

# Word Problem Problems? K-5 Schema-Based Instruction



# Sarah R. Powell, Ph.D.

Associate Professor  
The University of Texas at Austin



[srpowell@utexas.edu](mailto:srpowell@utexas.edu)



[@sarahpowellphd](https://www.instagram.com/sarahpowellphd)



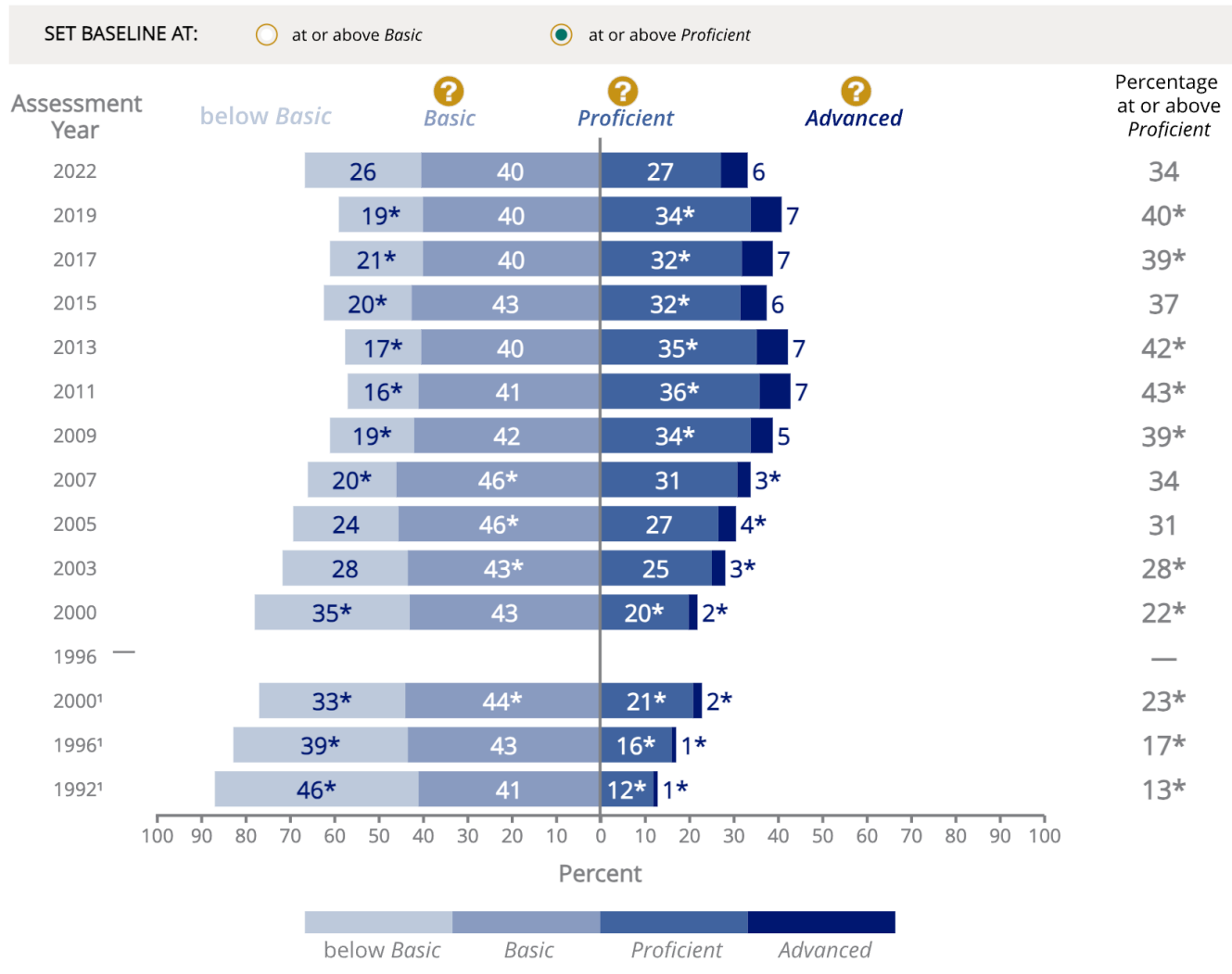
Say hello.

What makes word problems so difficult for students?



# GRADE 4 | MATHEMATICS

Average scale scores, percentage, percentage, percentage, percentage and percentage for grade 4 mathematics, by All students jurisdiction: 1990, 1992, 1996, 2000, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, and 2022



# Word Problems



# Word Problem Problems? K-5 Schema-Based Instruction

srpowell@utexas.edu @sarahpowellphd  
www.sarahpowellphd.com

Research and Information

A diagram consisting of seven empty rounded rectangular boxes arranged in a hierarchical structure. At the top is one box. Below it are two boxes. Below those are two boxes. At the bottom are two boxes.





Key words tied to operations is an ineffective word-problem strategy.

(Karp et al., 2019; Powell et al., 2022)

Using a meta-cognitive strategy improves word-problem performance.

(Freeman-Green et al., 2015; Krawec et al., 2012; Montague et al., 2011; Swanson et al., 2014)

A focus on schemas improves word-problem performance.

(Alghamdi et al., 2020; Cook et al., 2020; Flores et al., 2016; Fuchs et al., 2021; Griffin et al., 2019; Jitendra et al., 2013; Lein et al., 2020; Peltier et al., 2020; Powell et al., 2022; Xin & Xhang, 2009; Zheng et al., 2013)



# Ineffective Strategies







1. Keywords tied to operations

Carmelita had 8 pencils fewer than Jenny. If Jenny had 18 pencils, how many pencils did Carmelita have?

Carmelita had 8 pencils fewer than Jenny. If Carmelita had 18 pencils, how many pencils did Jenny have?

### Key Words Used in Math Word Problems

Addition Words	Subtraction Words
<ul style="list-style-type: none"> <li>add</li> <li>all together or altogether</li> <li>and</li> <li>both</li> <li>combined</li> <li>how many in all</li> <li>how much</li> <li>in all</li> <li>increased by</li> <li>sum</li> <li>plus</li> <li>together</li> <li>total</li> </ul>	<ul style="list-style-type: none"> <li>change</li> <li>decreased by</li> <li>difference</li> <li>fewer or fewer than</li> <li>how many are left (or have left)</li> <li>how many did not have</li> <li>how many</li> <li>how much taller, heavier, less or less</li> <li>lost</li> <li>minus</li> <li>need to</li> <li>reduce</li> <li>remain</li> <li>subtract</li> <li>take away</li> </ul>
<ul style="list-style-type: none"> <li>x by (dimension)</li> <li>double</li> <li>each group</li> <li>every</li> <li>factor of</li> <li>increased by</li> <li>multiplied by</li> <li>x of</li> <li>x product</li> <li>x times</li> <li>x triple</li> </ul>	<ul style="list-style-type: none"> <li>Divis</li> <li>as much</li> <li>cut up</li> <li>each group</li> <li>equal share</li> <li>half (or at)</li> <li>how many parts</li> <li>per</li> <li>percent</li> <li>quotient</li> <li>ratio of</li> <li>separated</li> <li>share some</li> </ul>

## Division

Taking a total and sharing it equally

## Addition

Putting two or more things/amounts together.

**Keywords**

- Total
- Altogether
- In all
- Sum
- More than
- Combined

### Problem Solving Key Words

Addition	Subtraction
<ul style="list-style-type: none"> <li>add</li> <li>together</li> </ul>	<ul style="list-style-type: none"> <li>are not</li> <li>decrease</li> <li>difference</li> <li>fewer, larger, shorter</li> <li>left</li> <li>less than</li> <li>minus</li> <li>remain</li> <li>take away</li> </ul>

### key words

addition: sum, both

in all: together, perimeter

total: plus, add

more than: none

subtraction: subtract, main, less than

difference: decrease, fewer, take away, minus, how many more...

triple

factor

product

multiply

each

per

in all

multiple

area

double

times

average

division: equal groups, half

split

quotient

divide

shared

equally

each

distribute

### OPERATION cue words

ADDITION	SUBTRACTION
<ul style="list-style-type: none"> <li>and</li> <li>total</li> <li>join</li> <li>more than</li> <li>in all</li> <li>sum</li> <li>altogether</li> <li>increased</li> </ul>	<ul style="list-style-type: none"> <li>less than</li> <li>decreased</li> <li>remaining</li> <li>left</li> <li>fewer</li> <li>take away</li> <li>difference</li> <li>minus</li> </ul>
MULTIPLICATION	DIVISION
<ul style="list-style-type: none"> <li>product</li> <li>times</li> <li>as many as</li> <li>of</li> <li>by</li> <li>equal groups</li> </ul>	<ul style="list-style-type: none"> <li>quotient</li> <li>each</li> <li>broken into</li> <li>per</li> <li>distributed evenly</li> <li>parts</li> </ul>

### Key Words for All Operations

Addition	Subtraction
<ul style="list-style-type: none"> <li>Sum</li> <li>Total</li> <li>Plus</li> <li>In all</li> <li>And</li> <li>Join</li> <li>Altogether</li> <li>Perimeter</li> <li>Together</li> </ul>	<ul style="list-style-type: none"> <li>Fewer</li> <li>Less</li> <li>Exceed</li> <li>Remain</li> <li>Are not</li> <li>Minus</li> <li>Difference</li> <li>How many more</li> <li>Take away</li> <li>Left over</li> </ul>

When they say... They mean...

### Math Operation - Key Words

Addition	Subtraction
<ul style="list-style-type: none"> <li>add</li> <li>altogether</li> <li>and</li> <li>both</li> <li>in all</li> <li>sum</li> <li>total</li> <li>increase</li> </ul>	<ul style="list-style-type: none"> <li>difference</li> <li>fewer than</li> <li>gave/take away</li> <li>decreased by</li> <li>how many more</li> <li>show much longer/smaller/shorter</li> <li>minus</li> <li>remaining</li> </ul>
Multiplication	Division
<ul style="list-style-type: none"> <li>area</li> <li>product</li> <li>Each</li> <li>by - of - per</li> <li>Times</li> <li>double, twice, triple</li> <li>total</li> <li>increase</li> </ul>	<ul style="list-style-type: none"> <li>quotient</li> <li>divide</li> <li>into</li> <li>equal parts/share equally</li> <li>per</li> <li>amount of each</li> </ul>

### Math Posters

ADDITION	MULTIPLICATION
<ul style="list-style-type: none"> <li>-sum</li> <li>-total</li> <li>-more than</li> <li>-plus</li> </ul>	<ul style="list-style-type: none"> <li>-both</li> <li>-combined</li> <li>-increased by</li> <li>-perimeter</li> <li>-product</li> <li>-per</li> <li>-double</li> <li>-every</li> <li>-area</li> <li>-each</li> <li>-by</li> </ul>
SUBTRACTION	DIVISION
<ul style="list-style-type: none"> <li>-difference</li> <li>-remain</li> <li>-left</li> <li>-less than</li> <li>-minus</li> <li>-how many more</li> <li>-decrease</li> <li>-give away</li> <li>-reduce</li> <li>-discount</li> <li>-how many more</li> </ul>	<ul style="list-style-type: none"> <li>-quotient</li> <li>-divide by</li> <li>-into</li> <li>-split</li> <li>-out of</li> <li>-shared</li> <li>-per</li> <li>-every</li> <li>-each</li> <li>-evenly</li> <li>-equal groups</li> <li>-half</li> </ul>

### Math Key Words

Addition	Subtraction	Multiplication	Division
<ul style="list-style-type: none"> <li>plus</li> <li>sum</li> <li>add</li> <li>total</li> <li>all together</li> <li>increase</li> <li>more</li> <li>combine</li> </ul>	<ul style="list-style-type: none"> <li>subtract</li> <li>minus</li> <li>difference</li> <li>left</li> <li>left over</li> <li>decrease</li> <li>take away</li> <li>fewer</li> </ul>	<ul style="list-style-type: none"> <li>times</li> <li>product</li> <li>factor</li> <li>double</li> <li>groups</li> <li>each</li> <li>area</li> <li>rows</li> </ul>	<ul style="list-style-type: none"> <li>quotient</li> <li>split</li> <li>share</li> <li>divide</li> <li>separate</li> <li>each</li> <li>average</li> <li>equal groups</li> </ul>



# Math Words Poster Set

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*Description of Single-Step Word Problems (n = 132)*

Schema	Occurrence of schema		Any keyword		Schema-specific keywords <sup>a</sup>		Multiple keywords <sup>a</sup>		Keyword(s) led to correct solution <sup>a</sup>	
	n	%	n	%	n	%	n	%	n	%
Total	27	20.5	26	96.3	23	88.5	5	19.2	21	80.8
Difference	17	12.9	17	100.0	14	82.4	2	11.8	12	70.6
Change	11	8.3	7	63.6	5	71.4	5	71.4	2	28.6
Equal groups	29	22.0	26	89.7	22	84.6	18	69.2	8	30.8
Comparison	10	7.6	9	90.0	9	100.0	4	44.4	5	55.6
Ratios or proportions	29	22.0	23	79.3	9	39.1	9	39.1	6	26.1
Product of measures	9	6.8	9	100.0	8	88.9	1	11.1	5	55.6

<sup>a</sup>When a problem featured a keyword.







*Description of Multi-Step Word Problems (n = 84)*

Schema	Occurrence of schema <sup>a</sup>		Any keyword		Keyword(s) led to correct solution <sup>b</sup>	
	n	%	n	%	n	%
Total	40	47.6	39	97.5	3	7.7
Difference	11	13.1	11	100.0	1	9.1
Change	21	23.8	19	95.0	1	5.3
Equal groups	49	58.3	48	98.0	1	2.1
Comparison	7	8.3	7	100.0	0	0.0
Ratios or proportions	22	25.0	16	76.2	1	6.3
Product of measures	7	8.3	7	100.0	2	28.6

<sup>a</sup>Sum across schemas does not equal 100 because each word problem featured more than one schema.

<sup>b</sup>When a problem featured a keyword.



Keywords are important to identify and understand

Keywords are the mathematical vocabulary that help an students understand what the story is about and what they need to do

Talk about keywords ("What does *more than* tell you about?")



But, do not tie a keyword to a specific operation!



## 2. Presenting problems by operation





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

Date: \_\_\_\_\_

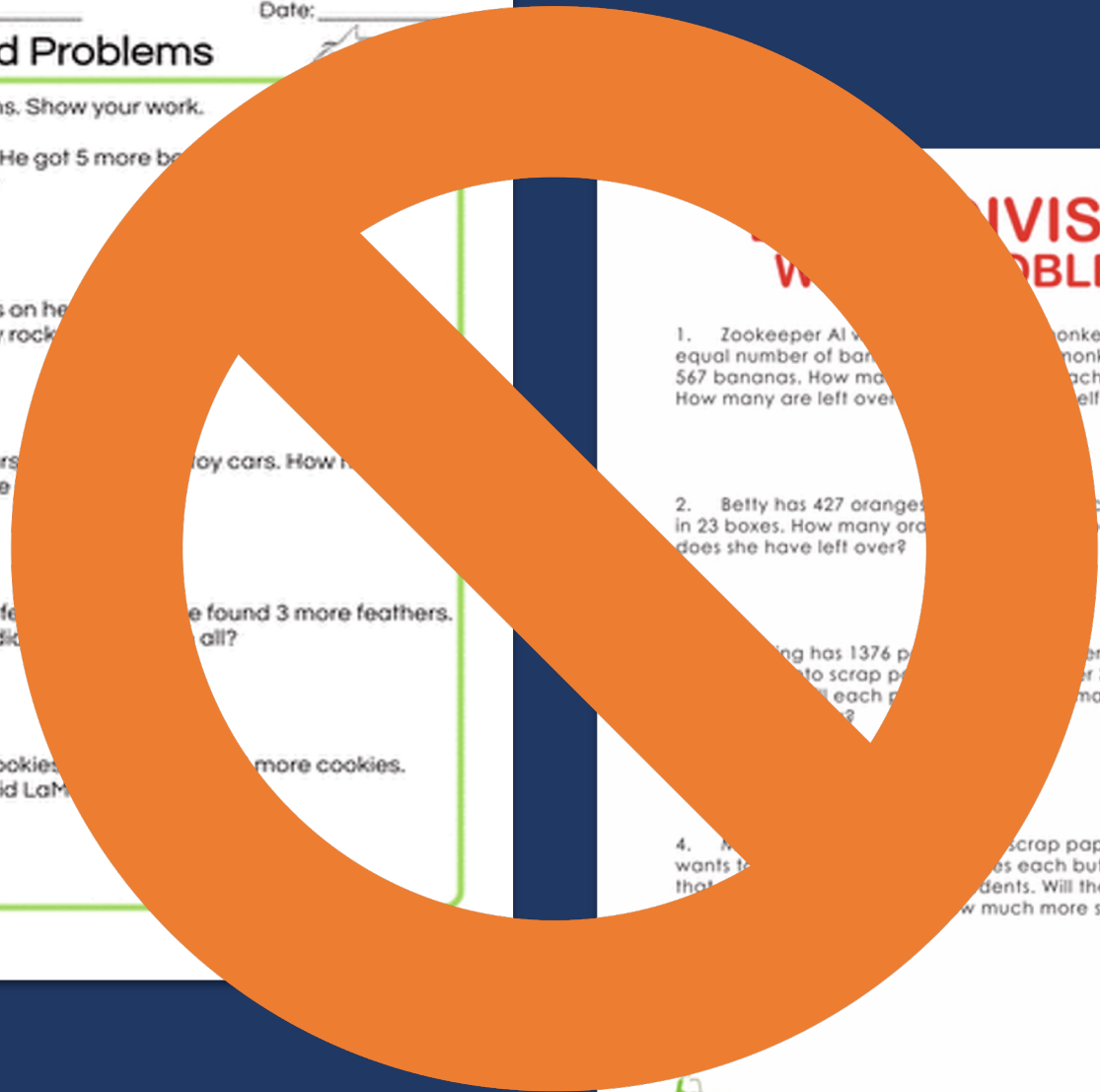
## Addition Word Problems

Solve the word problems. Show your work.

1. Noah had 12 books. He got 5 more books. How many books did Noah have in all?
2. Bonnie found 8 rocks on her front yard and 7 rocks in her backyard. How many rocks did she find in all?
3. Edward had 5 toy cars. He got 3 more toy cars. How many toy cars did Edward have in all?
4. Mariela collected 11 feathers. She found 3 more feathers. How many feathers did she have in all?
5. LaMonte made 14 cookies. He made 7 more cookies. How many cookies did LaMonte have in all?

## Division Word Problems

1. Zookeeper Al wants to divide 567 bananas among 9 monkeys in the zoo and 567 bananas among 7 monkeys in the zoo. How many bananas does each monkey get? And how many are left over?
2. Betty has 427 oranges. She wants to pack them up equally in 23 boxes. How many oranges will she have in each box and how much does she have left over?
3. Mr. King has 1376 pages of scrap paper. He wants to divide the pages equally among 32 students. How many pages will each student get? How many extra pages will he have left over?
4. Mr. King has 1376 pages of scrap paper. He instead wants to divide the pages equally among 32 students. Will there be enough pages for each student? How much more scrap paper does he need?



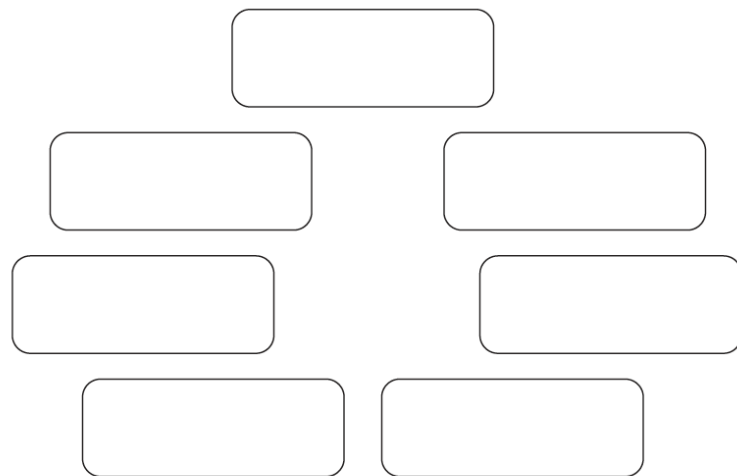
# Effective Strategies

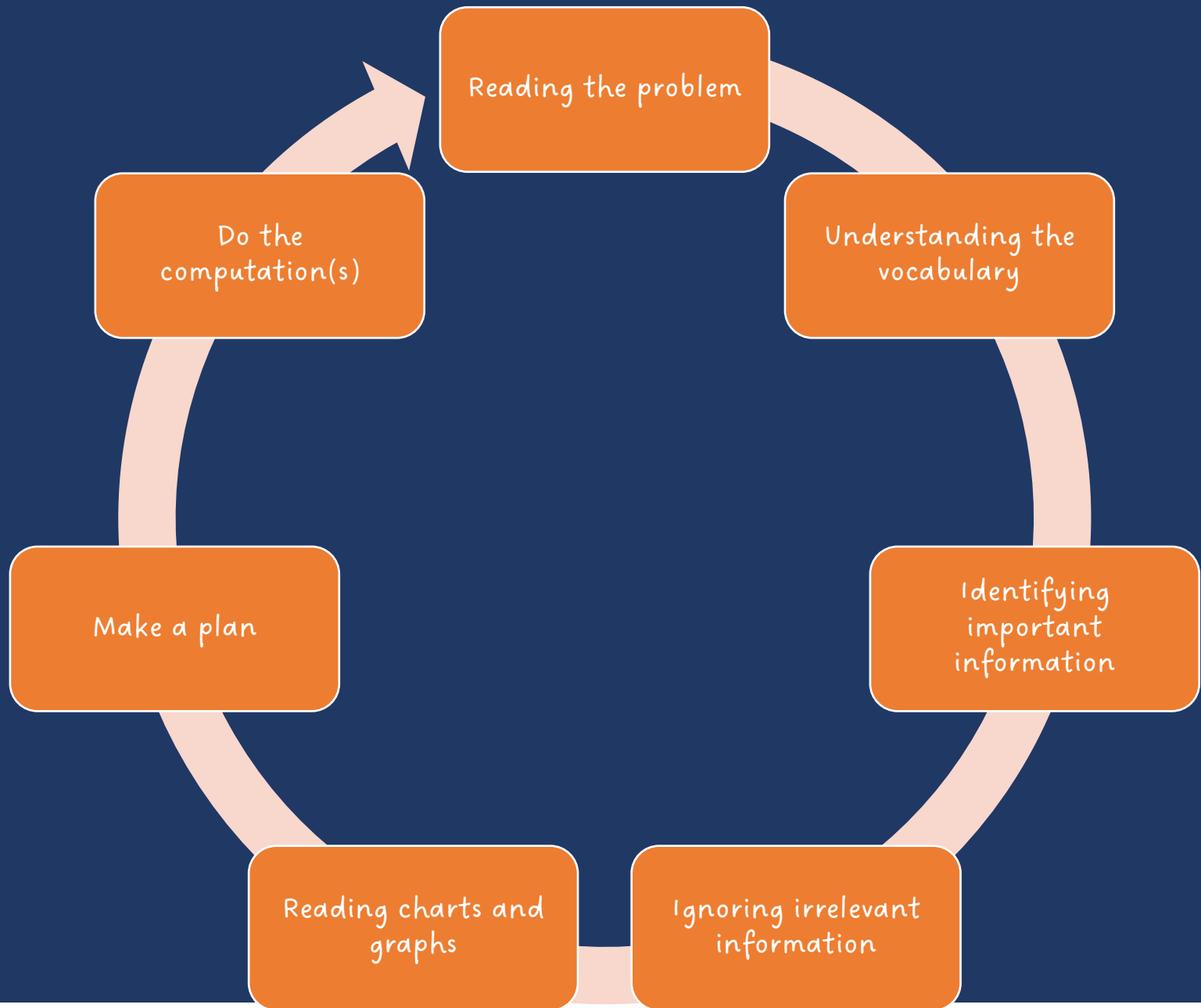


# Word Problem Problems? K-5 Schema-Based Instruction

srpowell@utexas.edu @sarahpowellphd  
www.sarahpowellphd.com

Research and Information





Teach an attack strategy

Teach about schemas



## WORD PROBLEMS

### Attack Strategies

#### SOLVE

- Study the problem
- Organize the information
- Line up a plan
- Verify the plan
- Examine the answer

#### R-CUBES

- Read the problem
- Circle key numbers
- Underline the question
- Box action words
- Evaluate steps
- Solve and check

#### UPS Check

- Understand
- Plan
- Solve
- Check



## RIDE

**R**ead the problem.

**I**dentify the relevant information.

**D**etermine the operation and unit for the answer.

**E**nter the correct numbers and calculate, then check the answer.

## RICE

**R**ead and record the problem.

**I**llustrate your thinking.

**C**ompute.

**E**xplain your thinking.

## RIDGES

**R**ead the problem.

**I** know statement.

**D**raw a picture.

**G**oal statement.

**E**quation development.

**S**olve the equation.



## SUPER

Slowly read the story problem twice.  
Underline the question and circle the numbers you need.  
Picture it. Draw the scenario to show what is happening.  
Explain the problem with a number sentence.  
Rewrite the answer in a sentence.

## SHINES

Slowly and carefully read the problem.  
Highlight or underline key information.  
Identify the question by drawing a circle around it.  
Now solve the problem. Show your work.  
Examine your work for precision, accuracy, and clarity.  
Share your answer by writing a sentence.

## STAR

Stop and read the problem carefully.  
Think about your plan and the strategy you will use.  
Act. Follow your plan and solve the problem.  
Review your answer.





# SOLVE

Study the problem.

Organize the facts.

Line up the plan.

Verify the plan with computation.

Examine the answer.

# R-CUBES

Read the problem.

Circle key numbers.

Underline the question.

Box action words.

Evaluate steps.

Solve and check.

# UPS✓

# UNDERSTAND

Read and explain.

# PLAN

How will you solve the problem?

# SOLVE

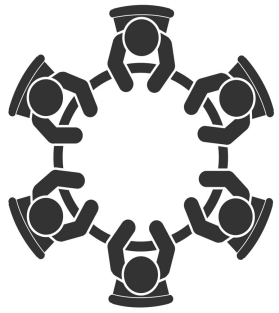
Set up and do the math!

# ✓CHECK

Does your answer make sense?

Created by: Sarah Powell (srpowell@austin.utexas.edu)





Share your favorite attack strategy.

Teach an attack strategy

Teach about schemas



Total

Difference

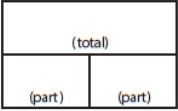
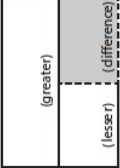
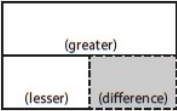

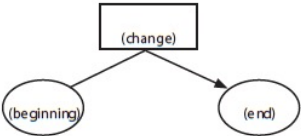
Change

Equal Groups

Comparison

Ratios/Proportions



Schema and Definition	Equations and Graphic Organizers	Examples	Variations
<b>Total</b> (Combine; Part-part-whole) Parts combined for a sum	$P1 + P2 = T$ (part + part = total) 	Sum unknown: Lyle has 11 red apples and 18 green apples. How many apples does Lyle have altogether?  Part unknown: Lyle has 29 red and green apples. If 11 of the apples are red, how many green apples does Lyle have?	More than two parts: Lyle has 34 apples. Of the apples, 11 are red, 18 are green, and the rest are yellow. How many yellow apples does Lyle have?
<b>Difference</b> (Compare) Sets compared for a difference	$B - s = D$ (bigger - smaller = difference)  $G - L = D$ (greater - less = difference) 	Difference unknown: Sasha wrote 85 words in her essay, and Tabitha wrote 110 words. How many fewer words did Sasha write than Tabitha?  Bigger/greater unknown: Tabitha wrote 25 more words than Sasha. If Sasha wrote 85 words, how many words did Tabitha write?  Smaller/lesser unknown: Tabitha wrote 110 words in her essay. Sasha wrote 25 words fewer than Tabitha. How many words did Sasha write?	(None)
<b>Change</b> (Join; Separate) An amount that increases or decreases	$ST +/- C = E$ (start +/- change = end)  	End (increase) unknown: Jorge had \$52. Then, he earned \$16 babysitting. How much money does Jorge have now?  Change (increase) unknown: Jorge had \$52. Then, he earned some money babysitting. Now, Jorge has \$68. How much did Jorge earn babysitting?  Start (increase) unknown: Jorge has some money, and then he earned \$16 for babysitting. Now, Jorge has \$68. How much money did he have to start with?  End (decrease) unknown: Jorge had \$52. Then, he spent \$29 at the ballpark. How much money does Jorge have now?  Change (decrease) unknown: Jorge had \$52 but spent some money when he went to the ballpark. Now, Jorge has \$23. How much did Jorge spend at the ballpark?  Start (decrease) unknown: Jorge had some money. Then, he spent \$29 at the ballpark and has \$23 left. How much money did Jorge have before going to the ballpark?	Multiple changes: Jorge had \$78. He stopped and bought a pair of shoes for \$42 and then he spent \$12 at the grocery. How much money does Jorge have now?

Powell & Fuchs (2018).

Material collected from: Griffin & Jitendra, 2009; Fuchs et al., 2014; Fuchs, Seethaler, et al., 2008; Fuchs et al., 2010; Jitendra, 2002; Kintsch & Greeno, 1985; Van de Walle, Karp, & Bay-Williams, 2013.



# Total

## Additive Word Problems

A.  
Ali delivered 12 boxes of cookies on Friday and 25 boxes of cookies on Saturday. How many boxes of cookies did Ali deliver?

B.  
In March and April, it rained a total of 11.4 inches. If it rained 3.9 inches in March, how many inches did it rain in April?

C.  
Sam mows lawns and made \$560 last week. She made \$95 on Monday, \$135 on Tuesday, and \$70 on Wednesday. How much did Sam make on Thursday and Friday?

NOTES ABOUT TOTAL PROBLEMS:



Total

Part-part-whole  
Combine

**Parts** put together into a **total**

Mandy saw **3** canoes and **8** kayaks. How many boats did Mandy see?

Mandy saw **11** boats. If **3** of the boats were canoes, how many were kayaks?

Mandy saw **11** boats. **8** of the boats were kayaks, how many were canoes?

Total

Part

Part



Total

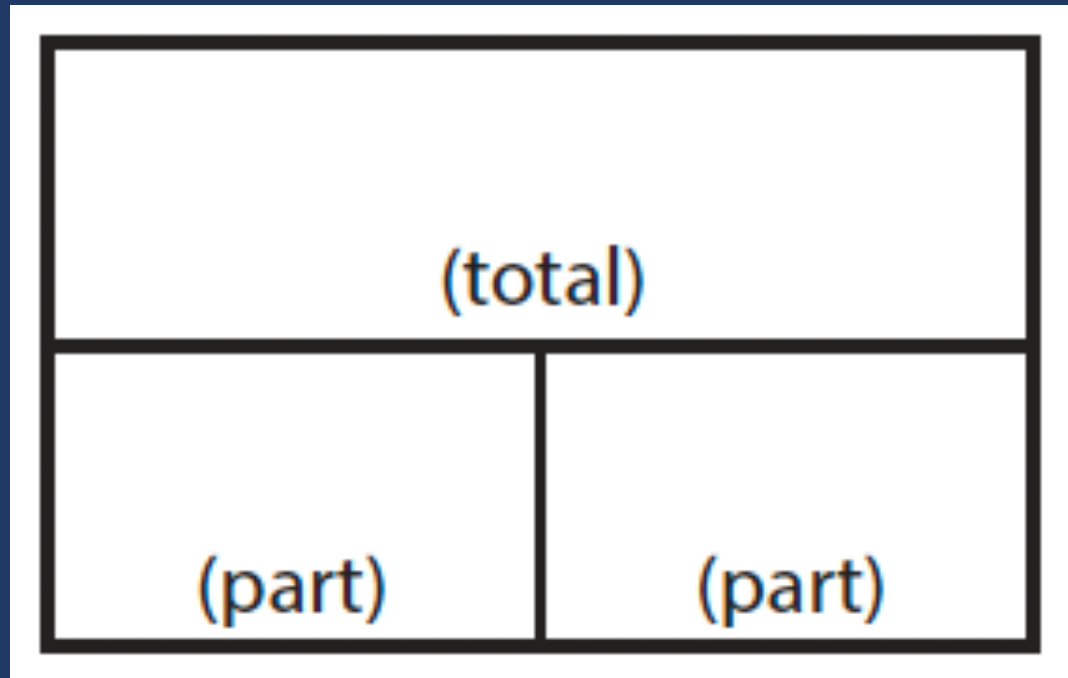
“Are parts put together for a total?”





Total

$$P1 + P2 = T$$



# Total

## Additive Word Problems

A.  
Ali delivered 12 boxes of cookies on Friday and 25 boxes of cookies on Saturday. How many boxes of cookies did Ali deliver?

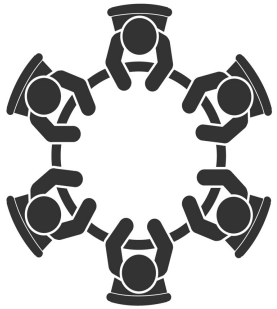
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C.  
Sam mows lawns and made \$560 last week. She made \$95 on Monday, \$135 on Tuesday, and \$70 on Wednesday. How much did Sam make on Thursday and Friday?

NOTES ABOUT TOTAL PROBLEMS:



Total



Share a Total problem.



# Difference

## Additive Word Problems

D.  
Audrey has 162 wooden beads and 95 glass beads.  
What is the difference between Audrey's wooden  
beads and glass beads?

E.  
Damian's dog eats  $9\frac{1}{2}$  cups of dog food each  
week. Monte's dog eats  $4\frac{1}{4}$  cups less each week  
than Damian's dog. How much does Monte's dog  
eat in a week?

F.  
The temperature in Norfolk was 12 degrees warmer  
than in Roanoke where the temperature was 79  
degrees. It was 86 degrees in Marion. What was the  
temperature in Norfolk?

NOTES ABOUT DIFFERENCE PROBLEMS:



# Difference

Compare

Greater and lesser amounts compared for a difference

L'Tanya has 10 pencils. Vickie has 4 pencils. How many more pencils does L'Tanya have?

L'Tanya has 6 more pencils than Vickie. If Vickie has 4 pencils, how many does L'Tanya have?

Vickie has 6 fewer pencils than L'Tanya. L'Tanya has 10 pencils. How many pencils does Vickie have?

Difference

Greater amount

Lesser amount



Total

“Are parts put together for a total?”

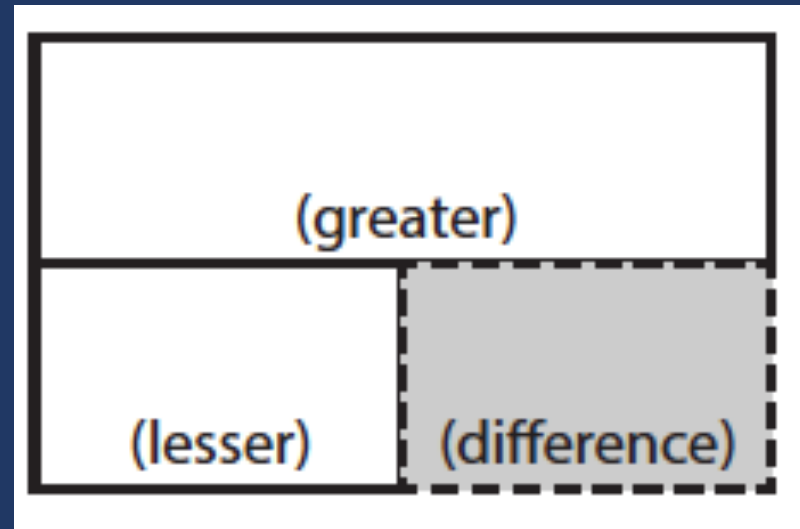
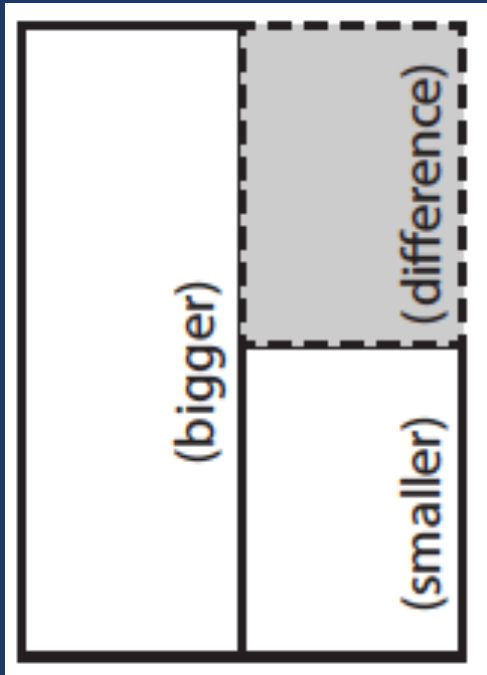
Difference

“Are amounts compared for a difference?”



# Difference

$$G - L = D$$



# Difference

## Additive Word Problems

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E.  
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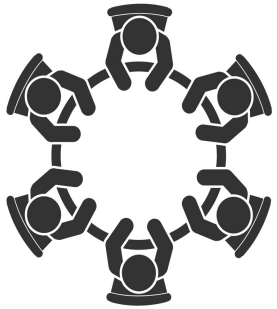
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temperature in Norfolk?

NOTES ABOUT DIFFERENCE PROBLEMS:





# Difference



Share a Difference problem.

# Change

## Additive Word Problems

G.  
A plant was  $3\frac{3}{4}$  inches tall at the beginning of June. By the end of July, the plant was  $9\frac{1}{8}$  inches tall. How many inches did the plant grow in 2 months?

H.  
Martina has some money in her bank account. Then, she spent \$135.69 and has a balance of -\$24.80. How much money did Martina have to begin with?

I.  
Hui saved \$70 in January. In February, she spent \$64 of the money she saved. She saved \$92 more in March. How much has Hui saved by the end of March?

NOTES ABOUT CHANGE PROBLEMS:



# Change

Join

An amount that increases or decreases

Annette had 6 notebooks. Then, she bought 3 notebooks. How many notebooks does Annette have now?

End amount

Annette had 6 notebooks. Then, she bought a few more notebooks. Now, Annette has 9 notebooks. How many notebooks did she buy?

Change amount

Annette had some notebooks. Then, she bought 3 notebooks. Now, Annette has 9 notebooks. How many notebooks did she have to start with?

Start amount



# Change

Separate

An amount that increases or decreases

Jenny baked 20 cookies. Then, she ate 3 of the cookies. How many cookies does Jenny have now?

End amount

Jenny baked 20 cookies. Then, she ate some of the cookies. Now, she has 17 cookies. How many cookies did Jenny eat?

Change amount

Jenny baked some cookies. She ate 3 of the cookies and has 17 cookies left. How many cookies did Jenny bake?

Start amount



Total

“Are parts put together for a total?”

Difference

“Are amounts compared for a difference?”

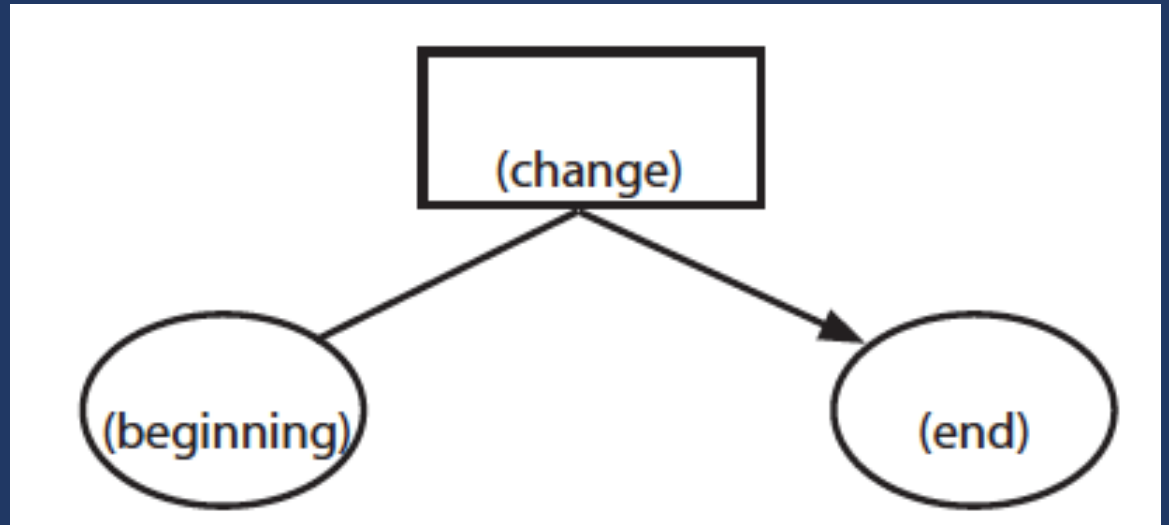
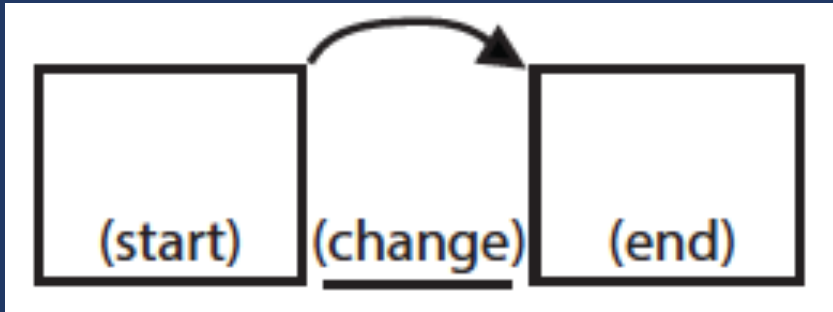
Change

“Does an amount increase or decrease?”



# Change

$$ST \quad + / - \quad C \quad = \quad E$$



# Change

## Additive Word Problems

G.  
A plant was  $3\frac{3}{4}$  inches tall at the beginning of June. By the end of July, the plant was  $9\frac{1}{8}$  inches tall. How many inches did the plant grow in 2 months?

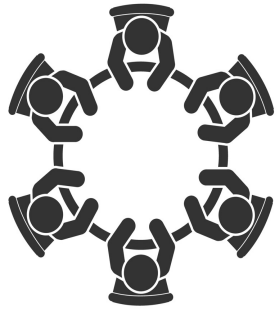
H.  
Martina has some money in her bank account. Then, she spent \$135.69 and has a balance of -\$24.80. How much money did Martina have to begin with?

I.  
Hui saved \$70 in January. In February, she spent \$64 of the money she saved. She saved \$92 more in March. How much has Hui saved by the end of March?

NOTES ABOUT CHANGE PROBLEMS:



# Change



Share a Change problem.



Total

Difference

Change

Equal Groups

Comparison

Ratios/Proportions



Schema and Definition	Graphic Organizers	Examples			Variations			
Equal Groups (Vary) A number of equal sets or units	$GR \times N = P$ 	Product unknown: Maria bought 5 cartons of eggs with 12 eggs in each carton. How many eggs did Maria buy?	Groups unknown: Maria bought 60 eggs. The eggs were sold in cartons with 12 eggs each. How many cartons of eggs did Maria buy?	Number unknown: Maria bought 5 cartons of eggs for a total of 60 eggs. How many eggs were in each carton?	With rate: Maria bought 5 cartons of eggs. Each carton cost \$2.95. How much did Maria spend on eggs?			
Comparison One set as a multiple or part of another set	$S \times T = P$ 	Product unknown: Malik picked 7 flowers. Danica picked 3 times as many flowers. How many flowers did Danica pick?	Set unknown: Danica picked 3 times as many flowers as Malik. If Danica picked 21 flowers, how many flowers did Malik pick?	Times unknown: Malik picked 7 flowers. Danica picked 21 flowers. How many times more flowers did Danica pick?	With fraction: Malik picked 25 red and yellow flowers. If 1/5 of the flowers were yellow, how many were red?			
Ratios/Proportions (Percentages; Unit Rate) Relationships among quantities  Ratio		Subject unknown: Sally typed 56 words in 2 minutes. How many words could Sally type in 7 minutes?	Object unknown: Sally typed 56 words in 2 minutes. How many minutes would it take Sally to type 192 words?	Base unknown: Justin baked cookies and brownies. The ratio of cookies to brownies was 3:5. If he baked 15 cookies, how many brownies did he bake?	Compared unknown: Justin baked cookies and brownies. The ratio of cookies to brownies was 3:5. If he baked 25 brownies, how many cookies did he bake?	Ratio unknown: Justin baked 15 cookies and 25 brownies. What's the ratio of cookies to brownies?	With percentage: Watson received an 80% on his science quiz. If the test had 40 questions, how many questions did Watson answer correctly?	With unit rate: Paula bought 5 boxes of markers. She spent \$9.75. What is the price of one box of markers?

Material collected from: Jitendra, DiPipi, & Perron-Jones, 2002; Jitendra & Star, 2011; Jitendra et al., 2009; Van de Walle et al., 2013; Xin, Jitendra, & Deatline-Buchman, 2005; Xin & Zhang, 2009.



# Equal Groups

## Multiplicative Word Problems

J.  
Lola baked 6 pies. For each pie, Lola used 5 apples.  
How many apples did Lola use?

K.  
Jane bought 112 light bulbs. The light bulbs come  
in packs of 4. How many packs of light bulbs did  
Jane buy?

L.  
Zachary has 3 feet of string. He makes bracelets,  
and each bracelet needs  $5\frac{1}{4}$  inches of string. How  
many bracelets could Zachary make?

NOTES ABOUT EQUAL GROUPS PROBLEMS:



# Equal Groups

Array  
Vary

**Groups** multiplied by **number in each group** for a **product**

Mandy has **2** boxes. There are **6** muffins in each box. How many muffins does Mandy have?

Product

Mandy has **12** muffins. They want to place them equally into **2** boxes. How many muffins will Mandy place in each box?

Number in each group

Mandy has **12** muffins. They put them into boxes with **6** muffins each. How many boxes did Mandy use?

Groups



# Equal Groups

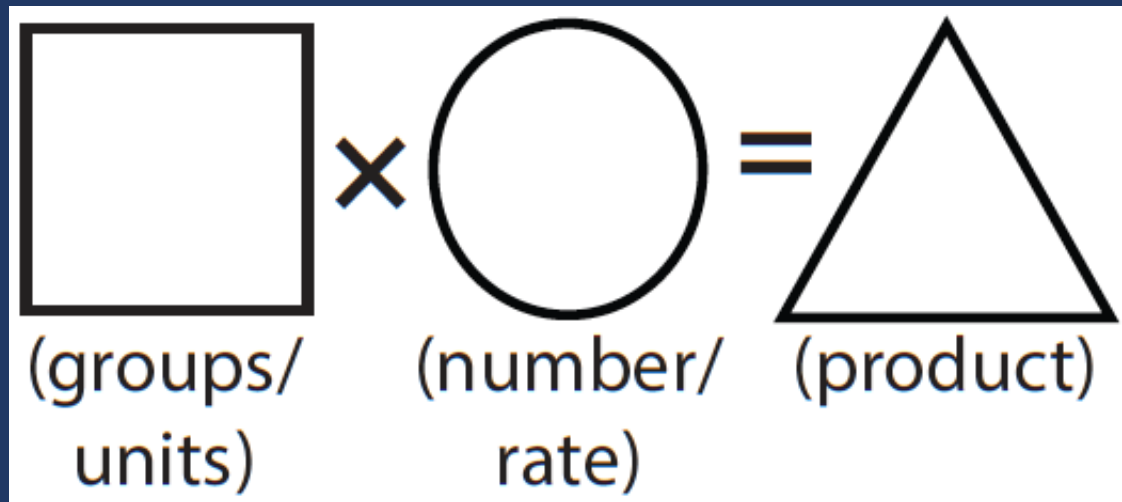
"Are there groups with an equal number in each group?"



# Equal Groups

$$GR \times N = P$$

$$GR \times E = P$$



# Equal Groups

## Multiplicative Word Problems

J.  
Lola baked 6 pies. For each pie, Lola used 5 apples.  
How many apples did Lola use?

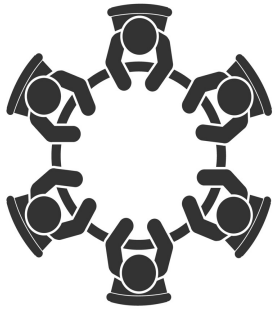
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and each bracelet needs  $5\frac{1}{4}$  inches of string. How  
many bracelets could Zachary make?

NOTES ABOUT EQUAL GROUPS PROBLEMS:



# Equal Groups



Share an Equal Groups problem.



# Comparison

## Multiplicative Word Problems

M.  
Enrique has 2 times as many pencils as Ava. Ava has 6 pencils. How many pencils does Enrique have?

N.  
Susan has 7 times as many books as Mo. Mo has 18 books. How many books Susan has?

NOTES ABOUT COMPARISON PROBLEMS:



# Comparison

Set multiplied by a number of times for a product

Joan ran 6 minutes. L'Tanya ran 4 times longer than Joan. How many minutes did L'Tanya run?

Set

Number of  
times

Product



## Equal Groups

“Are there groups with an equal number in each group?”

## Comparison

“Is a set compared a number of times?”



# Comparison

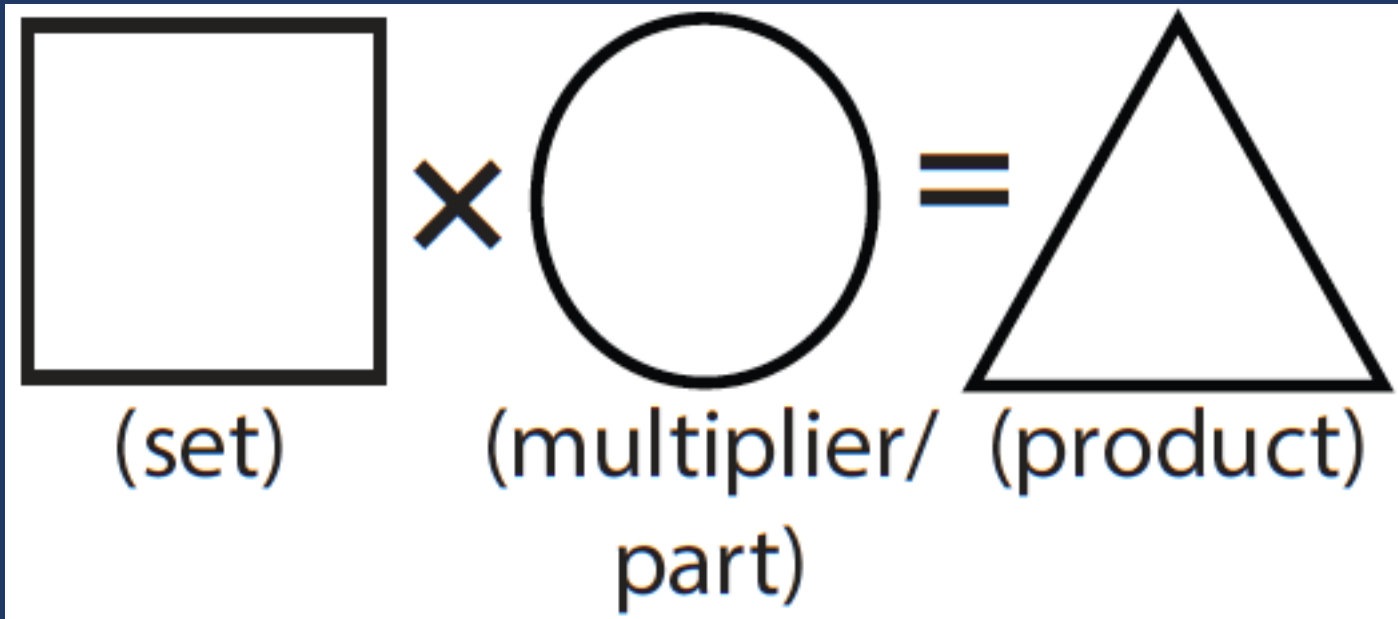
S

X

T

=

P



# Comparison

## Multiplicative Word Problems

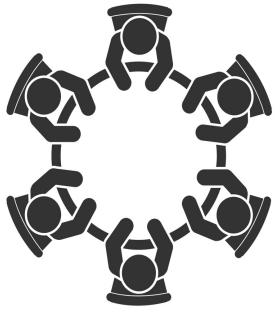
M.  
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N.  
Susan has 7 times as many books as Mo. Mo has 18 books. How many books Susan has?

NOTES ABOUT COMPARISON PROBLEMS:



# Comparison



Share a Comparison problem.

Total

Difference

Change

Equal Groups

Comparison

Ratios/Proportions



Total

Difference

Change

Equal Groups

Comparison

Ratio/  
Proportion

Mr. Abdul has a Ferrari, but Mr. Stark has 75 times more Ferraris than him. Who is cooler than Mr. Abdul?





Total

Difference

Change

Equal Groups

Comparison

Ratio/  
Proportion

For a three day walk a thon, Mekhi walked 1.5 miles on Monday, 4 miles on Tuesday, and 2.5 on Wed. What was the total that Mekhi walked during the 3 days?



Total

Difference

Change

Equal Groups

Comparison

Ratio/  
Proportion

There are 72 students in fifth grade. Each student has three notebooks. How many notebooks do all fifth grade students have all together?

Total

Difference

Change

Equal Groups

Comparison

Ratio/  
Proportion

Mrs. Smith's class had 4 more students than Mr. Bell's class. Mr. Bell's class has 19 students. How many students are in Mrs. Smith's class?



Total

Difference

Change

Equal Groups

Comparison

Ratio/  
Proportion

Martha had \$62 in her checking account. She then made a withdrawal of \$15. How much money is in her account now?

## WORD PROBLEMS



What are your strengths?



What are your opportunities for growth?



What are your plans for next Monday?

Next month?

Next year?





# Pirate Math Equation Quest

About

Research

Individual

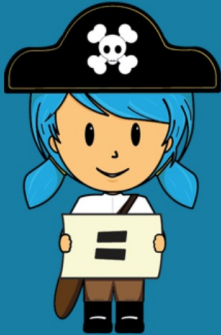
Small Group

STAAR

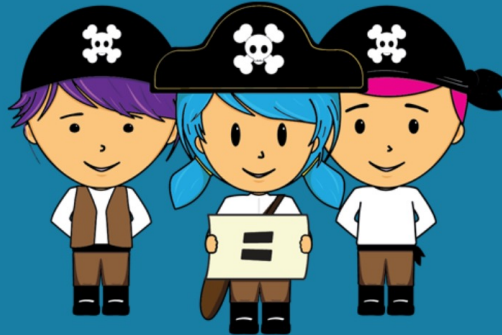
Videos

## Welcome to Pirate Math Equation Quest!

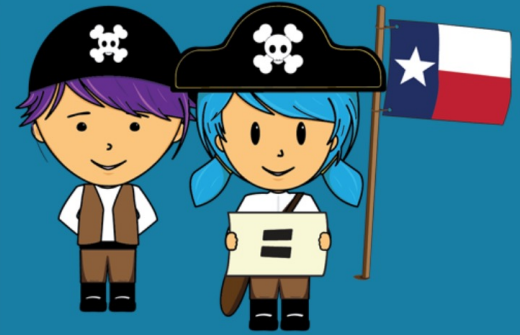
### Individual Word-Problem Intervention



### Small-Group Word-Problem Intervention



### Small-Group Word-Problem Intervention for STAAR



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<https://intensiveintervention.org>

National Center on  
**INTENSIVE INTERVENTION**

at American Institutes for Research

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For... ▾

## Intensive Intervention in Mathematics Course Content

NCII, through a collaboration with the University of Connecticut, developed a set of course content focused on developing educators' skills in designing and delivering intensive mathematics instruction. This content is designed to support faculty and professional development providers with instructing pre-service and in-service educators who are developing and/or refining their implementation of intensive mathematics intervention.

Intensive instruction was recently identified as a [high-leverage practice in special education](#), and DBI is a research based approach to delivering intensive instruction across content areas (NCII, 2013). This course provides learners with an opportunity to extend their understanding of intensive instruction through in-depth exposure to DBI in mathematics, complete with exemplars from actual classroom teachers.

NCII, through a collaboration with the University of Connecticut and the [National Center on Leadership in Intensive Intervention](#) and with support from the [CEEDAR Center](#), developed course content focused on enhancing educators' skills in intensive mathematics intervention. The course includes eight modules that can support faculty and professional development providers with instructing pre-service and in-service educators who are learning to implement intensive mathematics intervention through data-based individualization (DBI). The content in this course complements concepts covered in the [Features of Explicit Instruction Course](#) and so we suggest that users complete both courses.



**MODULE 5: INTENSIVE  
MATHEMATICS INTERVENTION:  
INSTRUCTIONAL STRATEGIES**





## Instructional Routines for Mathematics Intervention

The purpose of these mathematics instructional routines is to provide educators with materials to use when providing intervention to students who experience difficulty with mathematics. The routines address content included in the grades 2-8 Texas Essential Knowledge and Skills (TEKS). There are 23 modules that include routines and examples – each focused on different mathematical content. Each of the 23 modules include vocabulary cards and problem sets to use during instruction. These materials are intended to be implemented explicitly with the aim of improving mathematics outcomes for students.



<https://spedsupportstage.tea.texas.gov/resource-library/instructional-routines-mathematics-intervention>





<https://ies.ed.gov/ncee/wwc/PracticeGuide/26>



**IES** Institute of Education Sciences

What Works Clearinghouse™

Assisting Students Struggling with Mathematics: Intervention in the Elementary Grades

Educator's Practice Guide

WWC 2021006  
U.S. DEPARTMENT OF EDUCATION

*A publication of the National Center for Education Evaluation and Regional Assistance (NCEE) at IES*



# Sarah R. Powell, Ph.D.

Associate Professor  
The University of Texas at Austin



[srpowell@utexas.edu](mailto:srpowell@utexas.edu)



[@sarahpowellphd](https://www.instagram.com/sarahpowellphd)