when to add or subtract?

**Objectives**: Students will know and be able to:

* Recognize the three types of “take from” subtraction problems.
* Solve one-step problems.
* Use number lines with equally spaced points corresponding to whole numbers as a problem-solving tool.

**Anticipated Student Preconceptions/Misconceptions:**

Certain key words or phrases limit students’ thinking regarding how to approach a problem.

**Instructional Tips/Strategies/Suggestions:**

Use the ruler as a number line to solve problem during introduction

**Lesson Details**

**Lesson Opening**

* Explicitly connect yesterday’s lesson to today’s lesson, and communicate the objectives of the lesson: Yesterday, we spent time solving addition word problems. Today we will still work on solving word problems but we will be focusing on subtraction.

Activate Prior Knowledge (formative assessment)

* Say: Let’s talk about subtraction for a few minutes. What do you know about subtraction? (Responses may include comments such as: in subtraction we take things away; when we subtract, we start with something and then remove some; and other similar ideas which reflect some understanding of subtraction. If they say, however, when we subtract the answer is smaller, correct this misunderstanding by explaining that in second grade we will be working with whole numbers, and the answer is smaller, but when you get older you will learn about other types of numbers and the answers to a subtraction problem is not always smaller. Similarly, if students say in subtraction the bigger number always goes on top (or first), explain that this will not always be true as we get older and learn about and use other types of numbers.
* Ask: Can anyone tell me what we should do as we listen to word problems? (Listen to the words, visualize what is happening, think about the action… (SMP 1 –Make sense of problems and persevere in solving them – students make sense of the meaning of the task and find an entry point or a way to start the task; SMP 2– Reason abstractly and quantitatively).

**During the Lesson**

Focus Lesson: “I Do” (10 minutes)

* Model how to read the story problem below and explain the mental images she sees.Do a Think-Aloud as you determine the operation (action), show the unknown (or the “I don’t know”), and represent the problem. (SMP 1 –Make sense of problems and persevere in solving them; SMP 2– Reason abstractly and quantitatively; SMP 4Model with mathematics)

18 ducks were standing near the pond. A dog ran toward them and some flew away. There are now 11 ducks standing near the pond. How many ducks flew away?

a line of 18 ducks

**18 ducks were standing by the pond**

**11 ducks lined up in a row**

**11 ducks are still standing near the pond 18 - ? = 11**

Guided Instruction: “We Do” (10minutes)

* Say: I would like everyone to close his or her eyes and listen to the word problem. I will read it twice. Like yesterday, we first talk about the action (what is happening) in the word problem.

The second grade went on a field trip to the New England Aquarium. When they arrived at the penguin exhibit, they saw 22 penguins. Then 9 penguins left to eat. How many penguins are left?

* Now open your eyes. Who can retell the word problem in his or her own words? (Select two children to retell the word problem).
* After this, select children to act out the “action” of the word problem. What is the action of this word problem? Notice we are not drawing a picture for this problem. We could, but why do you think we using a different strategy to represent the problem? (Look for understanding of efficiency).Have students share their thinking.
* I need to find a way to represent what I visualized from the word problem with numbers. Can anyone tell me what operation we will use to solve this word problem? Through this problem, students practice modeling a problem solving situation with an equation or equation. Check to make sure the equation accurately matches the problem context. (SMP 4 - Model with mathematics).
* How can we represent what the word problem tells us and asks us in an equation,22 – 9 =? Ask students to suggest ways to solve the problem. After several responses, model solving the problem with the group using a Think Aloud process. Children’s strategies may include mental strategies (I know 10-9=1 and so 20-9=11, and 22 is 2 more, so 11+2=13) or use a number line, or with tallies or another strategy.

Collaborative “You Do It” (15 minutes)

* Give the students one of the subtraction word problem worksheets that follow this lesson, with a variety of subtraction word problems involving “add to” situations with *result unknown, change unknown* and *start unknown* (within 100).

Give the children time to work with a partner to look at their word problems and discuss what they notice about the problems. The teacher should emphasize that students are reading, visualizing and discussing each problem before solving it. There are two sheets of problems below.

**Lesson Closing**

Reflection (15 minutes)

* After students have completed a sheet of three problems, gather the class together and ask what the students notice about how the problems were the same and how they were different.
* Also discuss strategies and tools used to solve the word problems, e.g.: As I walked around the room I noticed some different approaches some of you used to show and solve your word problems (pick three students to share – make sure each word problem shared represents a different situation (result unknown, change unknown, and start unknown).
* Name the subtraction situations – result unknown, start unknown, and change unknown - and understanding what *result, change, start*, and *unknown* mean.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Result Unknown** | **Change Unknown** | **Start Unknown** |
| **Take From** | 8 cookies were on the plate. I ate 5 cookies. How many cookies do I have left?  8 – 5 = c | 8 cookies were on the plate. I ate some of the cookies. There are 3 cookies. How many cookies did I eat?  8 - ? = 3 | I had some cookies. I ate 5 of them. There are now 3 cookies left. How many cookies did I start with?  - 5 = 3 |

* Homework: a worksheet of subtraction word problems that include each situation (two of each).

Subtraction Word Problems

*A Day at the Flower Store*



Mrs. Henry purchased 25 sunflower plants. She planted 12. How many sunflower plants does she have left?

Linda purchased 19 tulip bulbs at the flower store. Connie planted some. Linda has 9 tulip bulbs left. How many did Connie plant?

Juan purchased some rose bushes. He planted 13 bushes at his mother’s house. He now has 12 left. How many rose bushes did he purchase at the flower store?

Subtraction Word Problems

*The Lemonade Stand*

**a boy sellilng lemonade**

Emmett poured 32 glasses of lemonade. He sold 17. How many glasses of lemonade does he have left?

Emmett’s mother purchases 41 lemons. She used a lot of them to make the lemonade. She has 17 left. How many lemons did she use to make the lemonade?

The baseball team stopped by Emmett’s lemonade stand. Emmett prepared for their arrival by pouring glasses of lemonade. The team purchased 17 glasses. Emmett has 12 left. How many glasses of lemonade did Emmett pour?

# Lesson 4: Solving Put Together/Take Apart Situations

**Brief Overview:** Students will solve one-step word problems involving “put together/take apart” with total unknown, addend unknown and both addends unknown (within 100). As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required:** Ability to draw from a variety of strategies; understanding of the meaning and process of measurement, including the concept of iterating

**Estimated Time:** 1 hour

**Resources for Lesson:**

* Manipulatives/counters
* 99’s charts
* Number lines
* Independent Practice Worksheet (end of this Lesson)

**Content Area/Course:** Math Grade 2

**Unit:** Problem Solving using Addition & Subtraction Situations

**Time:** 60 minutes

**Lesson 4:** Solving Put Together/Take Apart Situations

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.

SMP1 – Make sense of problems and persevere in solving them

SMP2 – Reason abstractly and quantitatively

SMP4 – Model with mathematics

SMP5 – Use appropriate tools strategically

SMP 7 – Look for and make use of structure

**Essential Questions addressed in this lesson:**

Q2 What does it mean to understand a problem?

Q3 How do you know when to add or subtract?

**Objective:**

* Students will know and be able to solve one-step “put together/take apart” word problems with total unknown, addend unknown and both addends unknown.

**Lesson Details**

**Lesson Opening**

Activating prior knowledge (formative assessment) (10minutes)

* At the rug or other meeting area, say:Yesterday, we solved subtraction word problems. Today we will still work on solving word problems, but we will think about what we worked on in the last two days -- we will work on “putting together” problems and “taking apart” problems. Let’s think back to the beginning of this unit and the strategies we have been using to solve word problems. What are some of those? (This lesson targets SMP 1 – Make sense of problems and persevere in solving them– students can make sense of the task and find and entry point for attempting the task.
* Knowing that we will work on both putting together and taking apart, what are some things we can expect? (We might have to use either addition or subtraction; we might have to choose either addition or subtraction…)

**During the Lesson**

Focus Lesson (5 minutes)

* Share the scenario that you went apple picking over the weekend: This weekend, I went apple picking at a nearby orchard. I picked 23 Macintosh apples from two trees. How many Macintosh apples could have been on each tree?
* Model the thinking process through a Think Aloud to develop possible addend combinations for the sum of 23 (e.g., draw two trees on the white board have 23 sticky notes available. Think aloud as you place the sticky notes on each tree, then model how you came up with different addends (SMP 7 – Look for and make use of structure): 23=10 +13 23= 11 + 12
* This is a good opportunity for children to see that is if you take one away from one side the other side you get the same answer: so to continue the pattern above you get: 23= 12+11 23=13+10 23=14+9.
* Have students think-pair-share to find different combinations. Have students share the next few equations in the pattern.
* Say: Next I picked Golden Delicious apples from two different trees. I picked 16 apples from one tree. After picking apples from both trees, I had 23 Golden Delicious apples. How many apples did I pick from the second tree? Model using a Think Aloud process to develop the sum of 23 with a different addend: 16 +? = 23 23 – 16 =?
* Ask: Why do you think this problem can be solved using either addition or subtraction? Give students a minute to think about how they would describe what is happening in the problem if they were solving it using addition. Discuss as a whole class.
* Then give students a minute to think about how they would describe what is happening in the problem if they were solving it using subtraction. Discuss as a whole class. (SMP 7 – Look for and make use of structure: Students make use of structure when they work with subtraction as missing addend problems such as 50-33 = ?, which can be written as 33 + ? =50 and can also be thought of as “how much more do I need to add to 33 to get to 50”?

Guided Instruction: “We do it” (10 minutes)

* Introduce the following scenario: While walking, a teacher saw two flocks of birds fly overhead. She counted 13 in the first flock. She counted 30 birds in all. How many birds were in the second flock? 13 +? = 30 30 - ? = 13
* In pairs, have students think about the word problem and what operation they would use to solve the problem. After 2-3 minutes, ask students to write an equation to model the problem and solve it.
* After another 2-3 minutes, ask pairs to turn and talk to different partners, discussing the addition or subtraction situation, their number sentence, and their answers.

*Note:* Establish that Turn and Talk is similar to Think-Pair-Share, but does not involve the preliminary *think* part. Students turn and talk to a partner to explore an idea or question that comes up in a whole class discussion. In this way everyone in class gets to voice their mathematical thinking instead of a few being called upon in class while others are passively listening. This can be modified by doing a Turn, Talk and Write, in which students write their thinking or a solution down. This works particularly well when used in the midst of a class discussion as a way to have students pause, think, and talk about what has been said.

* Have students observe that the answer is the same whether they used addition or subtraction to solve the word problem. While students are discussing, circulate to identify any common misconceptions as well as identifying pairs of students to share out.
* After 3-4 minutes, ask students to share with group. If common misconceptions were identified, address them at this time.

Collaborative “You do it” (25 minutes)

* Give students a handout with three “Put together/Take Apart” (total unknown, addend unknown, and both addends unknown) word problems to solve independently (at the end of this Lesson).
* Circulate while student work to observe their understanding of put together/take apart problems and their strategies and representations used for solving them (SMP1 – Make sense of problems and persevere in solving them; SMP2 – Reason abstractly and quantitatively; SMP4– Model with mathematics**;** SMP5– Use appropriate tools strategically).
* Differentiate by using scaffolded questioning to push student thinking. Identify students to call on to “share out” at the end of class.
* Select students to share solutions (and possibly difficulties) and thinking with the whole class. When possible, have students share both their solution strategies and difficulties or stumbling blocks. If a student or pair has worked through a difficulty, ask permission to call upon them later to share what was difficult and how they moved forward.

**Lesson Closing**

Reflection (5 minutes)

* After students share their solutions and explanations/illustrations, say*: Today all word problems involved “putting together and take apart.” Tomorrow we will be working on word problems that we will need to compare*. Ask students if they know what it means to compare and if they can share an example of when they compared something.
* Collect students’ work as a formative assessment to determine mastery and/or misunderstandings/misconceptions.

Word Problems

**Nina, Raphael, and Cassie went apple picking at the Golden Orchard on Saturday.**

1. Nina picked a total of 36 apples. She picked 22 Macintosh apples and the rest of the apples were Golden Delicious apples. How many of Nina’s apples were Golden Delicious? Write an equation to solve the problem. Show or explain your answer.
2. Raphael picked 28 Golden Delicious apples and 23 Macintosh apples. How many apples did Raphael pick in all? Write an equation to solve. Show or explain your answer.
3. Cassie picked a total of 53 Macintosh and Golden Delicious apples. How many Golden Delicious and Macintosh apples could she have picked? Write an equation for how many Golden Delicious and Macintosh apples Cassie could have picked. Show or explain your answer.

# Lesson 5 Solving Comparison Situations

**Brief Overview:** Students will solve one step comparison word problems with difference unknown, bigger unknown and smaller unknown (within 100). As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Estimated Time:** 60 minutes

**Resources for Lesson**

Manipulatives as needed

**Content Area/Course:** Math Grade 2

**Unit:** Problem Solving using Addition & Subtraction Situations

**Time:** 60 minutes

**Lesson 4:** Solving Comparison Situations

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.

SMP1 – Make sense of problems and persevere in solving them

SMP2 – Reason abstractly and quantitatively

SMP4– Model with mathematics

**Essential Questions addressed in this lesson:**

Q1 How can pictures or tools, including number lines, help us solve word problems?

Q2 What does it mean to understand a problem?

Q3 How do you know when to add or subtract?

**Objectives:** Students will know and be able to:

* Represent an equation using a symbol for an unknown in any position.
* Solve one-step addition and subtraction problems.
* Differentiate between different types of addition and subtraction problem situations.
* Use number lines with equally spaced points corresponding to whole numbers as a problem-solving tool.

**Lesson Detail**

**Lesson Opening**

Activate prior knowledge (formative assessment): (15 minutes)

* Say: Today we will continue to solve word problems using your understanding of “put together” and “take apart.” Let’s review our understanding of what we worked on in the last lesson.
* Have the children discuss their work over the past few days. Record their ideas on a chart.
* Introduce the word “compare.” Ask: Can you think of a time when you compared? What does it mean to compare? Make a connection to the comparison of two familiar story or book characters.
* Tell students: We can also compare things in math -- for example, a circle and a square. Draw or show each shape and have children discuss the two objects – record their ideas on a chart.

**During the Lesson**

Focus Lesson: “I Do” (5 minutes)

* Write the numbers 15 and 27 on the board. Say: I want to compare these numbers. I want to know what is the same and what is different about 15 and 27. Use snap cubes to make a tower to represent each number. Model holding the towers side by side, and note what is the same about each tower (they both “share” 15).
* Model how to represent the situation in an equation: Since both towers share 15, an equation could be: 15 + ? = 27. Or you could start with the bigger number, 27 and take away 15 to find the missing number: 27- 15 = ? (SMP 4 – Model with mathematics – use concrete manipulatives to provide further explanation of situation.)

Guided Instruction: “We Do” (10 minutes)

* Say: Mrs. Brown has 14 poetry books. Mr. Gomez has 8 more than Mrs. Brown. How many poetry books does Mr. Gomez have?
* Complete a “think aloud” to solve the problem. Begin with what you know or what information the problem gives you. Verbalize what it is you need to find out or solve. Make a list of the known information needed to solve the problem working through what you need to think about and do to solve the problem.
* Follow up with how you would check your work to be sure you answered accurately. (SMP1 Make sense or problems and persevere in solving them– students make sense of the meaning of the task and find an entry point; SMP 2: Reason abstractly and quantitatively – students make sense of the quantities and relationships while solving the task; contextualize situation.)

Collaborative “You Do” (25 minutes)

* Ask students to think about this word problem: I have 31 pieces of blue sea glass and 16 pieces of white sea glass in my collection. My friend Jen has 52 pieces of sea glass in her collection. I want to compare and find out who has more sea glass in their collection and find out how many more?
* Ask: What is the problem asking? What are we trying to find out? (This problem asks two questions: who has more? And, what do we need to do to solve the problem?)
* Popcorn share…
* Ask: What do we know? Let’s review our problem solving strategies. Have students turn and talk with a partner about the steps to use to solve this word problem. Popcorn share…
* Ask: What information is given to us? List student responses.
* Ask students: What do we need to do to solve the problem -- first we need to add or “put together” the teacher’s blue and white quantities of sea glass (31 + 16 = 47). Next we compare 47 and 52 to determine who has more. Next we subtract to find out how many more Jen has than the teacher (52 – 47 = 5). Is there another equation we could use to determine how many more Jen has than the teacher? (47 + ? = 52)
* Then ask: Did we solve the problem? Ask them to turn and talk to a partner about what the answer is and whether it answers the question we asked. (The answer should be Jen had 5 more pieces than you. SMP 3 -Construct viable arguments and critique the reasoning of others. Students discuss and critique each others’ reasoning and strategies, citing similarities and differences between strategies).
* Have students complete the following word problems:
* Susie has 24 math problems to complete for homework. She solved 13 before eating dinner. How many more math problems does Susie need to solve?
* Jeremy has 21 baseball cards in his backpack. He has 7 baseball cards at home. Paula has 26 baseball cards. Who has more baseball cards? How many more?
* Sylvia has two ant farms at her house, one has a black cover and the other has a red cover. She has 52 ants in all. The ant farm with the red cover has 22 ants inside. Which ant farm has more ants, the red covered or the black covered ant farm? How many more?

**Lesson Closing**

Reflection (5 minutes)

* Facilitate a whole group discussion: As I was walking around the room I noticed some different approaches the class used to show and solve their word problems.
* Have children share their strategies for solving word problems. Ask: What differences did you notice between putting together, taking apart, and compare problems?

# 

# Lesson 6: Writing One Step Story Problems

**Brief Overview:** In this lesson students will apply their understanding of addition and subtraction situations to create and solve their own one-step word problems. As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Estimated Time:** 60 minutes

**Resources for Lesson:**

Math wall situation labels and example problems

Situation assignment cards (end of Lesson)

Large white construction paper

**Unit:** Addition and subtraction with Word Problems

**Content Area/Course:** Grade 2 Math

**Lesson 6:** Writing One Step Story Problems

**Time:** 60 minutes

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.

SMP2 – Reason abstractly and quantitatively

SMP4 – Model with mathematics

SMP 7 – Look for and make use of structure

**Essential Question addressed in this lesson:**

Q2 What does it mean to understand a problem?

Q3 How do you know when to add or subtract?

**Objectives:** Students will know and be able to:

* Create and solve one-step addition and subtraction problems.
* Explain their thinking orally or in writing.
* Use number lines with equally spaced points corresponding to whole numbers as a problem-solving tool.

**Instructional Tips/Strategies/Notes for Teachers**

* Students may not differentiate between “put together” and “add to,” or “take from” and “take apart.” The important thing is that they think about the action in each word problem and can make sense of how addition and subtraction can be related to a story and both be used to solve for the unknown.
* If students struggle to write a story for the numbers that were given on the card, try having them use smaller numbers that require less computing so they can focus on relating addition and subtraction and let them act out the problem first with counters.
* Depending on the time of the year you are teaching this unit, 2-digit and 3-digit computations that require regrouping may not have been introduced. Therefore, for this lesson, two sets of situation cards for students are provided.
* All vocabulary words need to be posted on word wall with illustration or graphic and a definition in child friendly terms.
* Prior to the start of the lesson, print and cut situation labels, word problem cards, and assignment cards.

**Lesson Sequence**

**Lesson Opening**

Activate prior knowledge (formative assessment): (15 minutes)

* Say to the students: Today you will use your understanding about problem solving to write your own word problem. But before you do this, we need to think about all the different kinds of math stories. So we are going to play a matching game. On the math wall, I put up four situations: Add to, Take from, Put together/take part, and compare. I will read a math word problem, and I want you to decide which situation it belongs with. Read each word problem card, briefly discuss it, and place each card under the appropriate situation.
* Remind students that they can visit the wall during the lesson to check if the problem they write fits their assigned situation (SMP 2- Reason abstractly and quantitatively – students can refer to the context of the task or problem to determine the appropriate operations; SMP 4 – Model with mathematics– students are able to create an appropriate problem situation from an equation).

**During the Lesson**

Focus Lesson: “I Do It” (5 minutes)

Note: Save your model problem to use again in lesson 9.

* Show the students a card that says: Add to □ + 7 = 12.
* Say: Hmmm…Since my situation is an *Add to* problem, I am adding a number to another number. My *unknown* number is before the addition symbol, so I need to find the number that I started with before I added 7. I also know that the *whole* is 12. So I can think of it as: *unknown*plus 7 equals 12. Let’s see… Now I need to make it into a story. I like flowers, so how about… I had some (unknown number) flowers, then my best friend gave me 7 more, now I have 12. How many did I have at the start?
* Draw an example picture. Say: My picture shows the action of putting seven more flowers to the *unknown* flowers to make 12 in all.

**= 12**

?

Or:

|  |  |
| --- | --- |
| **!212** | |
| ? | 7 |

Guided Instruction: “We Do It” (10 minutes)

Note: Also save this model problem to use again in Lesson 9.

* Say: Now I want to do one together. Present the card: Take apart. 11 - □ = 5
  + What is the action? ( take apart)
  + What does take apart mean? (take some from a number)
  + Is the *unknown* a missing part or missing whole? (part)
  + What do we know? (whole is 11, one part is 5)
* Ask: Hmmm, since the problem is a take apart, the total is 11, and I know one part is 5. How can I think about this? (I have 11 and I take it apart into two parts, one part is 5, I don’t know the other part.)
* Ask: What do you think the story for this problem should be about? Let students share some ideas, then choose one. Let them know if you did not take their idea, they can use it for their own problem.
* Ask a student to come up and show how to write the problem, for example: I have 11 jelly beans, 5 are red and the rest are purple. How many of my jelly beans are purple?
* Ask a student to draw an illustration. Talk about how their drawing should show the action of the problem (splitting the pile of 11 jelly beans into a pile of each color)

Collaborative “You Do It Together” (25 minutes)

* Say: Each of you will work with a partner to create a word problem. You will also need to draw an illustration on a poster to go with it. I will assign you a situation and an equation. Your answer to your problem must be the *unknown* in your equation.
* Pair students and pass out assignments and paper. As students to complete the posters and answer the following questions with their groups:
  + What was the action in your problem?
  + Does your illustration show the action?
* Notes: Students can use the math wall to make sure they are writing the correct story situation. Early finishers: Have students try another situation card.

**Lesson Closing**

Reflection (5 minutes)

* When the groups are finished, have them tape their problems up in the front of the room.
* Ask each pair to read the problem of another pair, then write a comment on a sticky note and attach it (SMP 3 – Construct viable arguments and critique the reasoning of others- students can discuss and critique each other’s reasoning and strategies; citing similarities and differences between strategies).
* When all pairs of students are finished, bring them back to whole group and have them share the comments from their peers. (Important: Save the student stories to use in lesson 9!

“Add to” Problems Handout

Add to

Some ducks were swimming in a pond. 20 more ducks came over to the pond. Now there are 45 ducks in all. How many ducks came over?

Some friends were playing at the park. 14 friends went home. Then there were only 10 friends left. How many friends were playing at the start?

Put Together/Take Apart Handout

Put together/Take apart

30 kids are playing kickball on the field. There are 20 girls and the rest are boys. How many boys are playing?

Compare Situations Handout

The pine tree in front of the school is 70 feet tall. The oak tree is 40 feet tall. How much taller is the pine tree than the oak tree?

Compare

Situation Assignment cards (beginning of year)

Add to

20 + 12 =

Take from

50 - 20 =

Put together

40 + = 70

Take apart

35 - 8 =

Take from

+ 7 = 54

Take apart

90 - = 50

Put together

+ 8 = 32

Compare

42 - 7 =

Compare

- 8 = 40

Add to

50 + = 80

Situation Assignment Cards (middle/end of year or challenge):

Take apart

+ 30 = 50

Put together

40 + 17 =

Take apart

36 - 17 =

Take from

42 - 25 =

Add to

28 + 17 =

Put together

26 + = 18

Take apart

590 - = 326

Put together

+ 148 = 364

Take from

+ 137 = 265

Compare

42 - 27 =

Compare

- 418 = 340

Add to

450 + = 836

Take apart

+ 483 = 750

Put together

386 + 197 =

# Lesson 7: Solving Two-Step Word Problems (Part 1)

**Brief Overview:** In this lesson, students will use a number line to model and solve simple two step word problems. Problems will involve working with the same operation in both steps as well as opposite operations within the problem. They will work with numbers up to 20. As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required**: The distance between each whole number on a number line is the same; moving to the right on a number line will increase the number and moving to left will decrease the number; a number line is an important tool to use when adding and subtracting; “jumps” on number line are connected to the distance and need to be explicitly marked.

**Estimated Time:** 75-90 minutes

**Resources for Lesson**

Running Race Problem Handout (see end of Lesson)

Sledding Problem Handout (see end of Lesson)

**Content Area/Course:** Math – Grade 2

**Unit:** Addition and subtraction with word problems

**Time:** 75-90 minutes

**Lesson 7:** Solving Two-Step Word Problems

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

Note: relate addition and subtraction to length

2.MD.B.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2,…, and represent whole-number sums and differences within 100 on a number line diagram.

SMP 6 – Attend to precision

**Essential Question addressed in this lesson:**

Q1 How can pictures or tools, including number lines, help us solve word problems?

Q2 What does it mean to understand a problem?

Q3 How do you know when to add or subtract?

**Objectives**: Students will know and be able to:

* Solve two-step addition and subtraction problems.
* Use number lines with equally spaced points corresponding to whole numbers as a problem-solving tool.

**Instructional Tips/Strategies/Notes for Teachers**

* Represent numbers as lengths on a number line with equally spaced points corresponding to specific numbers.
* Use a number line as tool to solve the problem.
* Students’ justifications should be clear and accurately represents the strategy used on the number line.

**Anticipated Student Preconceptions/Misconceptions:**

Students may want to add all the numbers given in the problems.

**Lesson Sequence**

**Lesson Opening**

Activate prior knowledge (15 minutes):

* Tell children they have been practicing finding the answers to one step word problems. Now have students read the following problem silently, then do a turn and talk about how to solve the problem: There were 15 kids on a bus. At the next stop more kids got on. Now there are 25 kids on the bus. How many kids got on the bus?
* (From previous lessons, children should recognize this as an “add to” problem) Say: We know there are 15 kids on the bus. That is part of the whole. We do not know how many more kids go on when the bus stopped. This is the unknown and is also part of the whole. When you put the two parts together (15 and unknown) you get the total number of kids on the bus, 25. So the equations would be 15 + \_\_\_\_ = 25.
* Have a group of two volunteer to talk about how they solved the problem as you take notes to show their thinking. Briefly discuss the answer, making sure children are secure with this activity (SMP6 Attend to precision – students need to be precise in communication and calculations as well as give precise explanations and reasoning regarding the process of finding solutions).
* Explain that today they will use what they know about solving one-step word problems to solve two-step problems. They will look at problems to solve each part to make sure they have answered the question.

**During the Lesson**

Focus Lesson: “I Do It” (20 minutes)

* Solve the following problem while modeling your thinking about the steps to solve the problem: Juan is helping his dad make a path from their front door to the street. On Saturday morning they clear 12 feet. On Saturday afternoon they clear 9 feet. If they want to make the path 40 feet long how much will they have to clear on Sunday?
* Say: I see three numbers in this problem. I need to read it again carefully to be sure I know what I need to do to solve for the correct answer. After a second reading, think out loud and model your thinking: I know they cleared 12 feet and then 9 more. That is the first part of the problem.

Step 1: 12 + 9 = \_\_\_\_\_\_\_

A number line with the following numbers spaced evenly apart on the bottom:  12, 13, 14, 15, 16, 17, 18, 19, 20, 21 

On top of the number line is the text Step 1: 12 + 9 = ______

* I found that 12 feet and 9 feet equals 21 feet (SMP 5:Use appropriate tools strategically – students will use number lines appropriately).
* Now, let’s reread the question to see if we answered it: If they want to make the path 40 feet long, how much will they have to clear on Sunday? Ask students what the answer (21 feet) tells them? (how much they cleared on Saturday) I know they will clear more on Sunday to make the path 40 feet long. I am not done with this problem. I have another step to do. I know that 21 feet of path has been cleared, but they only cleared that on Saturday. So on Sunday they will start at 21 feet and go to 40 feet. I can use my number line and count from 21 feet to 40 feet. Model this on the number line.

Step 2: 21 + \_\_\_\_ = 40

A number line with the numbers 21 through 40 spaced evenly apart on the bottom.  On top of the number line is the text Step 2: 21 + ______ = 40

* In step 2, I found out that they need to clear 19 more feet to make the path 40 feet long. That answers the questions. I had to do two steps to finish this problem.

Guided Instruction: “We Do It” (30 minutes)

* Guide the children through solving this problem: *Gabriella is running a race. She stops for water at mile 5. She runs 8 more miles and stopped for water again. She has to run 13 more miles to get to the finish line. How long is the race?*
* Have children do a turn and talk about the problem. Ask a pair to volunteer to explain their thinking. Use the student sheet to write down their thinking (note that they are not solving the problem yet, but planning their solution strategy). This sheet can be either on a chart/overhead or projected onto the board using an ELMO. Each student should have a copy of the sheet of their own to do their work as the peers explain. If you need to, continue to work on the problem after the children have explained it -- students must to understand they need to do two separate steps to get the answer.
* Let’s do this problem one part at a time. We know that Gabriella ran 5 miles and stopped for water. Then she ran 8 more miles and stopped again.

Step 1: 5+8 = \_\_\_\_\_\_\_

**0 1 2 3 4 5 6 7 8 9 10 11 12 13**

* Did we answer the question -- How long is the race? We found out that she ran 5 miles and 8 miles, which is 13 miles. But she is not done the race. We know she has to run 13 more miles to get to the finish line. We need to do another step. Start with 13, that is how many miles she ran already. Add 13 more miles.

Step 2: 13 + 13 =\_\_\_\_

A number line with the numbers 13 through 26 spaced evenly apart on the bottom.  On top of the number line is the text Step 2: 13 + 13 = _______

* So, we know she ran 26 miles in all.

Collaborative “You Do It Together” (30 minutes):

* Present children with the following problem to solve on their own: We are making a sledding path. We shoveled 10 feet of one snow one day and 12 feet of the snow the next day. If we shovel 14 more feet of snow how long will our sledding path be?
* Encourage students to solve the problem using strategies that make sense to them. Tell them that their papers will be assessed based on their pictures, numbers, words and a number line that helped them solve the problem (SMP 6 – Attend to precision – students will give precise explanations and reasoning regarding their process of finding solutions).

**Lesson Closing**

Wrap up: (20 minutes)

* Collect the students’ work and ask for volunteers to describe and show how they solved the problem.
* Review how strategies differ from doing a one-step problem to a two step problem.

Resources for Lesson 7

*Running Race Problem*

We Do: Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Gabriella is running a race. She stops for water at mile 5. She runs 8 more miles and stops for water again. She has to run 13 more miles to get to the finish line. How long is the race?

 [](http://www.google.com/imgres?start=128&hl=en&biw=1280&bih=642&tbm=isch&tbnid=RIGjYCYVyGcIkM:&imgrefurl=http://npolitan.wordpress.com/2011/04/06/finish-strong/&docid=CsYQMshp2GsL9M&imgurl=http://npolitan.files.wordpress.com/2011/04/finish-line.jpg&w=1500&h=1450&ei=dyt7UPmgA6jh0wGBpoHoAQ&zoom=1&iact=hc&vpx=800&vpy=308&dur=680&hovh=221&hovw=228&tx=113&ty=100&sig=100751420463948348168&page=7&tbnh=149&tbnw=155&ndsp=23&ved=1t:429,r:49,s:100,i:151)

*Sledding Problem*

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

We are making a sledding path. We shoveled 10 feet of one snow one day and 12 feet of the snow the next day. If we shovel 14 more feet of snow how long will our sledding path be?

# 

# Lesson 8: Solving Two-Step Word Problems (Part 2)

**Brief Overview:** In this lesson, students will continue to model and solve two-step word problems. Problems will involve working with the same operation in both steps as well as opposite operations within the problem. They will work with numbers up to 20. As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required:** Cubes can be used to represent situations; the length is going across the object from one edge to the other; how to use the relationship between addition and subtraction, e.g., Fact Families.

**Estimated Time**: 75-90 minutes

**Resources for Lesson**

Prepared chart (see sheet #1 -- bear, deer, raccoon)

Individual paper (see sheet #2 -- fish outlines)

Interlocking cubes – about 25 for each student

**Content Area/Course:** Math – Grade 2

**Unit:** Addition and Subtraction with word problems

**Time**: 75-90 minutes

**Lesson 8**: Solving Two-Step Word Problems (Part 2)

**Standard(s)/Unit Goal(s) to be addressed in this lesson**

2.OA.A.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.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.B.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2,…, and represent whole-number sums and differences within 100 on a number line diagram.

SMP 5 Use appropriate tools strategically

**Essential Question addressed in this lesson:**

Q1 How can pictures or tools, including number lines, help us solve word problems?

Q2 What does it mean to understand a problem?

Q3 How do you know when to add or subtract?

**Objective:**

* Students will be able to solve two-step addition and subtraction problems with unknown numbers.

**Anticipated Student Preconceptions/Misconceptions**

Children may say they have solved the problem after doing one step.

**Instructional Tips/Strategies/Suggestions:**

Students need to know that nonstandard units should aligned end-to-end as they place them across the table.

**Lesson Sequence**

**Lesson Opening**

Activator (20 minutes)

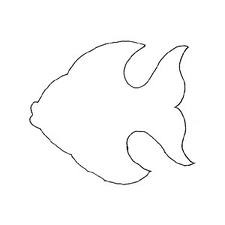
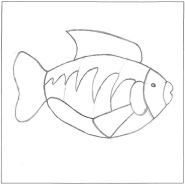
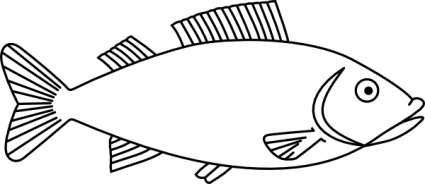
* Tell students: We have been working on solving problems that have more than one step. Today we will solve problems that involve measurement.
* Model how to use interlocking cubes to measure a shoe. (Make sure students are lining the tile up with the front of the shoe and stop at the end of the shoe.) Reinforce the correct way to get an accurate measurement.
* Have children use interlocking cubes to measure a crayon box, a book and a shelf in the room. Have them label each tower so that they can use them in the lesson. (SMP 5 Use appropriate tools strategically – students need to have access to and determine which tools are the most appropriate to use).

**During the Lesson**

Focus Lesson: “I Do It”

* Use the pre-measured objects from the activator to answer the following word problem*:* The crayon box is 4 cubes long. The book is 6 cubes long. If I place the crayon box and the book side by side on the shelf how much room will I have left?
* Model going through the problems step by step:
* Step 1: I know the crayon box is 4 cubes and the book is 6 cubes. (Link the tower of 4 cubes and 6 cubes together.) So, together they are 10 cubes long. The equation for that would be 6 + 4 = 10. Now, I have two towers (display the two towers side by side): The crayons and book together (point to the tower of 10) and the shelf (point to the tower of 20).
* Let’s see if I have answered the question: If I place the crayon box and the book side by side on the shelf how much room will I have left? I added the crayon box and book to get 10, but I don’t know how much room will be left on the shelf. I have another step to do to solve this problem.
* Step 2: I know the crayon box and book are 10 (hold up the tower) and I know the shelf is 20 (hold up the tower). I can see that the tower for the shelf is longer than the tower for the crayon and book. I need to find out how much longer the shelf it than the crayon and book. That is a “take apart” or a “add to” problem. The whole shelf is 20 and I am taking away the part with the crayon and book (10). So the equation for this would be: So, my equation would be: 20 **-** = 10.
* I could start with 10 and add some more to get to 20. The equation for this would be: 10 **+** = 20.
* So I found that I can put the crayon box and book on the shelf and there will be 10 cubes of space left on the shelf.

Three fish: Copy for each student

FISH A FISH B FISH C

(If you put fish A and B together would it be longer or shorter than Fish C?) How much longer or shorter?

Guided Instruction: “We Do It”

* Present the class with a chart that displays the outline of the footprint of a bear, deer and raccoon. At the bottom of the chart is the question: If we put the deer and raccoon footprint together would it be longer or shorter than the bear? How much longer or shorter? Have children come up and measure each footprint with cubes – indicting the number next to the print. Together create cube towers for each print. Have children solve the problem using these towers to solve the problem. Model the number sentences to match their problem.

Example of chart:



* If we put the deer and raccoon footprint together would it be longer or shorter than the bear? How much longer or shorter?

Collaborative “You Do It Together” (20 min)

* Provide each student with a copy of the outline of three fish: A, B and C. They also need at least 25 interlocking cubes. Provide each student with a sheet of paper that is blank at the top and has the following question at the bottom: If you put fish A and B together would it be longer or shorter than Fish C? How much longer or shorter? Students work individually to solve this problem.

**Lesson Closing**

Reflection – 15 minutes

* Call students together. Guide a discussion or “math talk” about the different skills needed to complete this type of word problem, covering the following topics:
* two step problems
* compare problems
* using nonstandard measurement properly.
* Have students share their strategies for solving word problems.

# Lesson 9: Writing Two-Step Word Problems

**Brief Overview:** Students will create two-step word problems. Problems may involve working with the same operation in both steps or opposite operations within the problem. They will work with numbers up to 20. As you plan, consider the variability of learners in your class and make adaptations as necessary.

**Prior Knowledge Required:**

**Estimated Time:** 60 minutes

**Resources for Lesson**

Math wall

Student stories from Lesson 6

Situation assignment cards

Small dry erase board, markers

Large white construction paper

**Unit:** Addition and subtraction with Word Problems

**Content Area/Course:** Mathematics,Grade 2

**Lesson 9:** Writing Two-Step Word Problems

**Time:** 60 minutes

**Standard(s)/Unit Goal(s) to be addressed in this lesson:**

2.OA.A.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.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD**.**B.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2,…, and represent whole-number sums and differences within 100 on a number line diagram.

**Essential Question addressed in this lesson:**

Q2 What does it mean to understand a problem?

**Objectives**: Students will know and be able to:

* Solve two-step addition and subtraction problems.
* Use number lines with equally spaced points corresponding to whole numbers as a problem-solving tool.

**Instructional Tips/Strategies/Notes for Teachers**

* Prior to the start of the lesson, print and cut situation assignment cards.
* If students are struggling to write a story for the numbers that were given on the card, try having them use smaller numbers that require less computing so they can focus on relating addition and subtraction and let them act out the problem first with counters.
* Suggested guiding questions to supplement the essential question: Why is it important to understand different word problem situations? How do we create an equation to represent a problem?

**Lesson Sequence**

**Lesson Opening**

Activate prior knowledge (formative assessment)(15 minutes)

* Say: A couple of lessons ago we wrote our own math stories. Today, we are going to take the story you wrote and make it longer by adding another step to your story and write a new number sentence. Let’s take a look at the math wall, and review the four situations: Add to, Take from, Put together/take part, and Compare.
* Now, I am going to read a couple of your stories, and see if you can identify the story situation. Give each student a small dry erase board and marker. Hold up and read a story example from lesson 6 and ask students to identify the word problem situation. Repeat for two more student stories.

**During the Lesson**

Focus Lesson: “I Do It” (5 minutes)

* Show students the problem you created in Lesson 6. Say: I am going to pick another word problem, or story, situation card and use it to add another part to my story.”
* Read the original story: I had some flowers, then my best friend gave me 7 more, now I have 12. How many did I have at the start?
* Pick a new card: Put together/Take apart. Think aloud: Since it is put together/take apart, my second step is to think about the flowers I had at the start in parts. So how about I decide that all the flowers I had in the end were red, except for 2 that were blue. The new question we can ask is: How many of the flowers I started with were red? So, my second equation is: 12 – 2 = □.
* I am going to rewrite my story now with both parts and ask a new question: I had some flowers, then my best friend gave me 7 more. Now I have 12. If I only had 2 blue flowers in the end and the rest were red, how many were red?

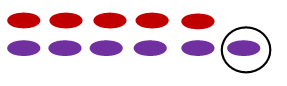
flowers
three red, two blue that are circled, 7 red

or

|  |  |
| --- | --- |
| !212 | |
| blue | ? red |

Guided Instruction: “We Do It” (10 minutes)

* Say: The problem we did together last time was: I have 11 jelly beans, 5 are red and the rest are purple. How many of my jelly beans are purple?
* Pick a new situation card, e.g., compare.
* Let students share some ideas about how to add another step or question to the problem, e.g., how many more purple jelly beans than red jelly beans? Ask a student to draw an illustration and write a new number sentence. Talk about how their drawing should show the action of the problem.



* There is one more purple than red (6 – 5 = □). The *unknown* is the difference. (SMP2– Reason abstractly and quantitatively – students decontextualize and represent task by using numbers and symbols; they also contextualize by referring to context of the task in order to determine the operation needed to solve the problem.)

Collaborative “You Do It Together” (25 minutes)

* Say: Each of you will work with your partner again to write another part to your word problem. You will need to make another poster with your new story written a new illustration to go with it. Your answer to your problem must be the *unknown i*n your new problem.
* Pair students and pass out assignments and large white construction paper.
* As students complete the posters, have them answer the following questions with their groups: What was the action in the second part of your problem. Does your illustration show the action? (SMP4 – Model with mathematics – students make sure their equation accurately matches the problem context.)
* Notes: Students can use the math wall to make sure they are writing the correct story situation. Early finishers: Have students try another situation card.

**Lesson Closing**

Reflection (5 minutes)

* When the groups are finished, have them tape their problems up in the front of the room. Ask each pair to read another and write a comment on a sticky note and attach. When all the pairs are finished, bring students back to whole group and share the comments from their peers.

Curriculum Embedded Performance Assessment (CEPA) #1

Teacher Instructions

**Goal:** The task is to decide how to spend a $100 gift card at a toy store. Each student will explain to a parent or guardian that he/she can afford to buy three toys instead of two, using mathematics.

**Role:** Each student isa toy store customer.

**Audience:** Parents

**Situation**: You are at a toy store and have $100 to spend. You have chosen two items, but think you can afford to buy a third item. You tell your parent that you think you have enough money to buy 3 items. Your parent is not sure if that is true and wants to see evidence. It is OK to buy one more item but you need to make sure you have enough money before going to the cashier. You will show the math proving that you can buy the three items with $100 and then explain it so it is understandable.

**Product:** A written explanation showing your math to help your parent or guardian understand your reasoning for how you can or can’t buy three toys instead of two.

**Other directions**: Use the sheet on the following page, if it’s needed, for students to pick out toy store items.

**Criteria for Success**:

Your work will be judged using the CEPA Rubric.

images for Toy Store CEPA
bear $14
Rocket  $54
Remote Controlled Car: $46
Video Game:  $64
Sports Pack:   $32
Doll: $25
Spinning Top:$15
Lego Set: $43
Kite: $27




# CEPA #1: Student Instructions

**The Toy Store Decision**

You are at a toy store and have $100 to spend. You have chosen two items, but think you can afford to buy a third item. You tell your parent that you think you have enough money to buy 3 items. Your parent is not sure if that is true and wants to see evidence.

Prove that you can buy the three items with $100 using mathematics. Provide an equation, model your equation using a number line, and explain your thinking.

# CEPA #2: Playground Development Project

Student Instructions

**The task:** You are part of a team that has been asked to help design a new playground for your town.

1. What is the distance between point B and point C?

Show your thinking by writing an equation and model your equation using a number line.

1. The team would like to create a walking path that is 35 meters long.

Could you use the triangular path from the picnic table to the water fountain, to the flag pole and back to the picnic table? Is this 35 meters?

Show your thinking by writing an equation. If that path is not 35 meters, how much longer does it need to be?

See map on the next page.

A

a map showing distances between locations on the playground
A to B: 24 m; B to C:  unknown 
 C to picnic table: 28 m, picnic table to flag: 7 m; flag to water fountain: 12 m, water fountain to picnic table: 15 m; water foundtain to E: 31 m; E to D; 24 m;
the distance from B to the picnic table is 39 m.

There are also images for students to cut out and place on the playground map as part of their design:  swings, slide, teeter totter, carousel, and a climbing structure.

It is 39 meters from Point B to the picnic table

A

Note – The distance from point B to the picnic table is 39 m.

Note – The distance from point B to the picnic table is 39 m.

Note – The distance from point B to the picnic table is 39 m.

Rubric for CEPAs #1 and #2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Performance Indicators** | **Exceeds Standards**  **4** | **Meets Standards**  **3** | **Partially Meets Standards**  **2** | **Does not Meet Standards**  **1** |
| **Problem Solving** | Work shows a thorough and accurate understanding of the problem solving situation(s).  Able to accurately determine the appropriate operation(s) and use efficient strategies to solve the problem(s). | Work shows an understanding of the problem solving situation, with minimal errors.  Able to determine the appropriate operation(s) and efficient strategies needed to solve the problem(s). | Work shows partial understanding of the problem solving situation(s).  Able to determine the appropriate operation(s) and strategies needed to solve the problem(s). Strategies used may not be efficient. | Work shows limited or no understanding of the problem solving situation(s).  Did not use appropriate operations or efficient strategies to solve the problems.  Work shown is incomplete. |
| **Mathematical Reasoning and Justification** | Shows thorough conceptual understanding of one- and two-step problem solving situation(s) involving addition and subtraction within 100; demonstrates understanding beyond the specified standards.  Justification is based on evidence of accurate mathematical reasoning using addition and subtraction within 100. | Work shows a solid conceptual understanding of one- and two-step problem solving situations involving addition and subtraction within 100.  Justification is based on evidence or mathematical reasoning using addition and subtraction within 100. | Work shows partial conceptual understanding of one- and two-step problem solving situations involving addition and subtraction within 100.  Justification show partial evidence of mathematical reasoning using addition and subtraction within 100. | Work shows little or no conceptual understanding, of one- and two-step problem solving situations involving addition and subtraction within 100.  Justification does not show evidence of mathematical reasoning using addition and subtraction within 100. |
| **Mathematical Calculations** | Calculations are complete and accurate with no errors.  Efficient strategies are used. | Calculations are complete and accurate with minimal errors.  Efficient strategies are used. | Calculations are incomplete and/or contain multiple errors.  Inefficient strategies may have been used. | Calculations are incomplete, contain many errors or are not shown.  Inefficient strategies were used. |
| **Modeling Equations and Number Lines** | Number line begins at zero and all numbers are correctly placed and evenly spaced.  Number line accurately represents the equation used.  Equation accurately represents the problem solving situation and includes a symbol representing the unknown number. | Number line begins at zero and most numbers are correctly placed and evenly spaced.  Number line accurately represents the equation used.  Equation accurately represents the problem solving situation and includes a symbol representing the unknown number. | Number line is only partially correct--it may not begin at zero, and/or may contain some incorrectly placed or unevenly spaced numbers.  Number line does not accurately represent the equation used.  Equation accurately represents the problem solving situation and includes a symbol representing the unknown number. | The number line is inaccurate or not shown.  Number line does not accurately represent the equation used.  Equation does not accurately represent the problem solving situation. |
| **Communication** | Precise mathematical language is used to communicate mathematical thinking.  Explanation conveys a deep understanding of addition and subtraction within 100.  Explanation is supported by accurate mathematical evidence (equation, number line, calculations) | Mathematical language is mostly used to communicate mathematical thinking.  Explanation conveys a conceptual understanding of addition and subtraction within 100.  Explanation is supported by mostly accurate mathematical evidence (equation, number line, calculations) | Some mathematical language is used to communicate mathematical thinking.  Explanation conveys a partial conceptual understanding of addition and subtraction within 100.  Explanation is partially supported by mathematical evidence (equation, number line, calculations). Some errors may be evident. | Little or no mathematical language is used.  Explanation conveys limited conceptual understanding of addition and subtraction within 100.  Explanation is may not be supported by mathematical evidence (equation, number line, calculations). Many errors may be evident. |

Unit Resources

**Lesson 1**

* Poster or chart paper
* Story problem situations for each group
* Picture to represent the story problem that teacher reads to class
* Poem: *My Neighbor's Dog is Purple* by Jack Prelutsky or other poem for visualization

**Lesson 2**

* Addition word problems (end of the Lesson)
* Chart of “Add To” situations (end of Lesson)

**Lesson 3**

* Subtraction word problems (end of Lesson)
* Chart of “Take From” situations (end of Lesson)

**Lesson 4**

* Manipulatives/counters
* 99’s charts
* Number lines
* Independent Practice Worksheet (end of this Lesson)

**Lesson 5**

* Manipulatives, as needed

**Lesson 6**

* Math wall situation labels and example problems
* Situation assignment cards (end of Lesson)
* Large white construction paper

**Lesson 7**

* Running Race Problem Handout (see end of Lesson)
* Sledding Problem Handout (see end of Lesson)

**Lesson 8**

* Prepared chart (see sheet #1 -- bear, deer, raccoon)
* Individual paper (see sheet #2 -- fish outlines)
* Interlocking cubes – about 25 for each student

1. See Glossary, Table 1. [↑](#footnote-ref-1)