Using Numberless Problems in the Classroom to Support Mathematical Practices 1 & 2

Presented by Becky Sullivan

Outcomes & Agenda

Outcomes

Participants will…

- Understand how using problems without numbers can support MPs 1 & 2.
- Leave with a problem to try with your class.

Agenda

- What is a Numberless Problem?
- Connect to MPs 1 & 2
- How to prepare
- Create your own

Why Numberless Problems?

Numberless Word Problems

- Slow students down
- Allow for reasoning and discourse
- Scaffold (temporary and removed as student improves)

Mathematical Teaching Practices

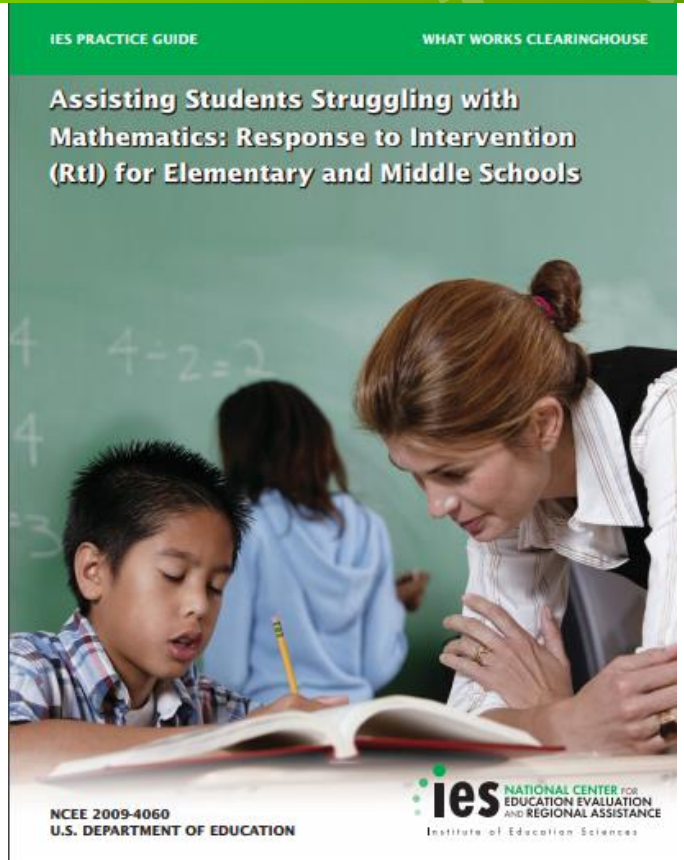
- Tasks that promote reasoning & problem solving
- Meaningful mathematical discourse
- Purposeful questions

Principles to Actions: Ensuring Mathematical Success for All (NCTM, 2014)

Numberless Problems as a Scaffold

When students are taught the underlying structure of a word problem, they not only have greater success in problem solving but can also gain insight into the deeper mathematical ideas in word problems.

p. 26



Numberless Word Problems & Mathematical Practices

MP 1:
Make Sense of Problems and Persevere in Solving Them

- Understanding
- Strategies
- Flexibility & perseverance

MP 2:
Reason Abstractly and Quantitatively

- Situations & Numbers
- Number sense
- Engage in “contexts”

Let’s Try One Out…

Henry bought some pies, which he plans to share with a group of his friends.

There is exactly enough to give each member of the group an amount of pie.

Let’s Try One Out…

Henry bought 4 pies, which he plans to share with a group of his friends.

There is exactly enough to give each member of the group an amount of pie.

Let’s Try One Out…

Henry bought 4 pies, which he plans to share with a group of his friends.

There is exactly enough to give each member of the group a 1/6 of the pie.

How many people are in the group?

A look inside a classroom…

How do numberless word problems support the standards?

Turn & Talk

How did the video clip of the Notice & Wonder routine and process of going through the numberless word problem connect to Math Practices 1 & 2?

“

...being able to do computations alone does not equate to math proficiency. Our new definition of proficiency includes knowing when, why, and how to apply calculations to situations.

Putting the Practices Into Action: Implementing the Common Core Standards for Mathematical Practice K-8 (2013) page 8
Susan O’Connell & John SanGiovanni

Numberless Problems with First Graders

(Spring)

There were some students on a bus. At the next stop, some more students got on. Then, more got on at the last stop.

Notice	Wonder
• There were some students already on the bus. More more and more got on.	• How many students were on there first?
• If there were numbers, we could add them to find the final amount.	• Why aren't there numbers if it's math?
• The word "some" tells us that there's a number.	• How many students were there all together?
	• How many students got on at each stop?
	• Were there 15 all together?

There were 7 children on the bus.

At the next stop, 6 more got on.

Then, 4 more got on.

How many children are on the bus? 17

There were 5 children on the bus.

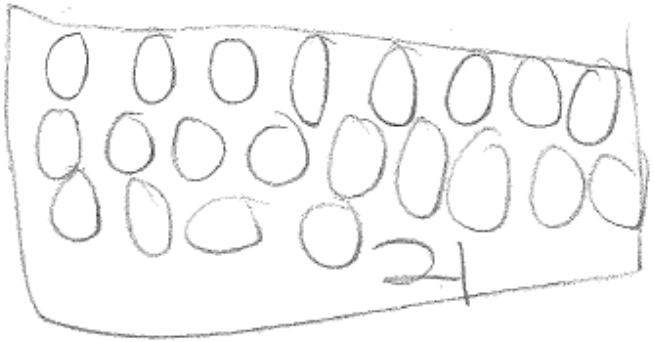
At the next stop, 6 more got on.

Then, 10 more got on.

How many children are on the bus?

21

5
+6
+10
21



There were 4 children on the bus.

At the next stop, 2 more got on.

Then, 3 more got on.

How many children are on the bus?

4 + 3 + 2 = 9

Third Grade

What do you see as a potential trouble area for students with this problem?

The first Ferris wheel was built in 1893 by George Ferris. It was ■ feet high!

The tallest roller coaster in the world is called Kindga Ka. It is ■ feet higher than the first Ferris wheel.

How tall is Kingda Ka?

When questioning, avoid the “key word” strategy.

- Encourages students to ignore the meaning and structure the problem and look for easy way out.
- Often misleading
- Many problems have no key words
- Doesn’t work with two-step or more advanced

Numberless Problems with Fifth Graders

Learning Target: I can explain what a problem means and is asking.

Bryan is at the candy store and excited to see that the gummy bears are only some amount per pound. If he spends a certain amount on gummy bears, how many pounds will he be able to buy?

Think about the problem above.

What questions do you have?

How would you go about solving it?

What information would you need?

How do we prepare?

- Reason for the numberless problem
- Existing problem or create one
- Remove the numbers.
- Decide how information will be presented.
- Plan questions you will ask at each stage.

Try it Out!

Numberless Word Problem Resources

- Brian Bushart's Blog
- Video of Kindergarten Numberless Problem
- Primary Bliss Blog (Scroll for free resource)
- Elementary Math Addict Blog

General Math Resources

- Graham Fletcher
- Robert Kaplinsky
- Christina Tondevold (The Recovering Traditionalist)
- Jo Boaler

Star & Wish

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