

ONCE UPON A TIME THERE WAS A WORD PROBLEM: USING STORY ELEMENTS TO TEACH WORD PROBLEMS



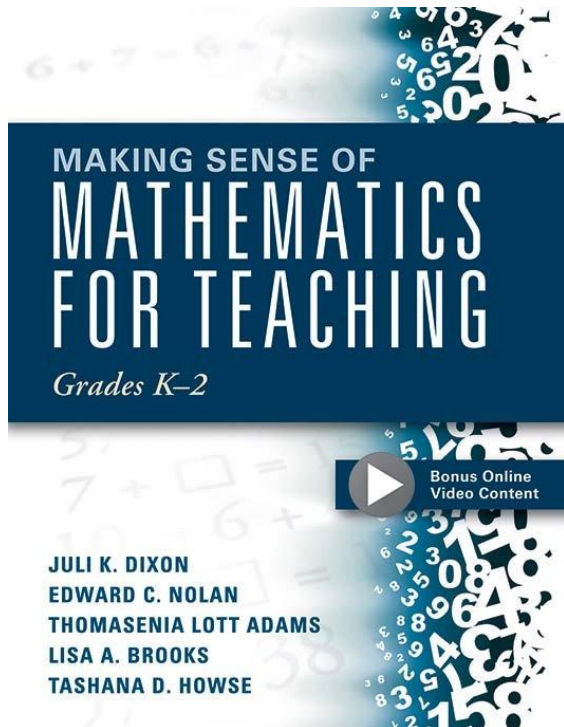
MICHELLE ALPERIN
EMILY STEENWYK
CHERYL FRICCHIONE

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NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

BACKGROUND INFORMATION



2nd Grade Word Problem Analysis

Blank chart for addition and subtraction problem types

		Result Unknown		Change Unknown	Start Unknown
Action	Join				
	Separate				
Nonaction	Part-Part-Whole	Whole Unknown		Part Unknown	
	Compare	Difference Unknown		Greater Unknown	Lesser Unknown
		"How many more?"			

GOOD READERS...

VISUALIZE

Use pictures or make a movie in their mind as they read

PREDICT

Guess what will happen next

SUMMARIZE

Retell the story in order

CONSTRUCT MEANING

Make connections

QUESTION

Decide if what they are reading makes sense

ORGANIZE

Use conventions and tools to give structure and track information

GOOD MATHEMATICIANS...

VISUALIZE

Use pictures or make a movie in their mind as they read **problems**

PREDICT

Guess what will happen next

SUMMARIZE

Retell the story in order

CONSTRUCT MEANING

Make connections

QUESTION

Decide if what they are **doing** makes sense

ORGANIZE

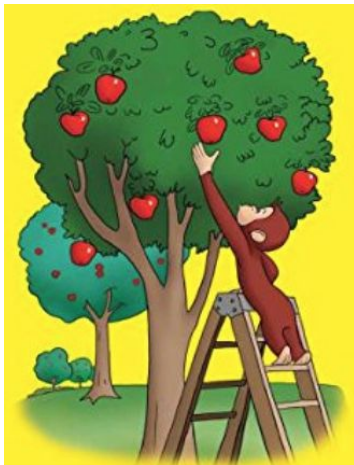
Use conventions and tools to give structure and track information

K: VISUALIZE - CONSTRUCT MEANING - PREDICT



What does
the plate
look like
now?

K: VISUALIZE - CONSTRUCT MEANING - PREDICT



**What does
the basket
look like
now?**

K: VISUALIZE - CONSTRUCT MEANING - PREDICT

Match each
picture to
the correct
expression

A matching exercise with pictures and math expressions. The pictures are arranged in a grid, and the math expressions are listed on the right. Blue arrows connect the pictures to the correct expressions.

Picture 1: 3 balloons (2 red, 1 blue) → $2 + 3$

Picture 2: 5 turtles (2 green, 3 crossed out with red X) → $5 - 3$

Picture 3: 5 peaches (3 whole, 2 crossed out with black X) → $5 - 2$

Picture 4: 5 birds (2 blue, 3 yellow/orange/green) → $3 + 2$

Math Expressions:

- $2 + 3$
- $5 - 3$
- $5 - 2$
- $3 + 2$

1ST: VISUALIZE - CONSTRUCT MEANING - PREDICT

Coach Cheryl
planted 7
flowers



1ST: VISUALIZE - CONSTRUCT MEANING - PREDICT

Coach Cheryl's
dog had 7
puppies



1ST: VISUALIZE - CONSTRUCT MEANING - PREDICT

**Representation
vs.
Illustration**

Coach Cheryl planted 7 flowers



Coach Cheryl's dog had 7 puppies

1ST: ORGANIZE

**Hard to
believe, but
this is an
example of
what I used
to get from
my dad when
he first
learned how
to text**



**Why is this
text message
so hard
to read?**

1ST: ORGANIZE



It is hard to tell here what constitutes an individual item and the total number of items is not easy to count



While organized and easy to count, tallies can be problematic when representing subtraction



The subtraction and the individual items are clearer here, but the total number of items is still not easy to count

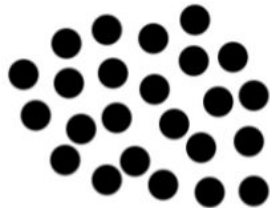
1ST: ORGANIZE

Which representation
allows you to “see” the
mystery number easiest?

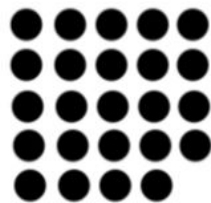
Representation 1



Representation 2



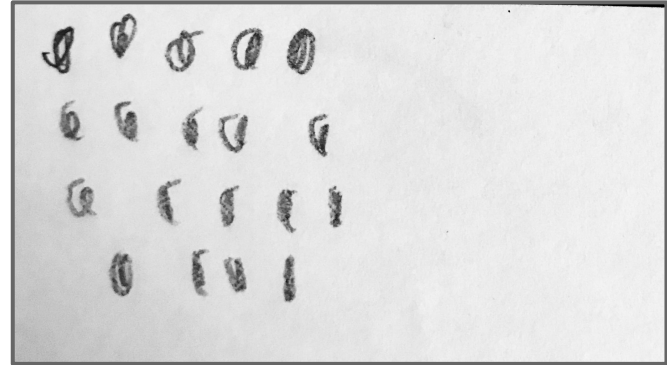
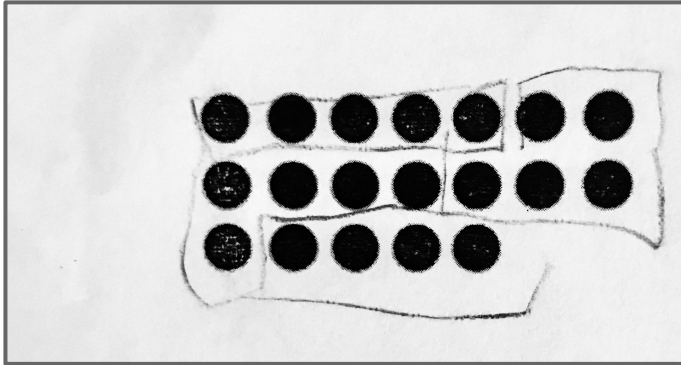
Representation 3



1ST: ORGANIZE

Coach Cheryl represented a mystery number below.

Fix her work to make the representation clearer.



1ST: CONSTRUCT MEANING - SUMMARIZE

Determine **ALL**
the stories that
can be
represented
using this model



1. There were 4 people on the bus. At the next stop 3 more people got on. How many people are on the bus now?
2. Allison bought 4 apples. She also bought 3 oranges. How many more apples did she buy?
3. There were 7 snacks in the bin. Four students took snacks. How many snacks are left in the bin?
4. There were 7 crayons in the box. Four of them were blue and the rest were red. How many were red?
5. Bobby ran 5 miles on Monday and another 2 miles on Tuesday. How many miles did he run altogether?

2ND: CONSTRUCT MEANING - SUMMARIZE - ORGANIZE



**What would you say
happened in the
BEGINNING?**

**What would you say
happened in the
MIDDLE?**

**What would you say
happened in the
END?**

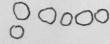

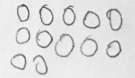
2ND: CONSTRUCT MEANING - SUMMARIZE - ORGANIZE



6 monkeys were jumping on the bed. Some more monkeys started jumping on the bed. Now there are 12 monkeys jumping on the bed.

Beginning: 6 monkeys were on the bed.

Middle: ? fell off / jumped on the bed.

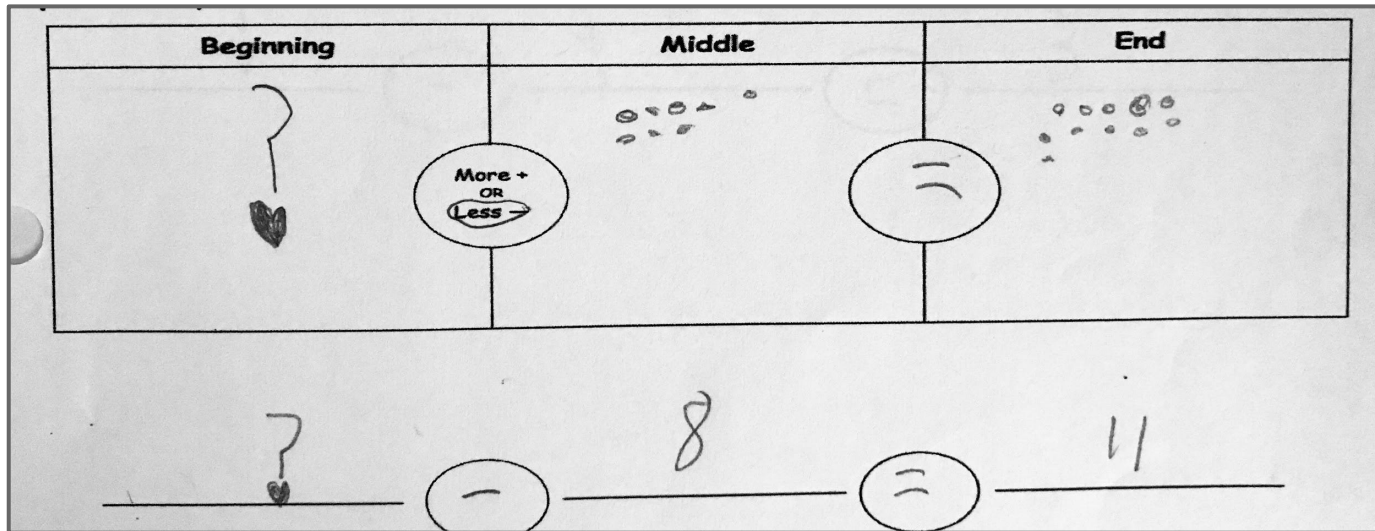
End: 12 monkeys are on the bed now.

Beginning	Middle	End
		

6  ?  12

2ND: CONSTRUCT MEANING - SUMMARIZE - ORGANIZE

Mary had some lambs. Then she lost 8 lambs.
Now she has 11 lambs.



2ND: CONSTRUCT MEANING

Write your own story where the middle is unknown.

I had 10 cokes
my brother ate some
Coke is now I have
5 how many
is in The middle

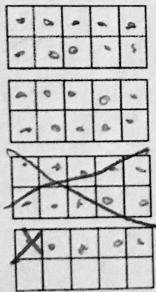
2ND: CONSTRUCT MEANING - SUMMARIZE - ORGANIZE

You have 35 M&Ms.
You eat some of
your candy. Now you
have 24 M&Ms. How
many pieces of
candy did you eat?

Number Model:

$$\begin{array}{c} \text{Beginning} \qquad \qquad \text{Middle} \qquad \qquad \text{End} \\ \underline{35} \quad \bigcirc - \quad \underline{?} \quad \bigcirc = \quad \underline{24} \end{array}$$

Ten Frame Representation:



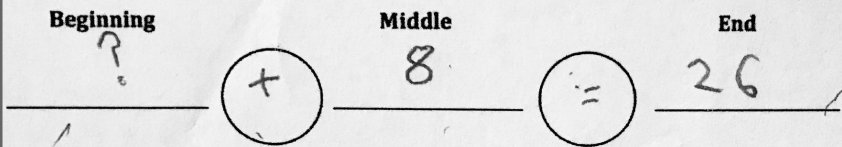
? = 11 because

$$35 - 11 = 24$$

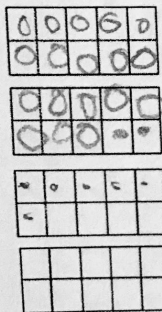
2ND: CONSTRUCT MEANING - SUMMARIZE - ORGANIZE

There are some students on the bus. 8 more students get on the bus. Now there are 26 students on the bus. How many students were on the bus in the beginning?

Number Model:



Ten Frame Representation:

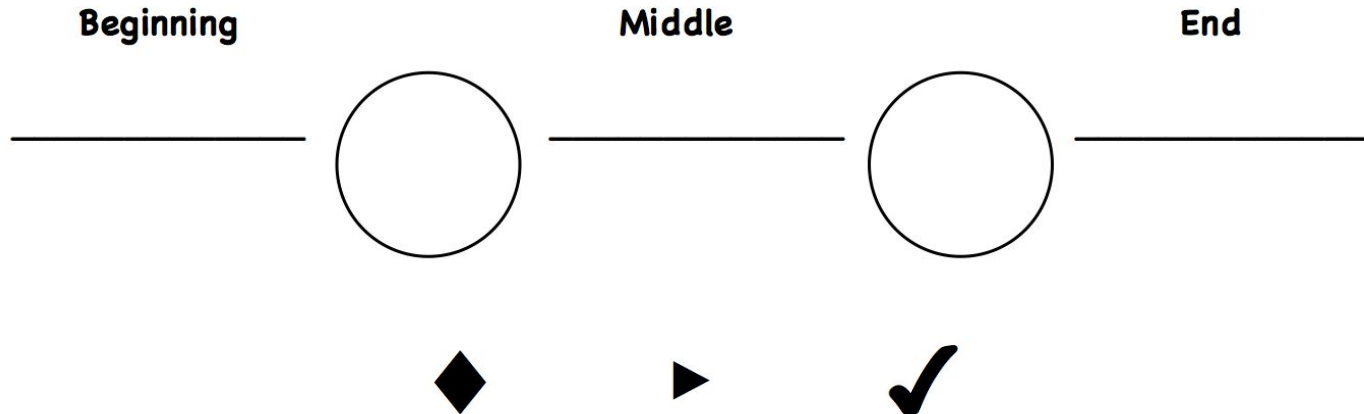


? = 18 because

$$18 + 8 = 26$$

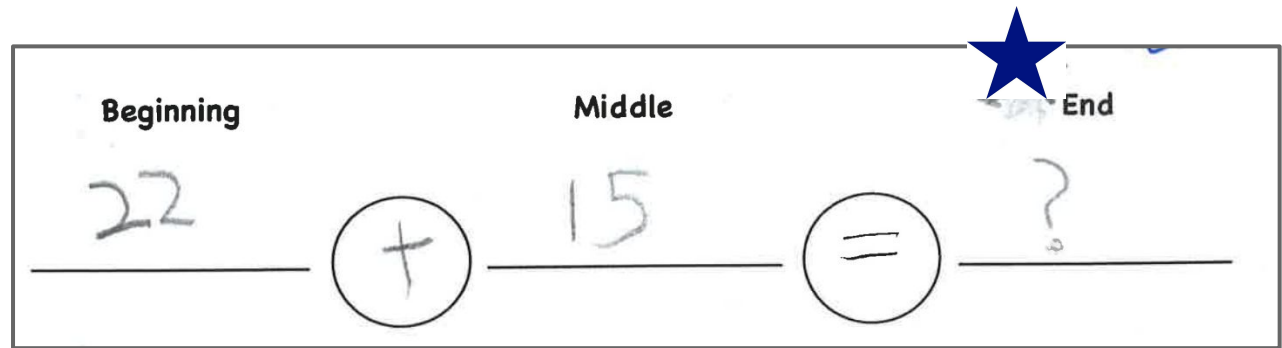
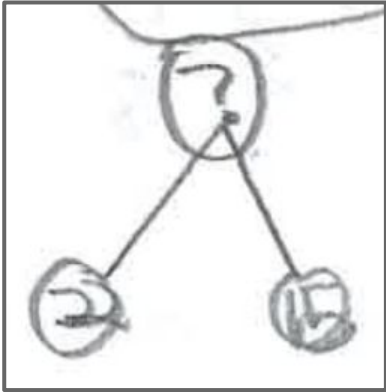
2ND: CONSTRUCT MEANING - ORGANIZE - QUESTION

There was a stack of ♦□ books in the library.
Stephanie returned ►□ books and put them on top of
the stack. Now there are ✓□ books in the stack.



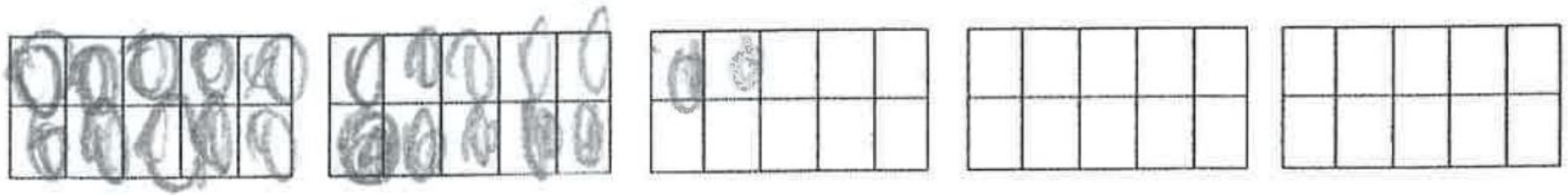
2ND: CONSTRUCT MEANING - ORGANIZE - QUESTION

You did 22 sit-ups. After a little break you did another 15 sit-ups. How many sit-ups did you do in all?



2ND: CONSTRUCT MEANING - ORGANIZE - QUESTION

You did 22 sit-ups. After a little break you did another 15 sit-ups. How many sit-ups did you do in all?



$$? = \underline{\quad 7 \quad}$$

2ND: CONSTRUCT MEANING - SUMMARIZE

Determine ALL the word models that correctly show the relationship between the amount of candy Mandy has and the amount of candy her sister has.

Mandy got 64 pieces of candy trick-or-treating. Her little sister got 48 pieces of candy. How many more pieces of candy does Mandy have than her sister?

1. Mandy's Candy - Her Sister's Candy =
How Many More Pieces Mandy Has
2. Mandy's Candy + Her Sister's Candy =
How Many More Pieces Mandy Has
3. Mandy's Candy - How Many More Pieces Mandy Has =
Her Sister's Candy
4. Her Sister's Candy + How Many More Pieces Mandy Has =
Mandy's Candy
5. Mandy's Candy + How Many More Pieces Mandy Has =
Her Sister's Candy
6. How Many More Pieces Mandy Has + Her Sister's Candy =
Mandy's Candy

2ND: CONSTRUCT MEANING - SUMMARIZE

Write **ONE MORE DIFFERENT** word model that also correctly shows the relationship.

Mandy got 64 pieces of candy trick-or-treating. Her little sister got 48 pieces of candy. How many more pieces of candy does Mandy have than her sister?

1. Mandy's Candy - Her Sister's Candy =
How Many More Pieces Mandy Has
- ~~2.~~ Mandy's Candy + Her Sister's Candy =
How Many More Pieces Mandy Has
3. Mandy's Candy - How Many More Pieces Mandy Has =
Her Sister's Candy
- ~~4.~~ Her Sister's Candy + How Many More Pieces Mandy Has =
Mandy's Candy
- ~~5.~~ Mandy's Candy + How Many More Pieces Mandy Has =
Her Sister's Candy
6. How Many More Pieces Mandy Has + Her Sister's Candy =
Mandy's Candy

SO WHAT ARE THE TAKE AWAYS?

MAKES KIDS'
WORK PHYSICALLY
EASIER TO READ



SAVES YOU TIME
AND ANNOYANCE

INCORPORATES
MATHEMATICAL
PRACTICES



ALLOWS YOU TO
DIFFERENTIATE
MORE

USES STRATEGIES
YOU ALREADY
KNOW



BUILDS
CONFIDENCE
TEACHING MATH

THANKS!

MICHELLE: malperin@rssnyc.org

EMILY: esteenwyk@rssnyc.org

CHERYL: cfricchione@rssnyc.org