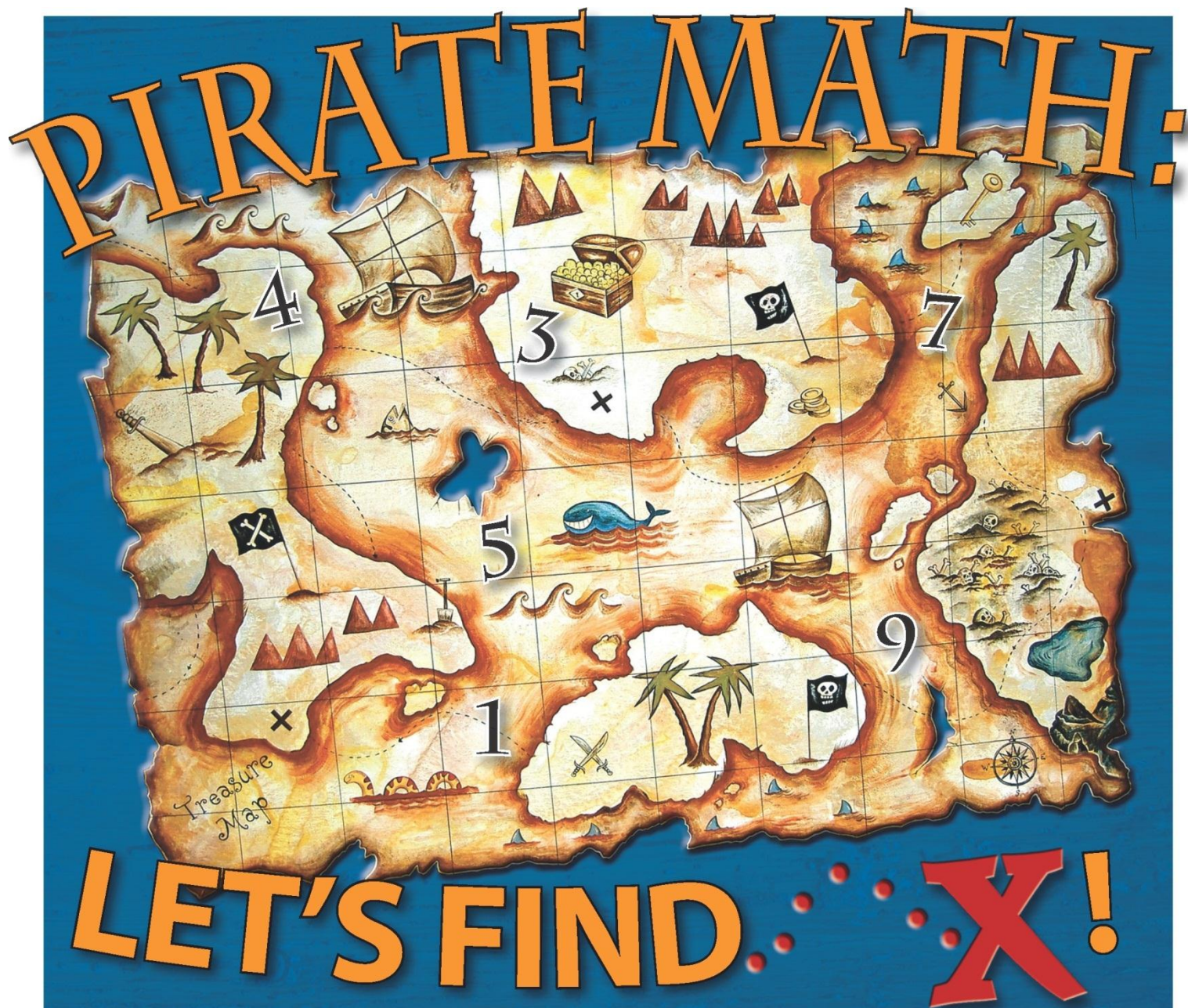




Tutoring Program for Remediating Difficulty with Word Problems

Lynn S. Fuchs, Pamela M. Seethaler,
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Vanderbilt University

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Special Education

Dear Educator,

Thank you for your interest in Pirate Math Word-Problem Solving Intervention Program at Third Grade. This Pirate Math small group tutoring program was developed at and is sole sourced by Vanderbilt University. We are pleased to offer you this excerpt to review.

These pages from the Pirate Math tutoring intervention manual are provided as a courtesy to allow you to preview a representative sampling of the Pirate Math Tutoring Program at 3rd Grade. This excerpt includes the following:

1. Table of Contents
2. Introduction
3. Total Problems – Day 5 – “Find X!” with addition number sentences
4. Difference Problems – Day 16 – “Find X!” with subtraction number sentences
5. Change Problems – Day 29 – *Start (Amount) +/- Change (Amount) = End (Amount)*

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If you have questions, email Lynn Davies at lynn.a.davies@vanderbilt.edu.

Thank you for your interest in Vanderbilt University's CBM Maze Fluency Passages.

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Pirate Math: Let's Find X!

A Tutoring Program for Remediating Difficulty with Word Problems

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Supplemental Materials Package

Student Worksheets (Days 1 - 48)

Pirate Problems (Days 1 - 48)

Math Fact Flash Cards Template

Sorting Cards Template

Introduction

Welcome to *Pirate Math*! We are excited that you've chosen to implement our tutoring program for remediating word-problem deficits with your students. *Pirate Math* was designed to supplement the regular mathematics curriculum in the area of addition and subtraction word problems. The individual tutoring activities, when conducted with appropriate levels of fidelity, effectively teach students with math difficulties to

- focus on and identify the underlying conceptual framework of three types of word problems (i.e., Total, Difference, and Change problems);
- identify and ignore extraneous information;
- set up an algebraic equation to correspond to the structure of word problems;
- solve for the missing variable (i.e., "X"), as expressed in the algebraic equation; and
- self-evaluate the reasonableness of solutions.

Why "*Pirate Math*?" Students are taught to "find X" in an equation (to solve for missing information), like pirates "find X" on a treasure map. To make the program interesting and motivating for students, we integrate the pirate theme across many aspects of the program, particularly within the reinforcement and motivation schedule. Students are handed token "treasure coins" throughout each lesson, to reward on-task behaviors such as listening, following directions, completing the activities, and increasing accuracy. The coins are counted at the end of the session, and students color in the same number of "footsteps" on a "treasure map." Once a student colors in all footsteps leading to a large printed "X," the student earns a small prize from a treasure chest. A new map is used, starting with the next session.

Pirate Math was developed as part of a 5-year study funded by the National Institute of Child Health and Human Development. We have scientifically evaluated the program with randomized control trials and found that *Pirate Math* significantly improves the word-problem skill of elementary-aged students. (For further information regarding the published study results, please contact one of the authors of this manual.)

To familiarize you with the components of the *Pirate Math* tutoring program, the remainder of this introduction describes (a) the features of the manual, (b) a suggested implementation schedule, (c) the activities that are a part of each daily lesson, and (d) the use of the supplemental materials.

Features of the Manual

This program is designed to provide one-on-one instruction to remediate deficits with solving addition and subtraction word problems. The program is designed as supplemental to your core curriculum. The manual provides scripted instruction for each session; however, *you should use the dialogue in the scripts as a guide*. Study the scripts before each session so that you are familiar with the terminology and strategies, but do NOT read scripts verbatim.

The 48 lessons are arranged in deliberate order. The first four lessons are introductory. They provide instruction and review for important computational and conceptual aspects of word problems. *Do not skip these lessons, because the critical strategies you rely on throughout Pirate Math are introduced at this time*. For example, the min-counting strategy for addition and the missing addend counting strategy for subtraction are explicitly taught during these lessons. Following the introductory lessons, there are three units, each focusing on one specific type of word problem. There is also a final unit that provides cumulative review and instruction for solving multiple-step word problems. The Table of Contents briefly describes the new material covered on each Day.

At the top of each scripted lesson, you will find a list of all materials required for that session. Gather everything you need prior to the session, so you can transition smoothly through the activities.

Once *Pirate Math* strategy instruction begins, you provide scaffolded instruction for three word problems during each lesson. These problems are labeled “Problem A,” “Problem B,” and “Problem C.” You will find problem solutions (see below for an example) for every problem the student works. These solutions appear in the text to use as a guide.

Solution to Problem A

<i>Problem Type:</i>	<i>Total, single-digit, chart*</i>
<i>Relevant Info:</i>	<i>P1 = 6; P2 = 5; T = X</i>
<i>Number Sentence:</i>	<i>6 + 5 = X</i>
<i>Answer:</i>	<i>X = 11 students</i>

You will note that an asterisk (*) appears after the word “chart” in this example. Every time a new feature is introduced (in this case, finding relevant information in a bar chart), an asterisk appears in the solution, alerting you to spend extra minutes attending to the new feature with your student. The scripted instruction for asterisked problems contains new terminology or strategies; study those parts of the scripts carefully.

You will also notice that a treasure box icon appears in various places throughout the scripts.



The treasure box icon serves as a prompt to reinforce your student’s appropriate behavior with a treasure coin. *Coins can and should be withheld for inappropriate behavior.* (We purchased coins at a novelty store for this use; students earned 0-8 coins per session.)

The Appendix section appears after Days 1 – 48. Here, you will find templates for *Pirate Math* materials. Make copies from these templates for your students.

For some of the materials that appear in the Appendix, you will need one for each student:

• Attendance Log

Pirate Math Attendance Log													Name: _____											
Day	1	2	3	4	5	6	7	8	9	10	11	12												
Tutoring date																								
Math Fact																								
Flash card score																								
Sorting cards score	NA	NA	NA	NA	NA																			
Pirate Problems score																								
Length of session																								
Day	13	14	15	16	17	18	19	20	21	22	23	24												
Tutoring date																								
Math Fact																								
Flash card score																								
Sorting cards score																								
Pirate Problems score																								
Length of session																								
Day	25	26	27	28	29	30	31	32	33	34	35	36												
Tutoring date																								
Math Fact																								
Flash card score																								
Sorting cards score																								
Pirate Problems score																								
Length of session																								
Day	37	38	39	40	41	42	43	44	45	46	47	48												
Tutoring date																								
Math Fact																								
Flash card score																								
Sorting cards score																								
Pirate Problems score																								
Length of session																								

Use the Attendance Log to keep track of student performance on the daily activities.

Simply fill in the boxes (i.e., for date, flash card score, sorting cards score, Pirate Problems score and the length of session) for each day you work with a student. Use the reverse side of the paper to record absences. *(During our scientific evaluations of Pirate Math, the information recorded on student logs was important to our study. However, you may decide how best to use the information recorded here.)*

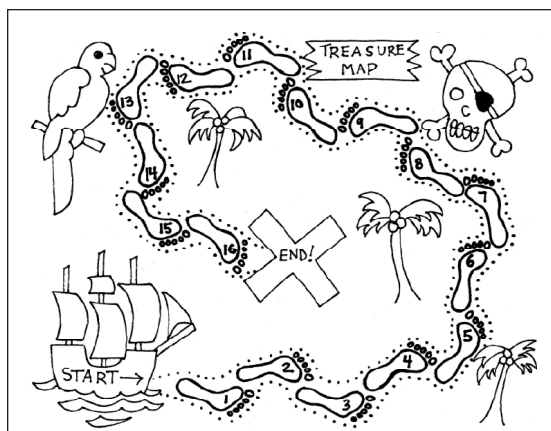
For some of the materials, you will need more than one for each student:

• Flash Card Graph

Math Fact Flash Card Graph																				Name: _____																			
40																				40																			
39																				39																			
38																				38																			
37																				37																			
36																				36																			
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3																				3																			
2																				2																			
1																				1																			
Day																																							

You will need three flash card graphs for each student.

• Treasure Map



You will need multiple copies of the Treasure Map for each student. Once a student colors in all footsteps on a Treasure Map and earns a prize from the treasure chest, he or she keeps the map. During the next session, the student receives a new map.

For some of the materials, you will need one set that you can use with more than one student:

- **Number Line Template** (for use in introductory lessons; you may have a similar one already)
- **Sorting Mat** (for use with daily activity)
- **Number Sentence Mat** (for use with number sentence equation instruction)
- **Numbers Template** (for use with number sentence equation instruction)
- **Training Posters** (to use once initial instruction has occurred)
- **Activity Guides** (abbreviated scripts that can be used across units; to refer to once initial instruction has occurred)

Additional materials:

- **Treasure Coins** (approximately 10 small gold coins purchased from novelty store; you may choose to create your own with gold cardstock)
- **Treasure Chest** (filled with prizes such as erasers, stickers, pencils, small toys, etc.)
- **Stopwatch** (to time each session, if desired)
- **Pencil, colored pencil, crayons** (for student)
- **Highlighter** (for student)
- **Timer** (that counts down minutes; for the timed session activities)

Implementation Schedule

Pirate Math is conducted with three lessons per week for 16 weeks (48 lessons). Each lesson takes 25-30 min to complete. We have found that as you and your student become more familiar with the word-problem strategies and daily activities, the sessions become shorter.

The lessons are meant to be delivered individually, and all activities within a lesson should be completed at each session. You will need a small table or two desks pushed together to create a workspace large enough to hold all the materials needed for each session.

Record each aspect of the sessions in the individual student's Attendance Log.

Daily Activities

Each tutoring session contains the same five activities, although Activity 4 doesn't begin until Day 6 and Activity 2 doesn't begin until Day 7.

- **Activity 1: Math Fact Flash Cards** (~ 2-4 min long; timed practice with 200 basic facts flash cards; student graphs daily progress in flash card graphs)
- **Activity 2: Word Problem Warm-Up** (~2-3 min; student "reteaches" problem from previous session to teacher; encourages mathematics communication and dialogue)
- **Activity 3: Lesson** (~15 min; scaffolded instruction on solution strategies; extensive review of problem types; transfer features are taught explicitly)
- **Activity 4: Sorting Cards** (~3 min; timed practice with sorting cards printed with word problems to appropriate box on mat; teacher provides corrective feedback)
- **Activity 5: Pirate Problems** (~5 min; timed paper-and-pencil review; computation problems on one side of paper; word problem on reverse side; teacher provides immediate corrective feedback)

Supplemental Materials

Along with this manual, you received a package of the Student Worksheets (Days 1- 48) and Pirate Problems (Days 1-48), and templates to make Math Fact Flash Cards and word-problem Sorting Cards. These are master copies. Keep these separate and make copies for the student(s) to use.

The Student Worksheets are used with corresponding lessons and align with the word problems in your manual. The Pirate Problems are the paper-and-pencil daily review that the student completes during Activity 5 of each session.

The set of 200 addition and subtraction flash cards (Math Fact Flash Cards) is used at the beginning of every session (Activity 1). Copy the flash cards onto stiff cardstock paper, making sure the correct answer appears on the reverse side, then, cut each paper into quarters. You may have similar flash cards (basic facts, from 0 – 18) that you could use.

The set of 60 Sorting Cards are used during Activity 4 of sessions 7 – 48. Copy the Sorting Cards onto stiff cardstock paper, making sure the correct answer appears on the reverse side, then, cut each paper into quarters.

Both sets of cards can be used for more than one student.



DAY 5

MATERIALS

Stopwatch
Treasure Map
Coins
Treasure chest
Math Fact Flash Cards
Timer
Flash Card Graph
Colored pencil

Attendance Log
Counting Up Addition poster
Counting Up Subtraction poster
Cut-out X and cut-out numbers
Number Sentence mat
Find X! Addition poster
Day 5 Student Worksheet
Day 5 Pirate Problems

ACTIVITY 1: FLASH CARDS

Let's start with flash cards.

Use script as needed (see *Activity Guide: Math Fact Flash Cards* in Activity Guide section).



ACTIVITY 2: WORD PROBLEM WARM-UP (BEGINS ON DAY 7)

ACTIVITY 3: LESSON

Today we'll learn how to do math problems with a missing part. The missing part is marked with an X. (Show X to student.) Just like a pirate, you need to find the X. By finding X, you'll find a treasure. That's the answer to a math problem!

NUMBER SENTENCE MAT

--	--	--	--	--

Today we'll do addition problems with X. Look at this number sentence mat. (Show number sentence mat.) **The big boxes are for numbers** (point to big boxes). **The smaller boxes are for a plus sign or minus sign** (point to first small box) **and an equal sign** (point to second small box). **Today, we'll work on addition number sentences, so I'll put a plus sign in this box.** (Put the plus sign in first small box.)

The equal sign goes here. (Put the equal sign in second small box.)

In a number sentence, X can go in 3 places. It can go before the equal sign, here (place X in first big box) **or here** (place X in second big box). **Or X can go after the equal sign, here** (place X in third big box).

PIRATE MATH STUDENT WORKSHEET
DAY 5

NAME: _____

DATE: _____

A. $3 + 4 = \underline{\quad}$ B. $6 + 2 = \underline{\quad}$
 $X = \underline{\quad}$ $X = \underline{\quad}$

C. $1 + 6 = \underline{\quad}$ D. $5 + 4 = \underline{\quad}$

E. $4 + \underline{\quad} = 7$

PRACTICE

$2 + \underline{\quad} = 5$ $1 + \underline{\quad} = 4$ $3 + \underline{\quad} = 7$

➡

Look at this problem. (Problem A.) **3 plus 4 equals blank.** Blank always tells you where the missing information is. We can also call the blank "X." When you see a blank, put X there right away. X tells you where the missing information is. Let's put X in the problem right now. (Write "X" on the blank.)

Listen again. 3 plus 4 equals X. The 3 and 4 tell you the numbers that are added together. These numbers go before the equal sign (point). Put 3 before the equal sign, in this box. (Demonstrate.) Put 4 before the equal sign, in this box. (Demonstrate.) Listen again: 3 plus 4 equals X. In this problem, the missing part, or X, is the total. So, X goes after the equal sign, in this box (demonstrate).

When X is after the equal sign, it stands for the total. Look at this poster. (Show *Find X! Addition* poster.) This poster says, "If X is after the equal sign, don't rewrite, just add." To find X when X is after the equal sign, you

add together the two numbers that come before the equal sign.

Look at this example. (Go through the example with student.) **For this problem** (Problem A again), **you find X by adding together the 3 plus 4.** What's 3 plus 4? Can you reverse the numbers? (Student.) **Why?** (Student.) **Let's do that using our fingers.** Put the bigger number in your head and say it. (Student.) **Now count up the smaller number on your fingers.** (Student.) **Your answer is the last number you say.** What's the answer? (Student.) **That's right. 3 plus 4 equals 7.** So, X equals 7. We write X equals 7 just like this. (Write 7 in the blank space of $X = \underline{\quad}$.)

Try this problem. (Problem B.) **6 plus 2 equals blank.** Where should we write X? (Student.) **Yes.** We write X on the blank (write "X" on the blank), so the problem reads 6 plus 2 equals X (point). The 6 and 2 are the numbers we add together. So, they go before the equal sign (point). Put 6 in this box. (Student.) Put 2 in this box. (Student.) **Where does X go?** (Student.) **That's right.** In this problem, what does X stand for? (Student.) **Right.** X stands for the total. **Put X after the equal sign.** That's where the total goes. (Student.)

Let's find X. X is after the equal sign, so you just add to find the answer. What's 6 plus 2? Can you reverse the numbers? (Student.) **Yes,** we can reverse the numbers in addition, but we don't need to do that for this problem because the bigger number is already first. Let's count up. Put the bigger number in your head and say it. (Student.) **Now count up the smaller number on your fingers.** (Student.) **Your answer is the last number you say.** What's the answer? (Student.) **That's right.** If 6 plus 2 equals 8, then X equals 8. We write X equals 8 just like this. (Write 8 in the blank space of $X = \underline{\quad}$.)

Look at this problem. (Problem C.) **1 plus 6 equals blank. Where should we write X?** (Student.) **Right. We write X on the blank** (write "X" on the blank), **so the problem reads, 1 plus 6 equals X** (point). **What numbers are we adding together?** (Student.) **Where do the 1 and 6 go?** (Student.) **That's right. The 1 and 6 are the numbers we add together, so they go before the equal sign. Do that now.** (Student.) **What does X stand for in this problem?** (Student.) **Right. X stands for the total. Where does X go?** (Student.) **Very nice! Put X after the equal sign, in this box.** (Student.)

Now it's time to find X. How do we find X, if X is after the equal sign? (Student.) **That's right, we add together the two numbers before the equal sign. What's 1 plus 6? Can you reverse the numbers?** (Student.) **Why?** (Student.) **Let's do that using our fingers. Put the bigger number in your head and say it.** (Student.) **Now count up the smaller number on your fingers.** (Student.) **Your answer is the last number you say. What's the answer?** (Student.) **That's right. So, what is X?** (Student.) **Perfect! X equals 7. Go ahead and write that on the paper.** (Student.)

Try this problem on your own. (Problem D.) **To find X, count up. 5 plus 4 equals blank. Go ahead and work.** (Student.) **Excellent! X equals 9.**



Now, look at this problem. (Problem E.) **It's a little different because X doesn't come at the end. 4 plus blank equals 7. Where does X go?** (Student.) **Right. X always goes in the blank. Write X on the blank.** (Student.) **This problem shows you that X can be anywhere in the problem. Depending on where X is, we solve for X differently.**

In 4 plus X equals 7 (point), **what numbers are we adding together?** (Student.) **Right. We're adding 4 and X together. So, in this problem, the missing part, X, goes before the equal sign, in this box. Put X in this box.** (Student.) **What number goes before the equal sign, in this box?** (Student.) **Good! Put a 4 in this box.** (Student.) **What's the total in this problem?** (Student.) **So, where does 7 go?** (Student.) **Great! Put a 7 after the equal sign, in this box.** (Student.)

So, our problem reads 4 plus X equals 7 (point). **To find the answer, we figure out how many** (point to X) **we add to 4 to get to the total, 7. When we have an addition number sentence with X before the equal sign** (point), **we find X by subtracting. Look at this poster with me.** (Show student *Find X!* poster.) **This says, "If X is before the equal sign, rewrite, and subtract."** (Go through examples with student.) **We subtract this adding number, which we know** (point to 4), **from our total** (point to 7), **which we also know. When we do that, we rewrite the problem like this** (write "7 - 4" vertically, next to the problem).

We already know how to solve a subtraction problem like this. Put the minus number, 4, in your head, and count up: 5, 6, 7 (hold up additional fingers as you count). **The answer is the number of fingers you have up. I have up 3 fingers, so X is 3. Let's plug that into our number sentence and check to see if that makes sense. 4 plus 3 equals 7. Is that right? Does 4 plus 3 equal 7?** (Student.) **It does! So, we know our answer is right.**

Remember, for an addition number sentence with X before the equal sign, solve it by subtracting. (Point to poster again.) **Let's practice rewriting number sentences now. Look at these three addition number sentences.** (Point to first Practice box.) **Rewrite each one as a subtraction problem. You don't need to solve them, just show me how to rewrite them.** (Student.) **Nice job!**

Now, look at this problem. (Problem F.) **2 plus blank equals 8. Where does X go?** (Student.) **Right. X always goes in the blank. Write X on the blank.** (Student.) **What numbers are we adding together?** (Student.) **Right. We're adding 2 and X together. So, in this problem, the missing part, X, goes before the equal sign, in this box. Put X in this box.** (Student.) **What number goes before the equal sign, in this box?** (Student.) **Good! Put a 2 in this box.** (Student.) **What's the total in this problem?** (Student.) **So, where does 8 go?** (Student.) **Great! Put 8 after the equal sign, in this box.** (Student.)

This problem reads 2 plus X equals 8 (point). Just like the last one we did, X is before the equal sign. What's the best way to find X when X comes before the equal sign? (Student.) **That's right! We rewrite the number sentence to look like subtraction. So, this becomes 8 minus 2. Write that now.** (Student.) **Now, if you don't know the answer to 8 minus 2 right away, count up.** (Student.) **Great! You found that X equals 6. Let's plug that into our number sentence and see if that makes sense. Does 2 plus 6 equal 8?** (Student.) **Super! So, we know our answer is right.**

Look at this problem. (Problem G.) **5 plus blank equals 9. Where does X go?** (Student.) **OK, write X on the blank.** (Student.) **Good! So we have 5 plus X equals 9. Go ahead and set up the problem using the numbers and X.** (Student.)

If correct: **Great job! You put 5 and X before the equal sign, because they're the numbers we add together, and you put 9 after the equal sign, because it's the total. Bravo!**

If incorrect: **Look at that again. What numbers are we adding together?** (Student.) **Good, we're adding 5 and X, so put 5 in this box (student) and X in this box (student). What's the total?** (Student.) **Good, the total is 9, so put 9 after the equal sign.** (Student.)

Now it's time to find X. X is before the equal sign, so how do you find the answer? (Student.) **That's right. You rewrite and subtract. Go ahead and do that now.** (Student.) **So, what's the missing number?** (Student.) **OK. Let's see if that makes sense. Does 5 plus 4 equal 9?** (Student.) **That's right! It does, so X equals 4. Write that on your paper!** (Student.)



Let's try another problem. (Problem H.) **3 plus blank equals 8. Where does X go? Write it now.** (Student.) **Now, fill the boxes.** (Student.) **OK, go ahead and solve for X.** (Student.) **So, what's the missing number?** (Student.) **OK. Let's see if that makes sense. Does 3 plus 5 equal 8?** (Student.) **That's right. The missing number is 5, so X equals 5. Write that on your paper!** (Student.)

Look at this problem. (Problem I.) **Blank plus 5 equals 7. This problem may look different, but you already know how to do it! In an addition problem, the order of the numbers you're adding doesn't matter. The answer stays the same.**

Think about blank plus 5 equals 7. Where does X go? Write it now. (Student.) **What numbers are we adding together?** (Student.) **That's right! X and 5 go before the equal sign, because they're the numbers we add together. Put X in this box.** (Student.) **Put 5 in this box.** (Student.) **What number is the total? Put it in this box.** (Student.) **Good, 7 is the total, so it goes after the equal sign.**

When you have an addition number sentence with X before the equal sign (point to poster again), **you solve it by subtracting this adding number we know** (point to 5) **from the total** (point to 7). **So, solve this problem just like before. Rewrite the number sentence as a subtraction problem, and find X.** (Student.) **Put the 5 in your head.** (Student.) **Now, count up to 7: 6** (hold up 1 finger), **7** (hold up another finger). **How many fingers are you holding up?** (Student.) **Great! So, 2 is the missing part. Let's see if that makes sense. Does 2 plus 5 equal 7?** (Student.) **That's right. The missing number is 2, so X equals 2. Write that on your paper!** (Student.) **Nice job!**

Remember, for an addition number sentence with X before the equal sign, solve it by subtracting. Let's practice rewriting number sentences again. Look at these three addition number sentences. (Point to second Practice box.) **Rewrite each one as a subtraction problem. You don't need to solve them, just show me how to rewrite them.** (Student.) **Nice job!**

Let's solve this problem. (Problem J.) **Blank plus 3 equals 9. Write X for the missing part, and solve for X. I'll help you if you need my help.** (Student.)

So, what's the missing number? (Student.) **Plug that into our number sentence and see if that makes sense.** (Student.) **That's right. The missing number is 6, so X equals 6. Write that on your paper!** (Student.)

Nice work. Now finish the last two problems. Write X for the missing part, and solve for X. Remember, if X comes before the equal sign, rewrite and subtract. (Problems K and L. Assist student, as needed.) **Great! You found that X equals 8** (Problem L) **and X equals 4** (Problem M). **You also checked your work to make sure that those answers make sense. Remember, for addition number sentences, solve problems that have an X before the equal sign here** (put X in first box) **or here** (put X in second box) **by subtracting. If you don't know the answer right away, count up to find X. Like pirates, use X to find the missing number.** (Hold up X.) **We'll practice this more tomorrow.**



ACTIVITY 4: SORTING CARDS (BEGINS ON DAY 6)

ACTIVITY 5: PIRATE PROBLEMS

Use script as needed (see *Activity Guide: Pirate Problems* in Activity Guide section).



Let's count up the number of coins you earned today and mark them on your treasure map. (Student.) Remember, once you fill in the footsteps to the 'X' in the middle of the map, you'll choose a prize out of the treasure box!



DAY 16

MATERIALS

Stopwatch
Treasure Map
Coins
Treasure chest
Math Fact Flash Cards
Timer
Flash Card Graph
Colored pencil
Attendance Log

Day 15 Pirate Problems
When You See a Math Fact poster
Cut-out X and cut-out numbers
Number Sentence Mat
Find X! Addition poster
Find X! Subtraction poster
Sorting Cards
Sorting Mat
Day 16 Student Worksheet
Day 16 Pirate Problems

ACTIVITY 1: FLASH CARDS

Let's start with flash cards.

Use script as needed (see *Activity Guide: Math Fact Flash Cards* in Activity Guide section).



ACTIVITY 2: WORD PROBLEM WARM-UP

Use script as needed (see *Activity Guide: Word Problem Warm-Up* in Activity Guide section).



ACTIVITY 3: LESSON

Every time you see a math problem, there are two ways you can get the answer. (Show *When You See a Math Fact* Poster.) **What are two ways to get the answer to a math fact?** (Student.)

Good. Let's talk about counting up. How do you count up an addition problem? (Student.)
How do you count up a subtraction problem? (Student.) **Very good.**

Now, it's time for a math fact quiz. I'll give you a fact, and you tell me the answer. Try to get the answer directly from your brain, right off the bat. Count up to find the answer only if you don't know the answer right away. Ready?

18 minus 9? (Student.)

9 plus 3? (Student.)

14 minus 8? (Student.)

6 plus 7? (Student.)

Over the past few weeks, we've learned about Total problems. Soon, we'll learn about Difference problems. Before we do that, let's work on subtraction problems with a missing part.

Whether it's adding or subtracting, we always put an equal sign in this little box. (Put equal sign on number sentence mat.) For subtracting, though, we put a minus sign in this little box. (Put minus sign on number sentence mat.) The X can go in three places. X can go here. (Place X in first box.) X can go here. (Place X in second box.) Or X can go here. (Place X in third box.)

Look at this problem. (Problem A.) 8 minus 5 equals blank. Where does X go? Write it on the blank. (Student.) Now we have 8 minus 5 equals X. In subtraction, the number we start with goes in this box (point). So, I put 8 here. (Demonstrate.) The minus number goes in this box (point), so I put 5 here. (Demonstrate.) The difference goes after the equal sign. In this problem, X is the difference. So, X goes after the equal sign, here. So, 8 minus 5 equals X.

PIRATE MATH STUDENT WORKSHEET
DAY 16

NAME: _____

DATE: _____

A. $8 - 5 = \underline{\quad}$ B. $6 - 2 = \underline{\quad}$

C. $7 - 4 = \underline{\quad}$ D. $5 - 4 = \underline{\quad}$

E. $8 - \underline{\quad} = 1$

PRACTICE

$4 - \underline{\quad} = 0$ $9 - \underline{\quad} = 5$ $6 - \underline{\quad} = 4$

F. $6 - \underline{\quad} = 2$ G. $4 - \underline{\quad} = 4$

H. $5 - \underline{\quad} = 3$

Let's use this poster to help us find X when we subtract. (Show student the *Find X! Subtraction* poster. Read through the first point and example with the student.) So, when X goes after the equal sign (point), don't rewrite the problem to find X. Just subtract the problem as is: 8 minus 5. Let's do that by counting up. Start with the minus number and count up to the number you started with. Which number is the minus number? (Student.) Yes, start with 5, and count: 6, 7, 8

(student). How many fingers do you have up? (Student.) That's right. If 8 minus 5 equals 3, then X equals 3. Write X equals 3 for the answer. (Student.)

Try this problem. (Problem B.) 6 minus 2 equals blank. Where does X go? Write it on the blank. (Student.) Now we have 6 minus 2 equals X. In subtraction, the number we start with goes in this box (point). What number goes in this box? (Student.) Put the 6 there. (Student.) The minus number goes in this box (point), so what number goes there? (Student.) Good. Put the 2 there. (Student.) The difference goes after the equal sign. In this problem, X is the difference. So, X goes after the equal sign, here. So, 6 minus 2 equals X.

Let's use this poster to help us find X when we subtract. (Show student the *Find X! Subtraction* poster.) So, when X goes after the equal sign (point), don't rewrite the problem to find X. Just subtract the problem as is: 6 minus 2. Do that now. (Student.) What's 6 minus 2? (Student.) What's X? (Student.) Write X equals 4 for the answer. (Student.)

Try the rest of the problems on this row. (Problems C and D.) They're both subtraction problems with X on this side of the equal sign (point). In these problems, X stands for the difference. Remember (point to poster), when X is after the equal sign, don't rewrite the problem. Just subtract the problem as is. Mark the missing information with an X. Then solve for X by subtracting. Go ahead and do the problems now. (Assist student, as needed.)



Now, let's look at this problem. (Problem E.) **8 minus blank equals 1. Where does the X go?** (Student.) **Go ahead and write X on the blank.** (Student.) **Now we have 8 minus X equals 1. This problem is different because the missing information is *before the equal sign*. Is X the number you start with or the minus number?** (Student.) **That's right, the missing part, X, comes right after the minus sign, so it's the minus number. So, X goes in this box** (point). **Put X here.** (Student.) **What number do you start with?** (Student.) **That's right! 8, the number you start with, goes in this box. Put 8 where it belongs.** (Student.) **What number goes after the equal sign?** (Student.) **Great! Put 1 where it belongs.** (Student.)

In this problem, X is the minus number. When X is the minus number, here's what we do. (Show student the *Find X!* poster.) **This says** (point), **"If X is the minus number, rewrite and subtract."** (Go through example with student.) **So, we rewrite the problem. We still subtract, but we subtract the numbers we have. Watch. Rewrite the number sentence so it's 8 minus 1 equals X. (Write below the original problem.) Now, I subtract. Start with 1, and count up to 8. 1 (touch forehead): 2, 3, 4, 5, 6, 7, 8 (hold up additional fingers while counting). How many fingers do I have up?** (Student.) **That's right! Now, just like before, let's check our work to see if 7 makes sense. Does 8 minus 7 equal 1?** (Student.) **It does! So, 7 is our missing number, because 8 minus 7 equals 1. Write X equals 7 for your answer. Good work.**

Let's practice rewriting subtraction number sentences when X is the minus number. Let's do the number sentences in the first Practice box. Don't solve the problems. Just rewrite them to set them up. Remember, when X is the minus number, we rewrite the problem to subtract the numbers we have. Use this poster to help you. (Assist student, as needed.) **Good! In each problem, X was the minus number, So, you rewrote the problem to subtract the numbers you have. Nice job!**

Now let's look at this problem. (Problem F.) **6 minus blank equals 2. Where does the X go? Write it.** (Student.) **OK, so now we have 6 minus X equals 2. What part of the problem does X stand for: the number we start with, the minus number, or the difference?** (Student.) **That's right. X stands for the minus number. So where does X go?** (Student.) **Good! Put the X in this box.** (Point to the second box.) **What number do you start with?** (Student.) **Where does 6 go? Yes. 6, the number you start with, goes in this box** (point). **Put 6 where it goes.** (Student.) **What number goes after the equal sign?** (Student.) **Great! Put 2 where it goes.** (Student.)

Now let's solve for X. X is the minus number, so what do you do? (Student.) **That's right. When X is the minus number** (point to the second point on the poster), **rewrite the problem to subtract the numbers you have.** (Student.) **Good, now the number sentence is 6 minus 2 equals X. What's 6 minus 2? If you don't know the answer right away, count up.** (Student.) **Great! Now let's check to see if our answer makes sense. Does 6 minus 4 equal 2?** (Student.) **Great! So, 4 is the missing part. X equals 4. Write that on the paper.** (Student.)

Go ahead and solve the next two problems. (Problems G and H.) **I'll help you if you need my help. Remember, write X for the missing part. When X is the minus number, rewrite the problem to subtract the numbers you have. Then, check your work to see if it makes sense.** (Assist student, as needed.) **Great work!**



Now, let me show you what happens when X stands for the number you start with. Look at this problem. (Problem I.) Blank minus 5 equals 3. Where does X go? Write it now. (Student.) OK, which is the minus number? Put it after the minus sign. (Student.) What number goes after the equal sign? Put it there now. (Student.) This problem is different because the missing information, X, is the number you start with.

When X is the number you start with, rewrite the problem but be careful. When X is the number you start with in subtraction, you rewrite the problem BUT you rewrite it as addition. Look at this poster. The third point says, If X is the number you start with, rewrite and add. This example (point) says, X minus 3 equals 2. To find X, we figure out what number, if we take 3 away, will leave 2. The only way to solve that is to add the number we take away (point to 3) to the number we end up with (point to 2). To rewrite this as an addition problem, then, we change it to 3 plus 2 equals 5.

So, subtraction is tricky (refer to poster). If X is the number on this side of the equal sign (point), you subtract the problem as is. But if X is on this side of the equal sign (point), you do something different depending on whether X is the number you start with (point) or the minus number (point).

In this problem, X is the number you start with. Put the numbers in their boxes. Remember to put X where it belongs. Now, how do you find X? Use the poster to help you. (Student.) Yes, X is the number you start with so you rewrite as addition. Watch me. I rewrite this problem to make it addition, like this. (Write 5 plus 3 underneath the original number sentence.) Now, I add the numbers together. 5 plus 3. I put the bigger number, 5, in my head (touch forehead and say, "5"), and count up the smaller: 6, 7, 8. The answer is the last number I say, so 8 is my answer. Now let's plug 8 back into the number sentence to see if it makes sense. Does 8 minus 5 equal 3? (Student.) Great, it does. So, X equals 3. Write that for your answer. (Student.)

Let's practice rewriting subtraction number sentences when X is the number you start with. Let's do the number sentences in the second Practice box. Don't solve the problems. Just rewrite them to set them up. Remember, when X is the number you start with, rewrite the problem and add. Use this poster to help you. (Assist student, as needed.) Good! In each problem, X was the number you start with, so, you rewrote the problem to add the numbers you have. Nice job!



Now look at this problem. (Problem J.) Blank minus 7 equals 2. Where does X go? Write it now. (Student.) Good, now we have X minus 7 equals 2. Put those numbers in the boxes where they belong. (Student.) OK, now we have to find X. How do we find X if X is the number we start with? Use the poster to help you set up the problem and find X. (Student.)

If correct: Excellent! You added together 7 plus 2, and got 9.

If incorrect: That's not quite right. Let's use the poster to help us. What does X stand for? (Student.) Good, X is the number you start with, so we rewrite and add. First, rewrite X minus 7 equals 2, to 7 plus 2 equals X. Now, add together plus 2. Do that now. (Assist student, as needed.)

So, what's the missing number? (Student.) **That's right. The missing number is 9, so X equals 9. Check that. Does 9 minus 7 equal 2?** (Student.) **Good! Go ahead and write X equals 9 on your paper!** (Student.)

OK, now go ahead and solve the last two problems on this page. (Problems K and L.) **Mark the missing information with X. If X is the number on this side of the equal sign** (point), **you just subtract the problem as is. But if X is on this side of the equal sign** (point), **you do something different depending on whether X is the number you start with or the minus number. Use the poster to help you solve for X.** (Assist student, as needed.) **Nice job!**

Let's practice with some more number sentences. Let's do the number sentences in the third Practice box (point). **Some of these numbers sentences are addition and some are subtraction. Don't solve the problems. Just look at the number sentences, and decide whether they should be rewritten to find X. If they don't need to change, leave them as is. If they do need to be rewritten to solve for X, rewrite the number sentence. Be careful! Not all of these number sentences will have to be rewritten. Use the *Find X!* posters to help you with the number sentences.** (Assist student, as needed.) **Excellent work!**



ACTIVITY 4: SORTING CARDS

Use script as needed (see *Activity Guide: Sorting Cards* in Activity Guide section).



ACTIVITY 5: PIRATE PROBLEMS

Use script as needed (see *Activity Guide: Pirate Problems* in Activity Guide section).



Let's count up the number of coins you earned today and mark them on your treasure map. (Student.) **Remember, once you fill in the footsteps to the 'X' in the middle of the map, you'll choose a prize out of the treasure box!**



DAY 29

MATERIALS

Stopwatch
Treasure Map
Coins
Treasure chest
Math Fact Flash Cards
Timer
Flash Card Graph
Colored pencil
Attendance Log

Day 28 Pirate Problems
RUN! poster
Change poster
Highlighter
Sorting Cards
Sorting Mat
Day 29 Student Worksheet
Day 29 Pirate Problems

ACTIVITY 1: FLASH CARDS

Let's start with flash cards.

Use script as needed (see *Activity Guide: Math Fact Flash Cards* in Activity Guide section).



ACTIVITY 2: WORD PROBLEM WARM-UP

Use script as needed (see *Activity Guide: Word Problem Warm-Up* in Activity Guide section).



ACTIVITY 3: LESSON

Every time you see a math problem, what are two ways to get the answer to a math fact? (Student.)

Good. Let's talk about counting up. How do you count up an addition problem? (Student.)
How do you count up a subtraction problem? (Student.) **Very good.**

Now, it's time for a math fact quiz. I'll give you a fact, and you tell me the answer. Try to get the answer directly from your brain, right off the bat. Count up to find the answer only if you don't know the answer right away. Ready?

16 minus 7? (Student.)

12 minus 9? (Student.)

3 plus 6? (Student.)

5 plus 5? (Student.)

Over the last few weeks, we've learned about Total and Difference word problems. Today, we'll learn about a new type of word problem, called Change problems.

Change problems (point to *RUN!* poster) **start with an amount of something. Then something happens to increase or decrease the amount you started out with. So, you end up with a new amount. What does the word "increase" mean?** (Student.) **That's right; the word "increase" means to make *more* of something. What does the word "decrease" mean?** (Student.) **That's right; the word "decrease" means to make *less* of something. In Change problems, sometimes you add and sometimes you subtract. If the change is an increase in amount, you add. If the change is a decrease in amount, you subtract.**

PIRATE MATH STUDENT WORKSHEET
DAY 29

NAME: _____

DATE: _____

A. Ally had 8 pillows on her bed. Then she added 6 more. Now she has 14 pillows on her bed.

B. Avery had 7 candles on his birthday cake. Then he took off 3 candles. Now he has 4 candles on his birthday cake.



For example, look at this story. (Problem A.) **"Ally had 8 pillows on her bed. Then she added 6 more. Now she has 14 pillows on her bed."** This story is a Change story because the number of pillows on Ally's bed changed. It increased, from 8 (circle the 8) to 14 (circle the 14). Because the change is an increase in amount, we add to find the end amount. To find the end amount of pillows, start with 8 (point to 8), and count up 6 (circle the 6) more: 9, 10, 11, 12, 13, 14 (hold up fingers as you count). The end amount is 14.

Look at this next story. (Problem B.) This problem says, **"Avery had 7 candles on his birthday cake. Then he took off 3 candles. Now he has 4 candles on his birthday cake."** This story is a Change story because the number of candles on Avery's cake changed, or decreased, from 7 (circle the 7) to

4 (circle the 4). Because the change amount is a decrease in amount, we subtract to find the end amount. To find the end amount of candles, start with 7 (point to 7) and subtract 3 (circle the 3). Start with 3, and count: 4, 5, 6, 7 (hold up fingers as you count). The end amount is 4.

So, with a Change problem, sometimes you add and sometimes you subtract. If the change is an increase, you add. If the change is a decrease, you subtract.

These Change problems are already solved. Each story tells us the start amount, the change amount, and the end amount. All of the important information is given. When we solve Change problems, though, some of the information is missing, and our job is to figure out what the missing number is.

Let's look at some word problems that have missing information. (Problem C.) This problem says, **"Janie had 4 dollars. Then her aunt gave her 8 more dollars for her birthday. How many dollars does Janie have now?"**

Solution to Problem C

Problem Type:	Change, single-digit, basic
Relevant Info:	$St = 4; C = +8; T = X$
Number Sentence:	$4 + 8 = X$
Answer:	$X = 12 \text{ dollars}$

(Problem D.) **This problem says, “The apple tree had 9 apples on it. Then Miguel picked 5 of the apples to make apple pie. How many apples were left on the tree?”**

Solution to Problem D

Problem Type: Change, single-digit, basic

Relevant Info: $St = 9$; $C = - 5$; $T = X$

Number Sentence: $9 - 5 = X$

Answer: $X = 4$ apples

Each of these problems tells you about a start amount increasing or decreasing. Then, the problem asks you to find the end amount. We call these problems “Change” problems. When there’s a missing number in the story, it’s a word problem we have to solve. (Point to *RUN!* poster.) Change problems are different from Total problems or Difference problems. With Total problems, *two or more different things* are combined. With Difference problems, *two different things* are compared. But with Change problems, *one thing* changes to become bigger or smaller in amount.

Now, for every problem, you look at two posters. The first poster is the *RUN!* poster. Do the “R” and the “U” just like before. When you get to the “N,” remember you now have three problem types to think about. The problem will be a “Total,” a “Difference,” or a “Change” problem. To figure out the problem type, you have to think hard about what the word problem means. If the problem tells a story about two or more things added together, it’s a Total problem. If the problem tells a story about two things being compared, it’s a Difference problem. If the problem tells you about an increase or a decrease in an amount, it’s a Change problem. For Change problems that tell you about an increase, you add. For Change problems that tell you about a decrease, you subtract.

If you decide the problem is a Change problem, then you go to the *Change* poster. (Show student the *Change* poster.) Let’s look at the *Change* poster. This poster shows you the steps to solve a Change problem. In a Change problem, you start with an amount of something (point to Step 1). Step 1 is the number you start with. Next, Step 2 is the change in amount (point to Step 2). You add for an increase. You subtract for a decrease. Step 3 is the new amount after the change (point to Step 3). For Step 4 (point to Step 4), you write the number sentence, just like with Total and Difference problems. For Step 5 (point to Step 5), find X.



Look at this problem. (Problem C.) Start out with *RUN!* R. (Point.) Read the problem. Let’s read this problem together. “Janie had 4 dollars. Then her aunt gave her 8 more dollars for her birthday. How many dollars does Janie have now?” (Read with student.)

U. (Point.) Underline the question. Do you see a question in that problem? (Student.) Remember, the best way to find the question is to look for the question mark. What’s the question?

If correct: Very nice. The question is, “How many dollars does Janie have now?” Let’s underline the question. (Underline the question.)

If incorrect: Let me read it one more time. (Read the problem again. Emphasize the question.) The question in this problem is, “How many dollars does Janie have now?” That’s the sentence that ends with the question mark. Let’s underline the question. (Underline the question.)

N. (Point.) Name the problem type. Remember, if the story tells about two or more things added together, it's a Total problem. If the story tells about two things being compared, it's a Difference problem. If the story tells about an increase or a decrease in an amount, it's a Change problem. What about this problem? (Student.) This problem is a Change problem because it starts with an amount of dollars and tells you about a change in that amount by adding more dollars. Write a C next to the problem so you remember it's a Change problem. (Student.)

Once you name the problem type, go to that poster. We decided the problem type is Change, so we go to the "Change" poster. As with other problem types, to solve a Change problem, you read the problem carefully to find some important pieces of information. These are all numbers. The story will tell you 2 of the numbers and ask you to find the missing number. The first number you look for is the amount you start with. We call this number "St" for start (point to poster). The second number you look for is the change: how many increased or decreased. We call this number "C" for change (point to poster). The third number you look for is the amount you end with. We call this number "E" for end (point to poster).

Let's read the problem carefully and look for the information we need.

Let's first decide what kind of thing changes in this story. Listen carefully to the story again. "Janie had 4 dollars. Then her aunt gave her 8 more dollars for her birthday. How many dollars does Janie have now?" What changes in this story? (Student.) That's right. The amount of dollars Janie has changes in this story. Let's circle the word *dollars* to help us remember that dollars are changing. (Circle.) This will become the label for our answer. Do you see *dollars* anywhere else in the story? Circle all of the *dollars* you find.

Now, let's find the numbers we need to solve this problem about *dollars*. The first sentence says, "Janie had 4 dollars." In this sentence, the number 4 tells us about dollars so we probably need this number. Let's circle 4. (Circle.) Right now, we're not sure whether the 4 is the number we start with, the amount that changes, or the number we end with.

Let's keep reading. "Then her aunt gave her 8 more dollars for her birthday." The 8 tells us about dollars, so we probably need this number. Let's also circle the number 8. (Circle.) We're not sure whether the 8 is the number we start with, the amount that changes, or the number we end with. Let's also circle the word *more*. That tells us that the start amount of dollars is increasing.

Let's finish reading the question carefully. "How many dollars does Janie have now?" There isn't a number in this sentence to circle, but the word *now* is important. Let's circle it. (Circle.) This question, with the word *now*, is telling us to find the end amount. So, the missing information in this problem is the end amount.

So, let's think about this problem and what we've circled. We have *dollars*, which tells us what this story is about. This will be the label for our answer. We have the numbers 4 and 8. We also have the word *more*, so we know that we increased the start amount of dollars. We don't know how many dollars Janie has after the change, or the end amount. We have to find the end amount.

CHANGE

1. How many do you *start* with? (St)

2. How many do you *change*? (C)
 Is there an increase? +
 Is there a decrease? -

3. How many do you *end* with? (E)

4. Write the number sentence.

 St + or - C = E

5. Find X!



Once you name the problem type, go to that problem type poster. We named the problem type as Change, so let's go to the *Change* poster.

When you solve a Change problem, you follow five steps.

(Point to *Change* poster.) **Step 1.** (Point to Step 1.) **"How many do you start with?"** In a Change problem, we have a start amount that changes into an end amount. So, first you find the start amount. Does this problem tell us the start amount of dollars for Janie? (Student.) Yes, this problem tells us that Janie had 4 dollars. That's the start amount. Write St next to the number 4 you circled. (Demonstrate.) We already circled the word *dollars* next to the 4 so we remember that we're talking about dollars. (Point.)

Step 2. (Point to Step 2.) **Step 2** asks, "How many do you change?" The second piece of information we need to find is the change amount: how many increased or decreased. Does the story tell us how many dollars *changed*? (Student.) Yes, the amount changed by 8, when Janie's aunt gave her 8 more dollars for her birthday. We can call this C for change. Write C next to the number 8 you circled. (Demonstrate.) We already circled the word *dollars* next to the 8 so we remember that we're talking about dollars. (Point.)

Did the change *increase* or *decrease* the start amount? (Student.) Yes, the change is an increase, because more dollars were added to the start amount of dollars. Since the change is an increase, we add. Let's write a plus sign next to the C to remind us that this is an increase in amount. (Demonstrate.) When we write the number sentence, the plus sign (point) will remind us to add.

So, for this problem, you add the change, C, to the number you start with, St. In this problem the number you start with, or St, is 4. The change, or C, is 8. (Point.)

Look at step 3. (Point to Step 3.) **"How many do you end with?"** The third piece of information is the amount you end with. Does the story tell us the *end amount* of Janie's dollars? (Student.) That's right. In this problem, the end amount of dollars is not in the story. The end amount of dollars, or E, in this problem is the missing information that we need to figure out. Write an E next to the word *dollars* in the question, to remind us that we need to find the end amount of dollars.

(Point to Step 4.) **Step 4** says, "Write the number sentence." For a Change problem, we always write the number sentence like this: St plus/minus C equals E. (Point to Poster and to boxes on paper.) St is 4 and C is 8. We know what St and C are, but we don't know what E is. E is our missing information. Mark missing information in a special pirate way. Take the highlighter and make a big X over the missing information. (Demonstrate.) Do you need a plus sign or minus sign? (Student.) You always use a plus sign when you have an increase in amount, because you are changing the amount by adding more. So, St plus C equals E (point), or 4 plus 8 equals X (write).

You already know how to solve a number sentence that looks like this. In fact, the cool thing about story problems is that no matter what the type of problem, whether it's a Total, Difference, or Change problem, you always add or subtract in number sentence the same way.

Now, it's time to be pirates! (Point to Step 5.) Step 5 says, "Find X." If you don't know the answer right away, then count up to find X. (Student.) What's X? (Student.) Great! So, X equals 12. Write 12 for X. (Demonstrate.)

We also need a label. Do you remember what the label is for this answer? (Student.) That's right. A good label for this answer is *dollars*. That's what we circled. So, Janie now has 12 dollars.

Let's see if that makes sense. "Janie had 4 dollars. Then her aunt gave her 8 more dollars for her birthday. How many dollars does Janie have now?" Does it make sense that Janie has 12 dollars? (Student.) Why or why not? (Student.) Yes. In a change problem with an increase, the end amount is always more than the two numbers you added together. 12 is more than 4. 12 is also more than 8. Let's check to see if we've answered the question, "How many dollars does Janie have now?" Did we answer the question? (Student.)



Now look at this problem. (Problem D.) Let's follow the two posters to solve this problem. Start out with *RUN!* R. (Point.) Read the problem. Let's read the problem together. "The apple tree had 9 apples on it. Then Miguel picked 5 of the apples to make apple pie. How many apples were left on the tree?" (Read with student.)

U. (Point.) Underline the question. Do you see a question in that problem? (Student responds.) Remember, the best way to find the question is to look for the question mark. What's the question?

If correct: Very nice. The question is, "How many apples were left on the tree?" Underline the question.

If incorrect: Let me read it one more time. "The apple tree had 9 apples on it. Then Miguel picked 5 of the apples to make apple pie. How many apples were left on the tree?" (Emphasize the question.) The question in this problem is, "How many apples were left on the tree?" That's the question that ends with the question mark. Let's underline the question. (Underline the question.)

N. (Point.) Name the problem type. Remember, if the story tells us about two or more things added together, it's a Total problem. If the story tells us about two things being compared, it's a Difference problem. If the story tells us about an increase or a decrease in an amount, it's a Change problem. What about this problem? (Student.) This problem is a Change problem because it starts with an amount of apples and tells you about a change in that amount by taking away some apples. Write a C next to the problem so you remember it's a Change problem. (Student.)

Remember, to solve a Change problem, read the problem carefully to find the important information. The big circle around RUN reminds you to circle the important information. In this story, what changes? (Student.) The amount of apples changes in this story. Let's circle the word *apples*. That will help us label our answer. Do you see any other *apples* in the story to circle? (Student.) Good! Circle them. (Student.)

Let's find the numbers we need to solve the problem about *apples*. The first sentence says, "The apple tree had 9 apples on it." What information in this sentence should you circle? (Student.) 9 tells about apples, so we probably need that number to answer the question. Go ahead and circle 9. (Student.)

Let's read the next sentence. "Then Miguel picked 5 of the apples to make apple pie?" What information in this sentence should you circle? (Student.) 5 tells about apples, so we probably need that number to answer the question. Go ahead and circle 5. (Student.) Let's also circle the word "picked" (circle) because that tells us we decreased the number of apples. So the end amount will be smaller than the start amount. Will we add or subtract? (Student.) Yes, the end amount is smaller so we subtract.

Let's read the last sentence. "How many apples were left on the tree?" There aren't any numbers to circle in this sentence. We already underlined the sentence.

So, let's think about what we've circled. Here's what we have. We have *apples* (point), which tells us what the problem is about. We also have 9 and 5 (point). We also have *picked* (point), which tells us that we decreased the number of apples, so we'll subtract. What do we need to find? (Student.) Yes, we don't know how many apples are on the tree at the end. So, we have to find the end amount.

Let's use the *Change* poster to help us find the 3 pieces of information we need to solve the problem. (Point to *Change* poster.) Remember, to solve a Change problem, read the problem carefully to find the important pieces of information, just like you do with Total and Difference problems. The story will tell you 2 of the three numbers that tell a complete story. Your job is to figure out what the missing number is. Begin by looking for the amount you start with. We call this number "St" for start (point to poster). Next, look for the change: did the amount increase or decrease, and by how many. We call this number C for change (point to poster). Then, look for the amount you end with. We call this number E for end (point to poster).

Step 1. (Point to Step 1.) "How many do you start with?" We know this story is about apples. Does the story tell us how many apples the tree *started with*? (Student.) Yes, the tree started with 9 apples. We can call this St for the number you start with. Write St next to the number 9 you circled. (Demonstrate.) We already circled the word *apples* next to the 9, so we remember we're talking about apples.

Step 2. (Point to Step 2.) **Step 2 asks, “How many do you change?” The second piece of information we need to find is the change in amount: how many increased or decreased. Does the story tell us how many apples *changed*? (Student.) Yes, the amount changed by 5, when Miguel picked them for his apple pie. We can call this C for change. Write C next to the number 5 you circled. (Demonstrate.) We already circled the word *apples* next to the 5, so we remember we’re talking about apples.**

Was the change an *increase* or a *decrease* in amount? (Student.) Yes, the change is a decrease, because some apples were picked. They were taken away. Do we add or subtract? (Student.) Yes, the change is a decrease, so we subtract. Let’s write a minus sign next to the C to remind us that this is a decrease. (Demonstrate.) When we write the number sentence, the minus sign (point) will remind us to subtract.

We subtract the change, C, from the number we start with, St. In this problem, what’s the number we start with? (Student.) Yes, the number we start with, or St, is 9. What’s the change? (Student.) Yes, the change, or C, is 5. (Point.)

Look at step 3. (Point to Step 3.) “How many do you end with?” The third piece of information is the amount you end with. Does the story tell us the *end amount*? (Student.) That’s right. In this problem, the end amount of apples is not in the story. The end amount of apples, or E, is the missing information. Write an E next to the word *apples* in the question, to remind us that we need to find the end amount of apples. (Write.)

(Point to Step 4.) **Step 4 says, “Write the number sentence.” For a Change problem, we always write the number sentence like this: St plus/minus C equals E. (Point to Poster and to boxes on paper.) St is 9 and C is 5. We know what St and C are, but we don’t know what E is. E is our missing information. Mark missing information in a special pirate way. Take the highlighter and make a big X over the missing information. (Demonstrate.) Do you need a plus sign or minus sign? (Student.) You always use a minus sign when you have a decrease in amount, because you are changing the amount by taking some away. So, St minus C equals E (point), or 9 minus 5 equals X (write).**

Now, it’s time to be pirates! (Point to Step 5.) Step 5 says, “Find X.” Use counting up to find X, if you don’t know the answer right away. (Student.) What’s X? (Student.) Great! So, X equals 4. Write 4 for X. (Demonstrate.)

We also need to add a label. What’s the label for this answer? (Student.) That’s right. A good label for this answer is *apples*. So, there are 4 apples left on the tree.

Let’s see if that makes sense. “The apple tree had 9 apples. Then Miguel picked 5 of the apples to make apple pie. How many apples were left on the tree?” Does it make sense that there were 4 apples left? (Student.) Why or why not? (Student.) Yes. In a change problem with a decrease, the end amount is always less than the number you started with. 4 is less than 9. Let’s check to see if we answered the question, “How many apples were left on the tree?” Did we answer the question? (Student.)



ACTIVITY 4: SORTING CARDS

Use script as needed (see *Activity Guide: Sorting Cards* in Activity Guide section).



ACTIVITY 5: PIRATE PROBLEMS

Use script as needed (see *Activity Guide: Pirate Problems* in Activity Guide section).



Let's count up the number of coins you earned today and mark them on your treasure map.
(Student.) **Remember, once you fill in the footsteps to the 'X' in the middle of the map, you'll choose a prize out of the treasure box!**