

# Reasoning Through Word Problems

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## Questions for Understanding

- Do I see pictures in my mind? How do they help me understand the situation?
- What do I know for sure?
- What do I want to know, figure out, find out or do? Do I have a sense of what my answer might look like?
- What does this situation remind me of?
- Is this related to things I've seen anywhere?

## Questions for Planning

- What representations can I use to help me solve the problem?
- Which problem solving strategy will help me the most in this situation?
- What is the big idea from math that is happening here?
- Is there something that I've done before that will help me solve this problem?

## Questions for Solving

- Is my strategy working?
- Do I see any patterns?
- Should I try another strategy?
- Do I need to go back and read the problem again?

## Questions for Looking Back

- Does my answer make sense for the problem?
- Is there a pattern that makes the answer reasonable?
- Is there another way to do this?
- Have I made an assumption?
- Did I use the math concepts that I thought would be using?

# KWC Chart

<b>What do you <u>KNOW</u> for sure?</b>	<b>What do you <u>WANT</u> to know, find, or figure out?</b>	<b>Are there any special <u>CONDITIONS</u>? (Limitations, constraints, special rules, "tricks" to watch out for?)</b>
I know that...	I'm trying to...	I need to...

**Show how you solved the problem using pictures, numbers, and words.**

**I know my answer makes sense because...**

What do you already know?

Brainstorm ways to solve this problem.

What do  
you need to find out?

Try it here.

How do you know your answer makes sense?

## Problem-Solving Worksheet

### **Understand**

Tell the problem in your own words.

### **Plan**

How will you solve the problem?

### **Solve**

Show how you solved the problem.

### **Look Back**

Explain how you solved the problem.

Does your answer make sense? Are your calculations correct?

What was easy/hard about solving the problem?

## Examples of Four Basic Structures of Addition and Subtraction Problems

<b>Join Problems</b>	<p><b>Result Unknown:</b></p> <p>Sandra had 8 pennies. George gave her 4 more. How many pennies does Sandra have altogether?</p>	<p><b>Change Unknown:</b></p> <p>Sandra had 8 pennies. George gave her some more. Now Sandra has 12 pennies. How many did George give her?</p>	<p><b>Initial Unknown:</b></p> <p>Sandra had some pennies. George gave her 4 more. Now Sandra has 12 pennies. How many pennies did Sandra have to begin with?</p>
<b>Separate Problems</b>	<p><b>Result Unknown:</b></p> <p>Sandra had 12 pennies. She gave 4 pennies to George. How many pennies does Sandra have now?</p>	<p><b>Change Unknown:</b></p> <p>Sandra had 12 pennies. She gave some to George. Now she has 8 pennies. How many did she give to George?</p>	<p><b>Initial Unknown:</b></p> <p>Sandra had some pennies. She gave 4 to George. Now she has 8 pennies left. How many pennies did Sandra have to begin with?</p>
<b>Part-Part Whole</b>	<p><b>Whole Unknown:</b></p> <p>George has 4 pennies and 8 nickels. How many coins does he have?</p> <p>George has 4 pennies and Sandra has 8 pennies. They put their pennies into a piggy bank. How many pennies did they put into the bank?</p>	<p><b>Part Unknown:</b></p> <p>George has 12 coins. Eight of the coins are pennies, and the rest are nickels. How many nickels does George have?</p> <p>George and Sandra put 12 pennies into the piggy bank. George put in 4 pennies. How many pennies did Sandra put in?</p>	
<b>Compare</b>	<p><b>Difference Unknown:</b></p> <p>George has 12 pennies and Sandra has 8 pennies. How many <b>more</b> pennies does George have than Sandra?</p> <p>George has 12 pennies. Sandra has 8 pennies. How many <b>fewer</b> pennies does Sandra have than George?</p>	<p><b>Larger Unknown:</b></p> <p>George has 4 <b>more</b> pennies than Sandra. Sandra has 8 pennies. How many pennies does George have?</p> <p>Sandra has 4 <b>fewer</b> pennies than George. Sandra has 8 pennies. How many pennies does George have?</p>	<p><b>Smaller Unknown:</b></p> <p>George has 4 <b>more</b> pennies than Sandra. George has 12 pennies. How many pennies does Sandra have?</p> <p>Sandra has 4 <b>fewer</b> pennies than George. George has 12 pennies. How many pennies does Sandra have?</p>

## Examples of Basic Structures of Multiplication and Division Problems

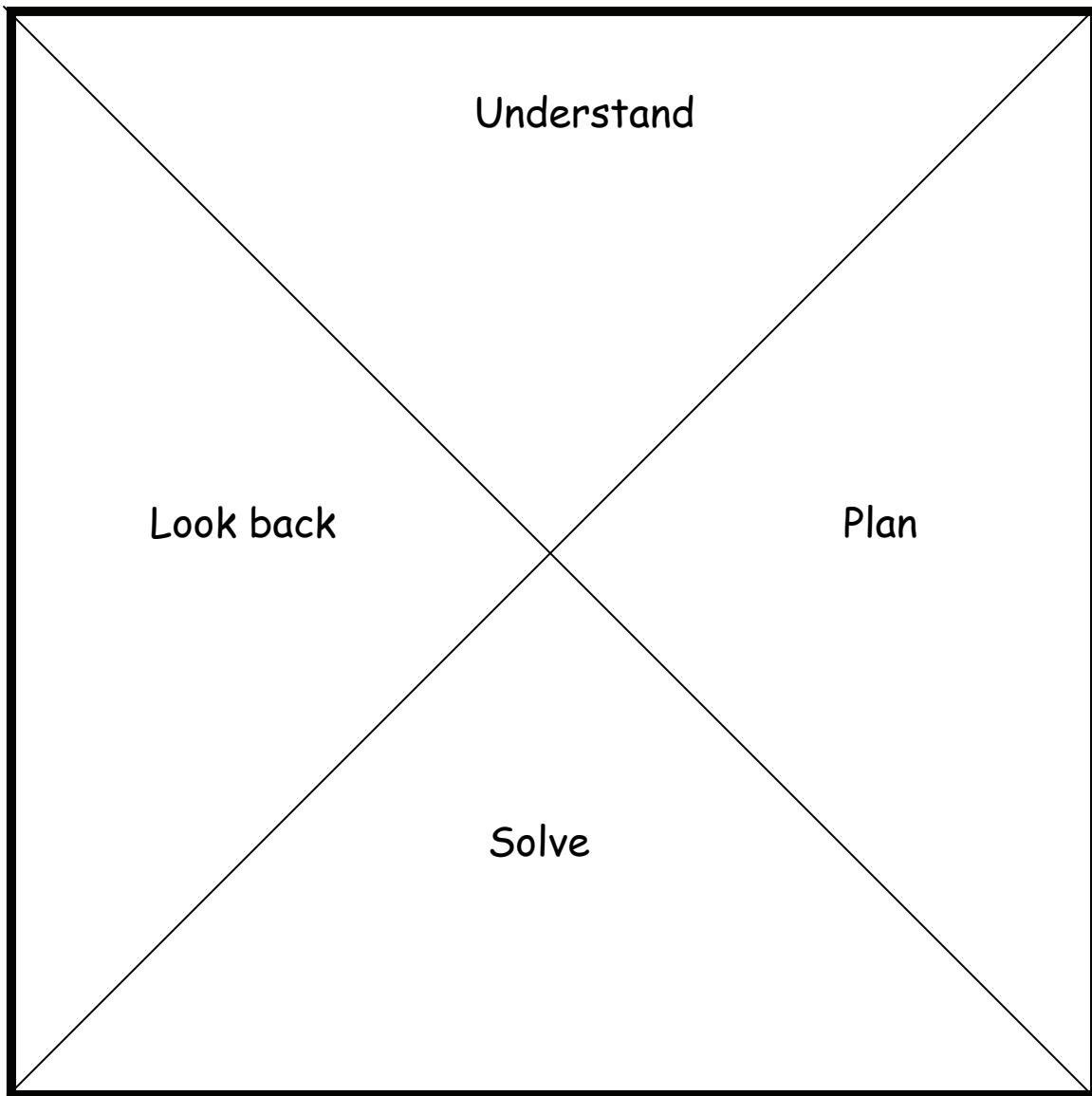
<b>Equal Group Problems</b>	<p><b>Whole Unknown:</b></p> <p>Bob has 4 bags of apples. There are 6 apples in each bag. How many apples does Bob have altogether?</p>	<p><b>Size of Groups Unknown:</b></p> <p>Bob has 24 apples. He wants to share them equally among his 4 friends. How many apples will each friend get?</p>	<p><b>Number of Groups Unknown:</b></p> <p>Bob has 24 apples. He put them into bags containing 6 apples each. How many bags did he use?</p>
<b>Multiplicative Comparison Problems</b>	<p><b>Result Unknown:</b></p> <p>Bob picked 6 apples. Sue picked 4 times as many apples as Bob. How many did Sue pick?</p>	<p><b>Start Unknown:</b></p> <p>Sue picked 24 apples. She picked 4 times as many apples as Bob. How many apples did Bob pick?</p>	<p><b>Comparison Factor Unknown:</b></p> <p>Sue picked 24 apples. Bob only picked 6 apples. How many times more apples did Sue pick than Bob?</p>
<b>Array or Area Problems</b>	<p><b>Whole Unknown:</b></p> <p>There are 9 rows of children at the assembly with 12 children in each row. How many children are there together?</p> <p>Joe's rectangular garden measures 5 feet by 12 feet. How many square feet are in the garden?</p>	<p><b>One Dimension Unknown:</b></p> <p>There are 108 children at the assembly. The children are divided equally in 9 rows. How many children are in each row?</p> <p>There are 108 children at the assembly. There are 12 children in each row. How many rows of children are there?</p> <p>Joe's rectangular garden covers 60 square feet. The length of the garden is 5 feet. What is the width of the garden?</p>	
<b>* Rate Problems</b>	<p><b>Whole Unknown:</b></p> <p>If you need 15 cents to buy one sticker how much money do you need to buy 6 stickers?</p>	<p><b>Size of Groups Unknown:</b></p> <p>Peter bought 15 folders for \$75.00. If each folder cost the same price how much did one folder cost? How much did 7 folders cost?</p>	
<b>* Combination Problems</b>	<p><b>Outcomes Unknown:</b></p> <p>An experiment involves tossing a coin and rolling a die. How many different outcomes are possible?</p> <p>Sue has 3 pairs of pants and 4 shirts that can all be worn together. How many different outfits consisting of a pair of pants and a shirt does she have?</p>		<p><b>Factor Unknown:</b></p> <p>Sue bought some new pants and shirts that can all be worn together. He has a total of 12 different outfits. If he bought 3 pairs of pants, how many shirts did he buy?</p>

\* These problem structures are typically introduced in middle school mathematics.

# Helping Students Get Unstuck

- **Jot Down Ideas**
- **Restate the Problem in Your Own Words**
- **Cross Out Unnecessary Information**
- **Substitute with Simpler Numbers**
- **Take a Break**
- **Use Manipulatives**
- **Talk the Problem Through**
- **Think of a Similar Problem**
- **Try a Different Strategy**
- **Give Yourself a Pep Talk**





# **Problem Solving**

What is this  
problem asking me to do?  
What do I know? What do  
I need to find out?  
Visualize the problem in my mind.

Which strategy  
should I use?

Does my answer  
make sense?

Is it reasonable?

Are there several  
steps?

Does this match  
my estimate?

Use your strategy to solve the problem.  
If it doesn't work, try a different  
strategy.

# Steps for Problem Solving

## 1. Understand

Do I see pictures in my mind?  
How do they help me understand the situation?

What do I know for sure?

What do I want to know/figure out/find out/do?  
Do I have a sense of what my answer might look like?

What does this situation remind me of?

Is this related to things I've seen anywhere

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## 3. Solve

Is my strategy working?

Do I see any patterns?

Should I try another strategy?

Do I need to go back and read the problem again?

## 2. Plan

What representations can I use to help me solve the problem?

Which problem solving strategy will help me the most in this situation?

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## 4. Look Back

Does my answer make sense for the problem?

Is there a pattern that makes the answer reasonable?

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