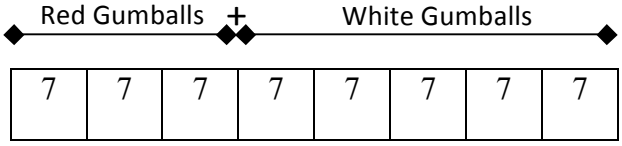
Decomposing Word Problems: Warm-up

4th Grade CST #56	3rd Grade CST #21
Anna bought 3 bags of red gumballs and 5 bags of white gumballs. Each bag of gumballs had 7 pieces in it. Which expression could Anna use to find the total number of gumballs she bought? A) $(7\times3)+5=$ B) $(7\times5)+3=$ C) $7\times(5+3)=$ D) $7+(5\times3)=$ Draw a bar model to find the answer.	Lisa rented 4 videotapes for $4.80. How much did each tape cost to rent? A) $1.20 B) $8.80 C) $12.00 D) $19.20 How would students arrive at each answer?
Other	**With a Partner**
Brainstorm a list of obstacles regarding word problems and student success.	Share your list with a partner. Work together to create a list of strategies to mitigate weaknesses regarding word problems.

Decomposing Word Problems: Warm-up Solutions

4th Grade CST #56	3rd Grade CST #21
Anna bought 3 bags of red gumballs and 5 bags of white gumballs. Each bag of gumballs had 7 pieces in it. Which expression could Anna use to find the total number of gumballs she bought? $7\times(5+3)=$ Draw a bar model to find the answer.  56 total gumballs	Lisa rented 4 videotapes for $4.80. How much did each tape cost to rent? How would students arrive at each answer? A) $1.20; divide B) $8.80; add 4 videos as $4.00 C) $12.00; add 4 as .4 with .80 D) $19.20; multiply
Other	**With a Partner**
Brainstorm a list of obstacles regarding word problems and student success. *See Quadrant IV*	Share your list with a partner. Work together to create a list of strategies to mitigate weaknesses regarding word problems. *Make small posters, share out, carousal walk.*

Decomposing Word Problems **Grades: 3-5**

Standards: 3MR1.1, 4MR1.1, 4MR2.4, 5MR2.4

Objective: Students will 1) find connections between language and mathematical equations, and 2) use knowledge of inverse operations to set up and solve math problems.

For all word problems, write each sentence onto sentence strips, then discuss/guide regarding the math connection and create another sentence strip that represents the content 'translated to math'. Using the 'math' versions, arrange the strips to create a correct equation. Use this equation and inverse operation to create three others. Use bar models and other strategies to solve.

Initially, scaffold the strategy by providing both sets of sentences and use think-aloud to help students find the connection between the written language and the mathematic translation.

3rd Grade CST #15.

What is the question we need to answer? [how much pie is left]

If the pie is being eaten, is that adding or subtracting? [subtracting] Subtracting what? [pie] How much? [$\frac{1}{5}$]

Repeat this script throughout the problem.

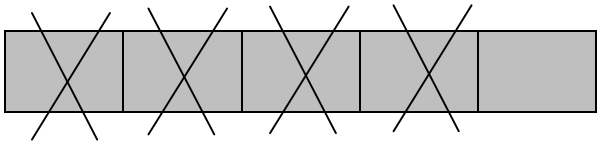
A pie was divided into fifths. Emily ate $\frac{1}{5}$ of the pie. Tony ate $\frac{2}{5}$ of the pie. Jenny ate $\frac{1}{5}$ of the pie.

How much of the pie was left?

Sentence Strips	Math Translation Strips
A pie was divided into fifths.	
Emily ate $\frac{1}{5}$ of the pie.	$-\frac{1}{5}$
Tony ate $\frac{2}{5}$ of the pie.	$-\frac{2}{5}$
Jenny ate $\frac{1}{5}$ of the pie.	$-\frac{1}{5}$

How much of the pie was left?	n

$$\frac{5}{5}-\frac{1}{5}-\frac{2}{5}-\frac{1}{5}=n$$



$\frac{5}{5}-\left(\frac{1}{5}+\frac{2}{5}+\frac{1}{5}\right)=n$	$\frac{5}{5}-n=\left(\frac{1}{5}+\frac{2}{5}+\frac{1}{5}\right)$	$n+\left(\frac{1}{5}+\frac{2}{5}+\frac{1}{5}\right)=\frac{5}{5}$	$\left(\frac{1}{5}+\frac{2}{5}+\frac{1}{5}\right)+n=\frac{5}{5}$

Subtraction "Families" $\longrightarrow$ Inverse Operation $\longrightarrow$ Comm. Prop. Addition

$$\frac{5}{5}-\left(\frac{1}{5}+\frac{2}{5}+\frac{1}{5}\right)$$
$$=\frac{5}{5}-\left(\frac{1+2+1}{5}\right)$$
$$=\frac{5}{5}-\frac{4}{5}$$
$$=\frac{5-4}{5}$$
$$=\frac{1}{5}$$
$$\therefore \frac{1}{5}\text{ of the pie was left}$$

YOU TRY 3rd Grade CST #16

What is the question we need to answer? [how much water is added altogether]

What math operation is this? [addition]

Adding what? [hot water] How much? [$\frac{2}{3}$ cup]

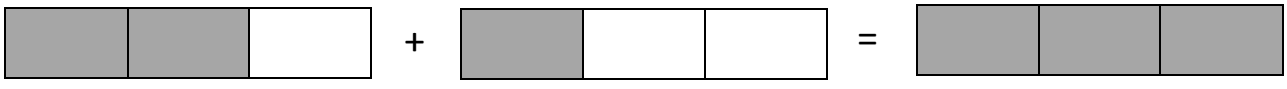
Repeat this script throughout the problem.

Jorge is making gelatin. He adds $\frac{2}{3}$ cup of hot water into a bowl. Then he adds $\frac{1}{3}$ cup of cold water. How much water does he add altogether?

Sentence Strips	Math Translation Strips
Jorge is making gelatin.	No math content within this sentence.
He adds $\frac{2}{3}$ cup of hot water into a bowl.	$+\frac{2}{3}$
Then he adds $\frac{1}{3}$ cup of cold water.	$+\frac{1}{3}$
How much water does he add altogether?	w

$\frac{2}{3}+\frac{1}{3}=w$	$\frac{1}{3}+\frac{2}{3}=w$	$w-\frac{1}{3}=\frac{2}{3}$	$w-\frac{2}{3}=\frac{1}{3}$

Commutative Property of Addition → Inverse Operation



$\frac{2}{3}+\frac{1}{3}=\frac{3}{3}$

$\therefore$ Jorge added 1 cup of water altogether.

4th Grade CST #29

What is the question we need to answer? [how many more pages need to be read]

How many pages were read? [541] What is the goal? [650] What math operation could be used to find the answer? [subtraction] Subtract what? [650 – 541]

Jonathan read 541 pages during his summer reading program. In order to reach his goal of 650 pages, how many more ages does he need to read?

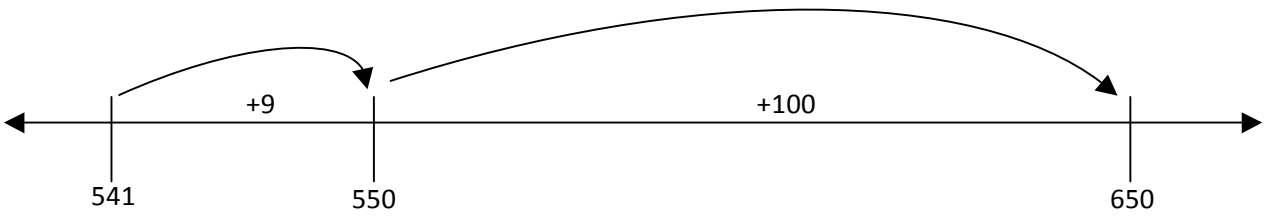
Sentence Strips	**Math Translation Strips**
Jonathan read 541 pages during his summer reading program.	541 pages
In order to reach his goal of 650 pages,	650 pages
how many more ages does he need to read?	p

$541 + p = 650$	$p + 541 = 650$	$650 - p = 541$	$650 - 541 = p$

Commutative Property of Addition → Inverse Operation

650	
p	541

650	
541	p



∴ Jonathan needs to read 109 more pages to meet his goal.

YOU TRY 4th Grade CST # 37

What is the question we need to answer? [how many cookies are made in the day]

What's going on with these 62 trays? [they're baking cookies in the morning] how many cookies? [12 on each tray] What math operation could we use to find out how many cookies are baked in the morning? [multiplication] What about the 53 trays? [add all the trays, multiply the trays with the cookies]

A cookie factory can bake 62 trays of cookies in the morning and 53 trays of cookies in the afternoon. If each tray holds 12 cookies, how many cookies can be made in one day?

Sentence Strips	**Math Translation Strips**
A cookie factory can bake 62 trays of cookies in the morning	+ 62 trays
and 53 trays of cookies in the afternoon	+ 53 trays
If each tray holds 12 cookies	× 12 cookies each tray
how many cookies can be made in one day?	c

$$(62 \text{ trays} + 53 \text{ trays}) \times 12 \text{ cookies} = c$$
$$115 \times 12 = c$$

$115 \times 12 = c$	$12 \times 115 = c$	$c \div 12 = 115$	$c \div 115 = 12$

Commutative Property of Multiplication → Inverse Operation

100	100	100	100	100	100	100	100	100	100	100	100
10	10	10	10	10	10	10	10	10	10	10	10
5	5	5	5	5	5	5	5	5	5	5	5

$$1200 + 120 + 60 = c$$
$$1380 = c$$

$\therefore 1380$ cookies can be made in one day.

5th Grade CST #22

What is the question we need to answer? [how many words are typed in 5.5 minutes]

How many words does Veronica type in one minute? [28] What is the question we need to answer? [how many words are typed in 5.5 minutes] If 28 words are typed in one minute, and we need to figure out how many words are typed in 5.5 minutes, what math operation can we use? [multiplication] What do we multiply? [28 x 5.5]

Veronica can type 28 words per minute. At this rate, how many words can she type in 5.5 minutes?

Sentence Strips	**Math Translation Strips**
Veronica can type 28 words per minute.	28 words per minute
At this rate, how many words can she type in 5.5 minutes?	× 5.5

$28 \times 5.5 = w$	$5.5 \times 28 = w$	$w \div 28 = 5.5$	$w \div 5.5 = 28$

Commutative Property of Multiplication → Inverse Operation

28	28	28	28	28	14	~~14~~

∴ Veronica can type 154 words in 5.5 minutes.

YOU TRY 5th Grade CST #21

What is the question we need to answer? [how much money was saved per pound]

What did Javier save? [$8.37] Did he save that altogether, or for each pound? [altogether] What math operation could you use to find out how much Javier saved per pound? [division] Divide what? [8.37] By what? [9]

Javier bought 9 pounds of ground beef. He saved $8.37 by using a store coupon. How much did he save per pound of ground beef?

Sentence Strips	**Math Translation Strips**
Javier bought 9 pounds of ground beef.	9 pounds
He saved $8.37 by using a store coupon.	$8.37 per 9 pounds
How much did he save per pound of ground beef?	p

$9 \times p = 8.37$	$p \times 9 = 8.37$	$8.37 \div p = 9$	$8.37 \div 9 = p$

Commutative Property of Multiplication → Inverse Operation

$8.37 \div 9 = p$

.50	.50	.50	.50	.50	.50	.50	.50	.50
.20	.20	.20	.20	.20	.20	.20	.20	.20
.20	.20	.20	.20	.20	.20	.20	.20	.20
.02	.02	.02	.02	.02	.02	.02	.02	.02
.01	.01	.01	.01	.01	.01	.01	.01	.01

$8.37 \div 9 = .93$; ∴ Javier saved $0.93 per pound.