

General Information

Lesson Parts & Duration

Total Duration: 1 hour

- Solving Addition Word Problems Step by Step – Unknown Part

Subject(s)

- Operations & Algebraic Thinking: Addition within 100, Tape Diagrams, Explaining Strategies Used (2.OA.1)

Objective

- Students will read word problems and determine important information.
- Students will determine the missing information they need to find to solve the word problems.
- Students will draw pictures/tape diagrams to solve the word problems.
- Students will write an equation to solve the word problems.
- Students will explain their thinking and strategies they used to solve the word problem.

Materials

- blank paper
- pencil & crayons/colored pencils
- document camera or whiteboard
- **Optional Printable Student Resources:** “Exit Slip” (page 9) (1 copy per student), “Solving Word Problems (Class Practice)” (page 10) (1 copy per student), “Solving Word Problems (Partner Practice)” (page 11) (1 copy per student)
- **Optional Printable Teacher Resources:** “Steps to Solve a Word Problem” (page 12) (1 copy for display), “Break Up Your Day” brain/movement break ideas (page 13)

Instructional Setting

- Students should be seated so that they can easily work with a partner.

Throughout this lesson, you will find:

- ☀ **Scripted Text** indicates things that need to be said directly. Bullets starting with a “T” followed by *italicized* type indicate scripted text
- ☀ **Clarifiers** within scripted text are in orange
- ☀ **Teacher Directions** indicate things you should be doing
- ☀ **Side notes** provide helpful hints, ELL strategies, differentiation and information
- ☀ **Break Up Your Day** (Brain/Movement Breaks) are in green boxes (at the end)

Remember!

Quality over quantity. All components do not have to be accomplished; lessons may be ended at any time and resumed later.

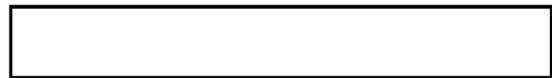
Instructional Plan: 60 minutes

Introduction

- T** Today we will practice solving addition word problems using tape diagrams and equations.
- T** We will also practice examining a word problem carefully to identify all of the important details needed to solve the problem.
- T** Let's start with this problem.
- T** "Today we are having a party. For our party, we will bake 32 large chocolate chip cookies, 12 cupcakes, and 24 brownies. How many treats did we bake in all?"
- T** I don't know about you, but that sounds like a lot to draw!
- T** Drawing pictures to solve problems was a useful strategy for us to use as Kindergarteners and 1st graders, but as 2nd graders we have some much more challenging math problems.
- T** This means we will need to find a new method of illustrating the problem so that we can see it visually.
- T** This new strategy is using something called, "tape diagrams" or "bar models."
- T** Tape diagrams help us to see a visual model that uses rectangles.
- T** Let me show you how using a tape diagram can help us to visually see our problem.
- T** The first step is to draw one long bar. **See example & model so students can follow.**
- T** Next, you break your bar up into the correct number of spaces.
- T** In our problem we had 3 parts: cookies, cupcakes, and brownies.
- T** So, I will break the bar into 3 pieces. **See example & model so students can follow.**
- T** Now here is the important part, the pieces I break the bar into should make sense with the numbers in my problem.
- T** Let me show you what I mean.
- T** Our problem had 32 cookies, 24 cupcakes, and 12 brownies.
- T** 32, 24, and 12 are not equal in value so that means the spaces should not all be the same size.
- T** 32 is the largest number and should have the largest piece, next is 24, should be smaller than 32, but larger than 12, and last is 12 which should be the smallest piece.
- T** Then I need to label each part. **See example & model so students can follow.**
- T** This is a "part + part + part = total" model. **See example & model so students can follow.**
- T** The unknown in our problem is the total, so below my bar I will draw a bracket and put a question mark.
- T** Not all word problems will follow this model of the total being the unknown.
- T** Sometimes the total might be known and one of the parts is the unknown. **See example & model so students can follow.**

Creating a Tape Diagram/Bar Model

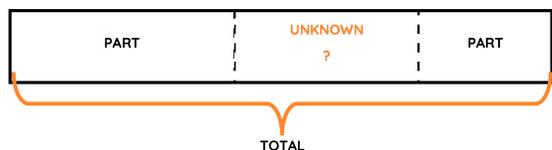
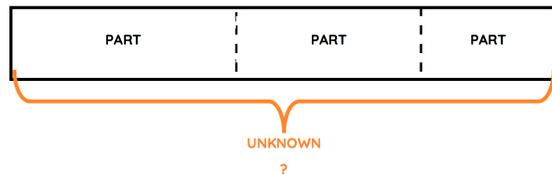
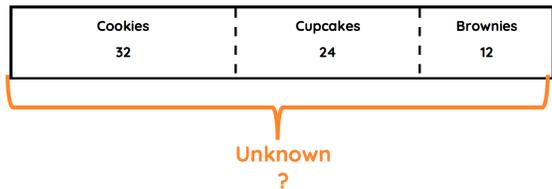
Step 1: Draw a Bar



Step 2: Separate spaces to match the number of items in your problem. Spaces should make sense based on the numbers.



Step 3: Label each part of your bar model/tape diagram.



- T* Either way we always label the parts of our diagram with the correct words and numbers and then identify the unknown by using a question mark.
- T* During this lesson we will focus on one of the parts being the unknown.

Pass out a copy of “Solving Word Problems (Page 1)” to each student –or– project it so that students can copy on blank paper.

Whole Group Practice

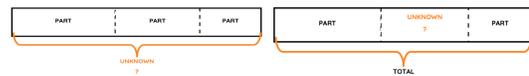
- T* Now that you have seen the strategy that we will be using, let’s practice a few problems.
- T* Once everyone has gotten the hang of solving word problems by identifying key information, drawing a tape diagram/bar model to represent the numbers, and finally writing an equation that matches to solve the problem, you will have a chance to solve some problems the same way.
- T* Let’s start by going through the whole process on a new problem.
- T* We are going to follow the RDW process.
- T* RDW stands for “Read, Draw, Write.”
- T* We will always start by reading our problem carefully.
- T* Then we will read it a second time and underline important details and circle our question.
- T* Next, we will “Draw,” in this case we aren’t drawing pictures, we are drawing a tape diagram/bar model.
- T* Finally, we will “Write,” this means we will write the equation and solve for the unknown.
- T* Then we will write our final answer in a complete sentence.

Name: _____

Steps to Solve a Word Problem

RDW: Read, Draw, and Write

- Read** the problem carefully.
- Read** it a second time underlining important details and circling the question.
- Draw** the information using a tape diagram/bar model.
- Label** all of the “Parts”, the “Total” and the “Unknown” using a question mark “?”.



- Write** the equation to match the word problem and **solve**.
- Write** your **answer** in a **complete sentence**.

Pass out 1 “Solving Addition Word Problems” sheet to each student –or– project it for students to copy on blank paper.

Whole Group Setting up the Paper

- T* Using the steps we just reviewed, let’s see if you can help me to solve this first problem.
- T* This time we will be working to solve for an unknown part, not for an unknown total.

Problem # 1

- T* We will start by completing problem number 1.
- T* First, we will read the problem carefully: “My dad went to the store and bought 18 snacks. 12 of the snacks were crackers and the rest were cheese sticks. How many cheese sticks did he buy?”
- T* Then we will read it a second time looking for important details.
- T* I will stop reading each time I find an important detail and I will underline it.

T “My dad went to the store and bought 18 snacks.” Let’s stop and underline “18 snacks.” See example & model so students can follow.

T “12 of the snacks were crackers,” stop and underline “12 of the snacks were crackers.” See example & model so students can follow.

T “and the rest were cheese sticks.” Stop and underline “rest were cheese sticks.” See example & model so students can follow.

T “How many cheese sticks did he buy?” Circle this because it is our question. See example & model so students can follow.

T Step 2 is to draw.

T This time we will draw a tape diagram bar, let’s decide how many parts there are in our word problem.

T Show me with your fingers how many parts there are in this problem. Answer: 2 parts.

T Correct, there are 2 parts.

T Thumbs up if you think all of the parts should be the same size and thumbs down if you think they should be different sizes. Answer: Thumbs down, they should be different sizes.

T The total of this problem is 18, and I know that 12 is one of my parts, $12 + 12$ is not 18, so they need to be different sizes.

T Next, I have to label each of the 2 parts and the total.

T The total is “18 snacks”,

T The first part is “12 crackers” and the second part is unknown so we will indicate that using a “?”.

T The last thing that we will do is write our equation, “ $12 + ? = 18$ ”.

T This is a bit trickier than that when we are finding an unknown total.

T There are two ways to look at this problem.

T I can use the opposite of addition, which is subtraction to find the unknown part.

T So, I would take my total which is 18 and subtract the part I know from it, so “ $18 - 12$.”

T The answer to “ $18 - 12 = 6$.”

T The other way to think about it is: 12 plus what number would give you 18?

T “ $12 + 6 = 18$.”

T Now I have my final answer which is 6.

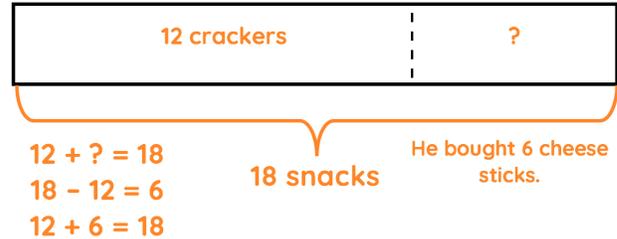
T The final step is to write our answer as a complete sentence.

T To do this, I will use words from my question to write a complete sentence containing my answer.

T Let me show you what I mean, the question is: “How many cheese sticks did he buy?”

T So, I will say, “He bought 6 cheese sticks.” I am using the words from the end of the question in my answer.

1. My dad went to the store and bought 18 snacks. 12 of the snacks were crackers and the rest were cheese sticks. How many cheese sticks did he buy?



Problem # 2

T Now I will let you try each step first and then we will check to see if you did it correctly.

T First, you need to read the problem carefully.

T Then read a second time and underline the important details and circle the question.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

T You should have underlined: “54 stuffed animals,” “25 are hippos,” “25 are lions,” and “monkeys.”

T Then circled the question which is: “How many monkeys are there?”

T Give me a thumbs up if you got that step right! Scan the room to get an idea of who is understanding and who may need more support later.

T Step 2 is to draw.

T Using this tape diagram bar, decide how many parts there are in our word problem.

T Divide the tape diagram up and label all of the parts.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

T Show me with your fingers how many parts there are in this problem. **Answer: 3 parts.**

T Correct, there are 3 parts.

T Thumbs up if you think all of the parts should be the same size and thumbs down if you think they should be different sizes.

Answer: Thumbs down, they should be different sizes.

T You should have label the first part “25 are hippos,” the second part “25 are lions,” and the third part is unknown.

T Since it is unknown you should have shown this with a “?”.

T Finally, the total is “54 stuffed animals,” which you should have written below the bar.

T The last thing that we will do is write our equation.

T Please write out the equation and solve.

2. Molly has **54 stuffed animals**, **25 are hippos**, **25 lions**, and the rest are **monkeys**. How many monkeys are there?



$$25 + 25 + ? = 54$$

$$54 - 50 = 4$$

$$25 + 25 + 4 = 54$$

54 stuffed animals

There are 4 monkeys.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

T This one is a bit trickier like the last one.

T We know the answer, but we are missing one of the parts.

T Our equation is: “25 + 25 + ? = 54.”

T To solve this, you can either take the answer and subtract the part you know from it, so: “54 - 25 - 25 = 4”.

T Or you need to ask yourself, 25 plus 25, plus what number equals 54, which is 4.

T So, “25 + 25 + 4 = 54.”

T Now I have my final answer which is 4.

T Final step, write you answer in a complete sentence.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

T To do this, you should have used words from the question to write a complete sentence containing your answer.

T The question is: “How many monkeys are there?”.

T So, I will say, “There are 4 monkeys.” I am using the words from the end of the question in my answer.



Now is a great time to take a break and get students re-energized. See our list of engaging movement and brain break ideas to get your students moving and ready to refocus! (see page 13)

Problem # 3

T Now I will let you try each step and then we will check to see if you are correct as we go.

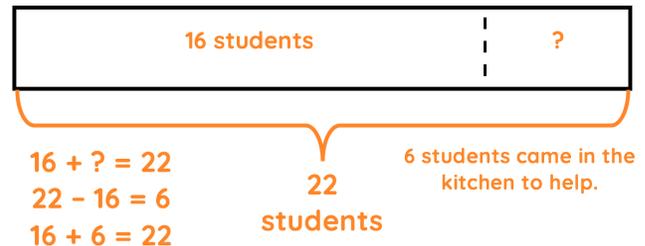
T First, you need to read the problem carefully.

T Then read a second time and underline the important details and circle the question.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

- T* You should have underlined: “16 students” and “22 students.”
- T* Then circled the question which is: “How many more students came in the kitchen to help?”
- T* Give me a thumbs up if you got that step right! Scan the room to get an idea of who is understanding and who may need more support later.
- T* Step 2 is to draw.
- T* Using this tape diagram bar, decide how many parts there are in our word problem.
- T* Divide the tape diagram up and label all of the parts.

3. There are **16 students** in the kitchen baking. Some more students came in the kitchen to help. Now there are **22 students baking** in the kitchen. How many more students came in the kitchen to help?



Give students about a minute to complete this step. Monitor and provide assistance as needed.

- T* Show me with your fingers how many parts there are in this problem. Answer: 2 parts.
- T* Correct, there are 2 parts.
- T* Thumbs up if you think all of the parts should be the same size and thumbs down if you think they should be different sizes. Answer: Thumbs down, they should be different sizes.
- T* You should have label the first part “16 students,” the second part is unknown.
- T* Since it is unknown you should have shown this with a “?”.
- T* Finally, the total is 22 students, which you should have written below the bar.
- T* The last thing that we will do is write our equation.
- T* Please write out the equation and solve.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

- T* This one is a bit trickier.
- T* We know the answer, but we are missing one of the parts.
- T* Our equation is: “ $16 + ? = 22$ ”.
- T* To solve this you can either take the answer and subtract the part you know from it, so: “ $22 - 16 = 6$ ”.
- T* Or you need to ask yourself, 16 plus what number equals 22, which is 6.
- T* So, “ $16 + 6 = 22$ ”.
- T* Now I have my final answer which is 22.
- T* Final step, write you answer in a complete sentence.

Give students about a minute to complete this step. Monitor and provide assistance as needed.

- T* To do this, you should have used words from the question to write a complete sentence containing your answer.
- T* The question is: “How many more students came into the kitchen to help?”
- T* So, I will say, “6 more students came in the kitchen to help.” I am using the words from the end of the question in my answer.

Problem # 4

- T* This is the last problem we will do together as a group.
- T* This time I would like you to try to follow the steps and solve the problem by yourself.
- T* Then we will discuss our answers.

Give students time to complete this problem. Monitor and provide assistance as needed.

- T* Now I would like 3 brave volunteers to come up and be the teacher and walk us through the problem and how you solved it. Call on 3 students to come up and share.

Allow students to share their tape diagrams and explain how they solved the problem. If students have different ideas or if they are incorrect, nicely clear up any misconceptions.

Partner Practice

Pass out the “Solving Word Problems (Partner Practice)” to each student –or– project it for students to copy on blank paper.

- T* Now that we have practiced 4 problems together as a class, I think you are all ready to try some similar problems with a partner.
- T* Please use the paper we did together as a guide to help you follow all of the steps: RDW: Read, Draw, and Write.
- T* When I say go, you will get up and find a partner who was born in the same month as you.
- T* If you can't find a partner I will pair you up with another student.
- T* Ready, Go! Don't forget to take your paper and pencil with you. Pair up any student who doesn't have a partner.

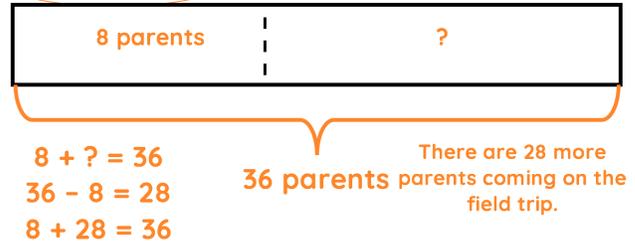
Allow students about 15-20 minutes to complete this sheet with a partner. Answers found on next page.

Optional Assessment Component “Exit Slips”

*You may use the exit slip at the end of this lesson as a quick assessment of student understanding. Either print them out (page 9), or simply have students copy the problems on a half sheet of paper.

- T* Now it is time to show your teacher what you have learned.
- T* But first let's turn and tell the person next to us how to make a tape diagram to solve an addition problem while solving for an unknown part.

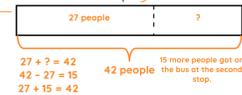
4. There are **8 parents** coming on the field trip from Mr. Smith's classroom. There are some more parents coming from the other 2nd grade classroom. There will be **36 parents coming** on the 2nd grade field trip in total. How many more parents are coming?



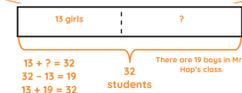
Name: ANSWER KEY

Solving Word Problems (Partner Practice)

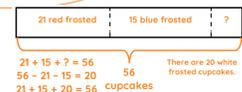
1. There are **27 people** on the city bus. **More people got on** the bus at the second stop. **Now there are 42 people** on the bus. How many more people got on the bus at the second stop?



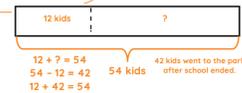
2. In Mrs. Hap's class, there are **32 students**. **15 of her students are girls** and the **rest are boys**. How many boys are in Mrs. Hap's class?



3. Ben made **56 cupcakes**. He frosted **21 of those cupcakes red**, **15 of the cupcakes he frosted blue**, and the **rest he frosted white**. How many cupcakes were frosted white?



4. There are **12 kids playing at the park**. After school ended a lot of kids went to the park. There were **54 kids at the park** after school. How many kids went to the park after school ended?



Differentiation:

- Support:** Pull small group aside to work through problems together or pair up students to work together.
- Enrichment:** Give students who need an additional challenge more problems containing larger numbers.

Give a few minutes for students to review. If you hear many incorrect responses please review quickly before having students complete their exit slips.

- T* You will solve 1 word problem independently, the same way that you solved the problems with the whole class, and with your partner.
- T* Remember to RDW: Read, Draw, and Write.
- T* You need to underline important details, circle the question, create a tape diagram, write an equation, solve, and finally write your answer as a complete sentence.
- T* Once you have finished please bring me your paper.

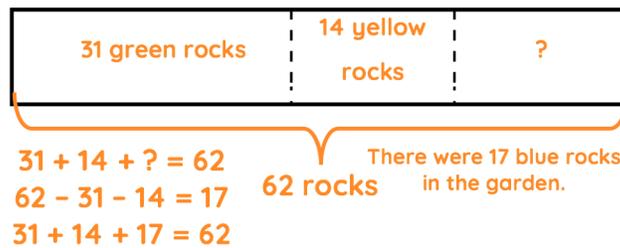
Collect “Exit Slips” and leave for the teacher. Answer found below.

Name: **ANSWER KEY** Date: _____

Exit Slip:

Addition Word Problems Using Tape Diagrams

1. George was painting 62 rocks for his vegetable garden. He painted 31 rocks green. Then he decided to paint 14 rocks yellow, and painted the rest blue. How many blue rocks were there in the garden?



Make sure to “Break Up Your Day!”

Now is a great time to take a break and get students re-energized. See our list of engaging movement and brain break ideas to get your students moving and ready to refocus! (see page 13)

Name: _____ Date: _____

Exit Slip:

Addition Word Problems Using Tape Diagrams

2. George was painting 62 rocks for his vegetable garden. He painted 31 rocks green. Then he decided to paint 14 rocks yellow, and painted the rest blue. How many blue rocks were there in the garden?

Name: _____ Date: _____

Exit Slip:

Addition Word Problems Using Tape Diagrams

3. George was painting 62 rocks for his vegetable garden. He painted 31 rocks green. Then he decided to paint 14 rocks yellow, and painted the rest blue. How many blue rocks were there in the garden?

Name: _____

Solving Word Problems (Class Practice)

1. My dad went to the store and bought 18 snacks. 12 of the snacks were crackers and the rest were cheese sticks. How many cheese sticks did he buy?

2. Molly has 54 stuffed animals. 25 are hippos, 25 lions, and the rest are monkeys. How many monkeys are there?

3. There are 16 students in the kitchen baking. Some more students came in the kitchen to help. Now there are 22 students baking in the kitchen. How many more students came in the kitchen to help?

4. There are 8 parents coming on the field trip from Mr. Smith's classroom. There are some more parents coming from the other 2nd grade classroom. There will be 36 parents coming on the 2nd grade field trip in total. How many more parents are coming?

Name: _____

Solving Word Problems (Partner Practice)

1. There are 27 people on the city bus. More people got on the bus at the second stop. Now there are 42 people on the bus. How many more people got on the bus at the second stop?

2. In Mrs. Hap's class there are 32 students. 13 of her students are girls and the rest are boys. How many boys are in Mrs. Hap's class?

3. Ben made 56 cupcakes. He frosted 21 of those cupcakes red. 15 of the cupcakes he frosted blue, and the rest he frosted white. How many cupcakes were frosted white?

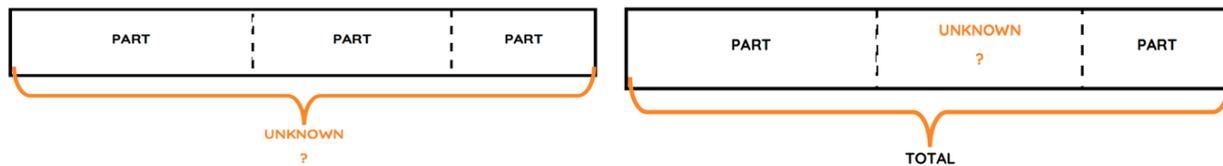
4. There are 12 kids playing at the park. After school ended a lot of kids went to the park. There were 54 kids at the park after school. How many kids went to the park after school ended?

Name: _____

Steps to Solve a Word Problem

RDW: Read, Draw, and Write

1. **Read** the problem carefully.
2. **Read** it a second time underlining important details and circling the question.
3. **Draw** the information using a tape diagram/bar model.
4. **Label** all of the “**Parts**”, the “**Total**” and the “**Unknown**” using a question mark “?”.



5. **Write** the **equation** to match the word problem and **solve**.
6. **Write** your **answer** in a **complete sentence**.

Make sure to “Break Up Your Day!”

These can be used in the middle of a lesson or at the end of your lesson.

Here are a few engaging movement and brain break ideas to get your students moving and ready to refocus!



Break Up Your Day: Guess My Number!



- Begin by showing an example:
- “I am thinking of a number between 1 and 10. Who would like to guess my number” Call on a student.
- When they take a guess, let them know if your number is bigger or smaller than what they guessed (ex: Student guesses 5, your number is 7, so you would say “My number is bigger than 5.” Then call on another student to guess).
- Keep giving clues until students guess the number.
- You could play again with the teacher picking the number if students need reinforcement, or you could have a student come up and pick the number (have them tell you what the number is so you can help them).



Break Up Your Day: The Wiggles!



- Let’s get our wiggles out before we continue!
- Stand up and shake out your arms (4-5 seconds to shake) Remember! No one should get hurt! ...now FREEZE!
- Now shake the wiggles out of your right leg...FREEZE!
- Now shake the wiggles out of your left leg...FREEZE!
- Now shake all the wiggles out of your whole body...FREEZE!



Break Up Your Day: Body Stretches!



10 minutes

FORMATION: Standing at desks

- Have students begin the day with a series of simple activities lasting 30 seconds or more: jumping jacks, knee lifts, flap arms like a bird, hopping, scissors (feet apart then cross in front, feet apart then cross in back)...
- Follow each activity with a basic stretching movement:
- Reach for the sky runner’s stretch
- Butterfly stretch (sit with bottom of feet together)
- Knee to chest, rotate ankles, scratch your back

Hold stretches for 10 - 30 seconds. Repeat a different simple activity followed by a new basic stretch as many times as desired.