Access & Equity in Math Class for Students with Disabilities

Integrating the Standards for Mathematical Practice in your practice

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independence through education

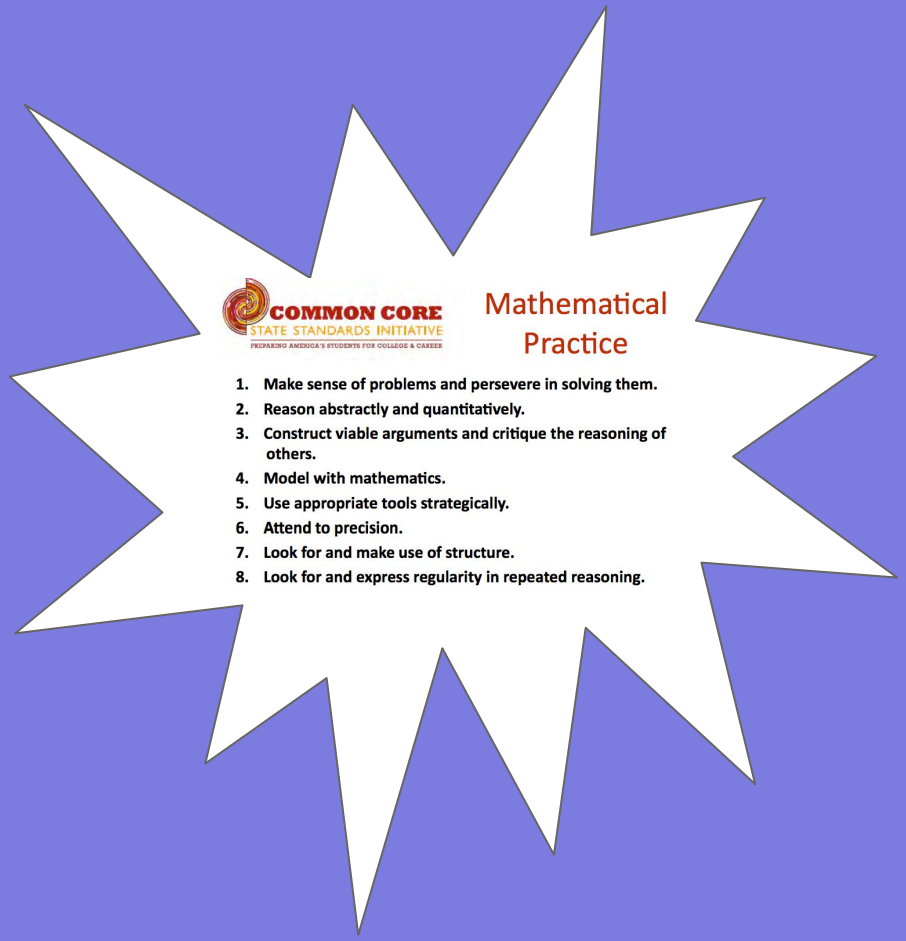
Access & Equity as defined by NCTM

An excellent mathematics program requires that all students have access to a high-quality mathematics curriculum, effective teaching and learning, high expectations, and the **support and resources needed to maximize their learning potential**.

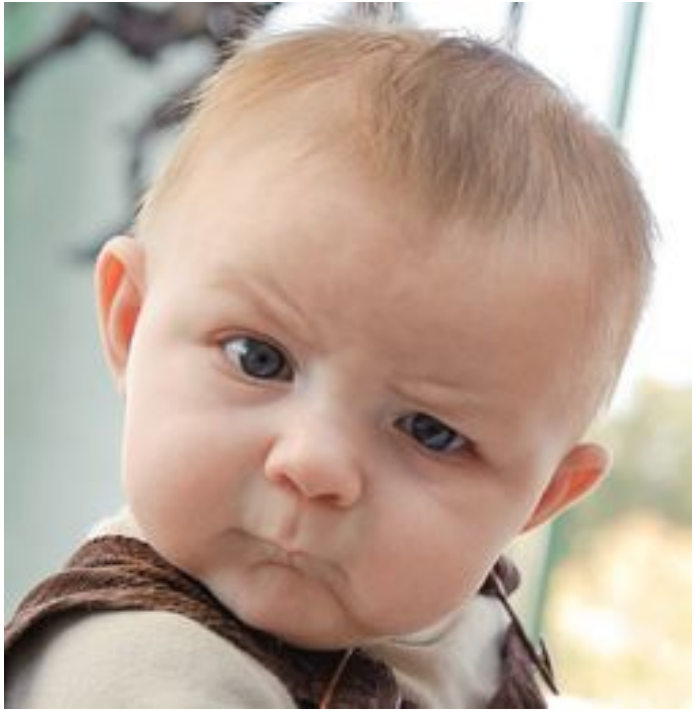
from *Principles to Actions: Ensuring Mathematical Success for All: Guiding Principles for School Mathematics*

How do we achieve this for Students with Disabilities?

Focus on the Standards for Mathematical Practice



Well...How Do I Do That?



Integrate Instructional Routines

COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

Mathematical Practice

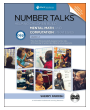
1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Standards for Mathematical Practice

- I Notice/I Wonder
- Estimation 180
- Which One Doesn't Belong
- Cognitively Guided Instruction
- Counting Collections
- Number Talks
- Contemplate then Calculate
- Number Strings

NCTM | The Math Forum
PEOPLE LEARNING MATH TOGETHER

ESTIMATION 180



BOSTON TEACHER RESIDENCY

CONTEXTS mathematics FOR LEARNING

Instructional Routines Are...

"...well designed procedures that have been proven in practice, that take into account the complexity of the goals that need to be accomplished, and **that allow the practitioner temporarily to hold some things constant while working on others.** The use of such routine procedures involves not only acquiring the capacity to do the steps in the routine in an actual working environment but also the learning professional norms or 'principles' **that would enable a practitioner to make appropriate judgments about when and where it is appropriate to use the routines**"

From *Using Designed Instructional Activities to Enable Novices to Manage Ambitious Mathematics Teaching* by Magdalene Lampert, et al.

All That?!?

Yes, but No...

Instructional Routines take *time* and *consistency* to implement successfully, so should you implement all of these tomorrow?

Probably not…

Should you try to integrate one or two?

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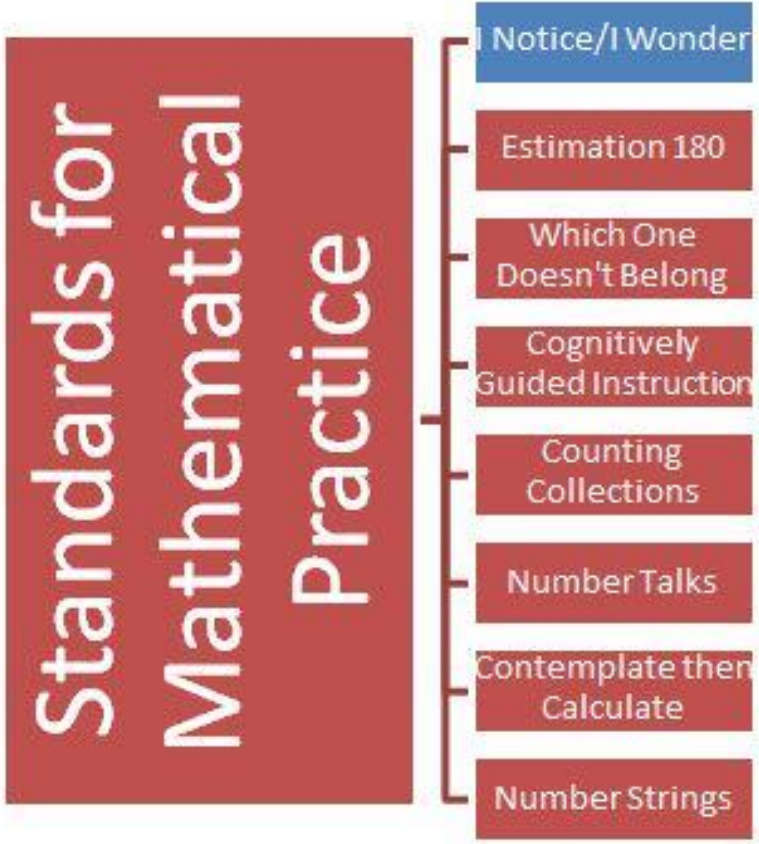

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PEOPLE LEARNING MATH TOGETHER

ESTIMATION 180

Which One Doesn't Belong?

Extending Children's Mathematics Fractions and Decimals

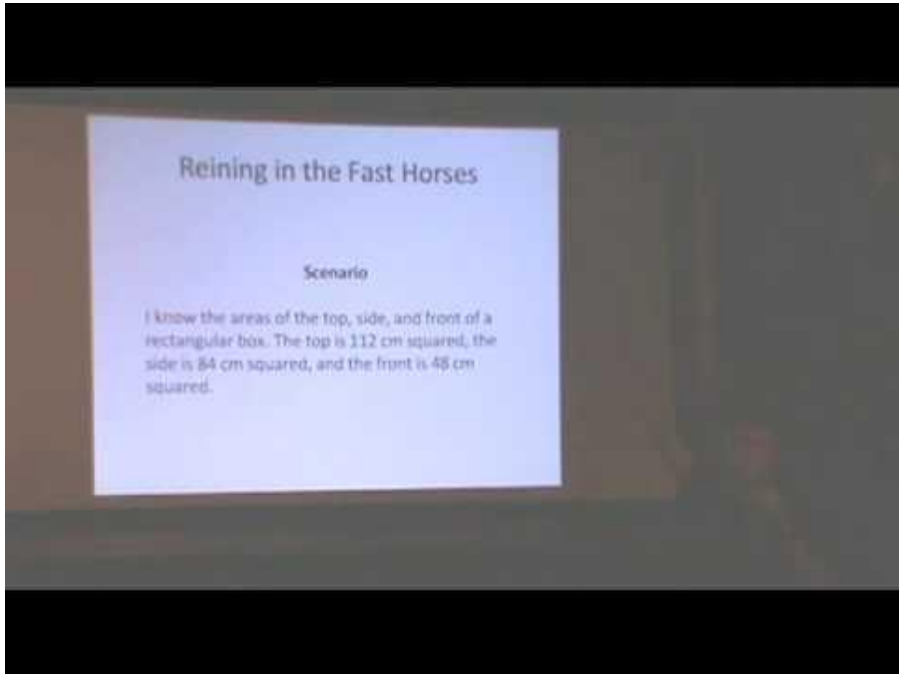
NUMBER TALKS

BOSTON TEACHER RESIDENCY

CONTEXTS for mathematics LEARNING

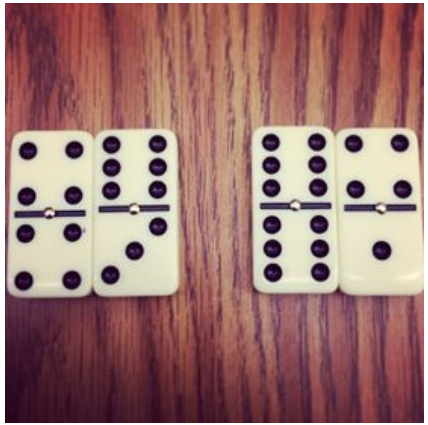
I Notice/ I Wonder

SMP.1 - Make sense of problems and persevere in solving them



I Notice/I Wonder

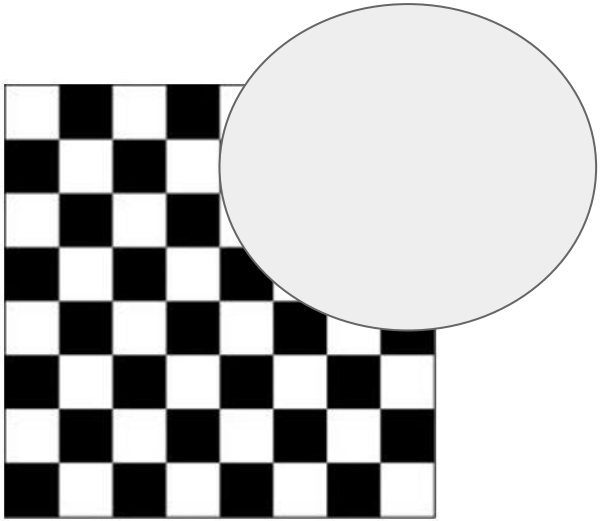
What do you notice?



What do you wonder?

I Notice/I Wonder

What do you notice?



What do you wonder?

I Notice/I Wonder

What do you notice? **What do you wonder?**

Zelma noticed something unusual about her ZIP Code: each consecutive pair of digits is the product of two one-digit numbers.

For example, look at this four-digit number: **1564**.

15 = 5 * 3
56 = 7 * 8
64 = 8 * 8

Zelma's ZIP Code contains the digits 2, 3, 4, 6, and 7, exactly once each.

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What We've Done...

Name: _____ Date: _____

Zelma's Zip Code

Zelma noticed something unusual about her ZIP Code: each consecutive pair of digits is the product of two one-digit numbers.

For example, look at this four-digit number: **1564**.

15 = 5 * 3
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64 = 8 * 8

Zelma's ZIP Code contains the digits 2, 3, 4, 6, and 7, exactly once each.

I notice...	I wonder...

Use a graphic organizer to help students express their thinking.

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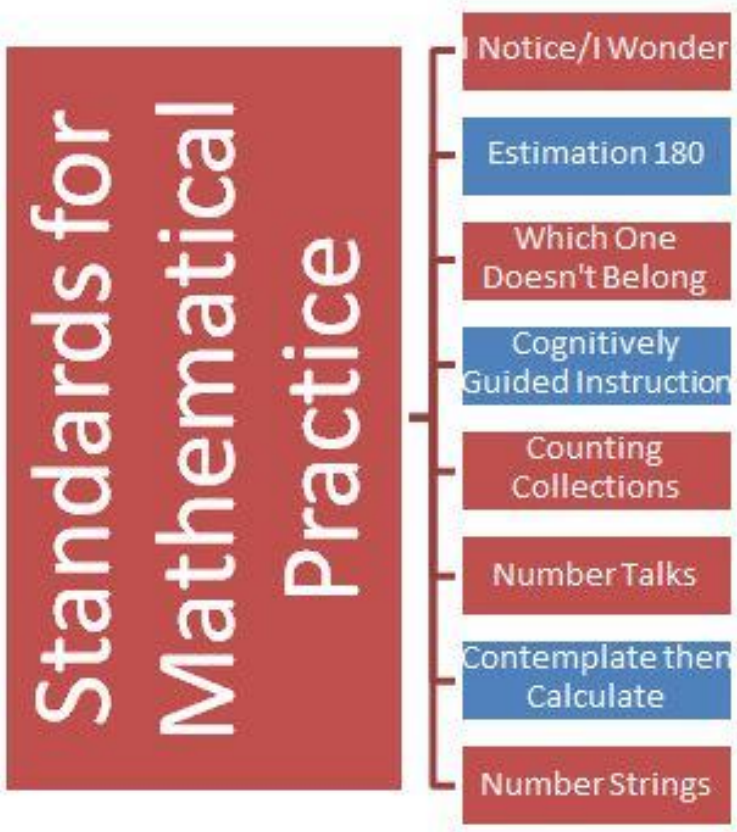

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ESTIMATION 180

Which One Doesn't Belong?

Extending Children's Mathematics

BOSTON TEACHER RESIDENCY

CONTEXTS for mathematics FOR LEARNING

Estimation 180

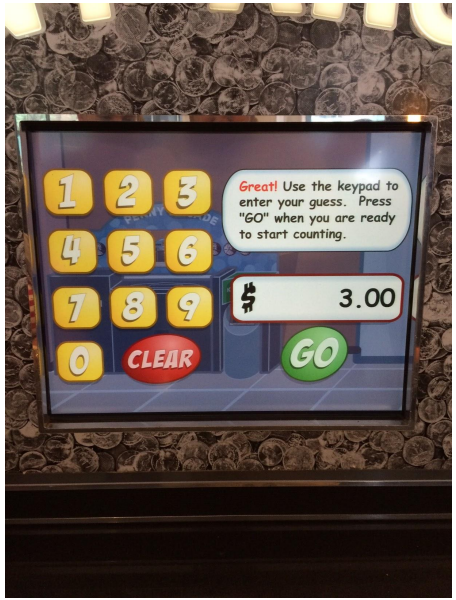
SMP.2 - Reason abstractly and quantitatively

Estimation 180

There’s a website!

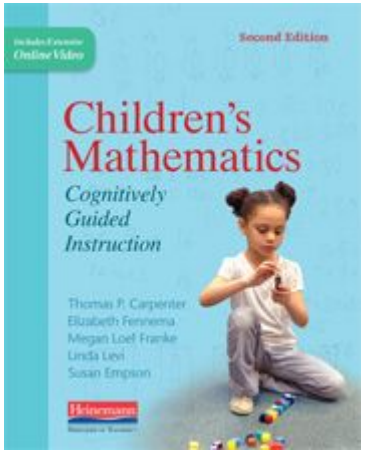
What We've Done...

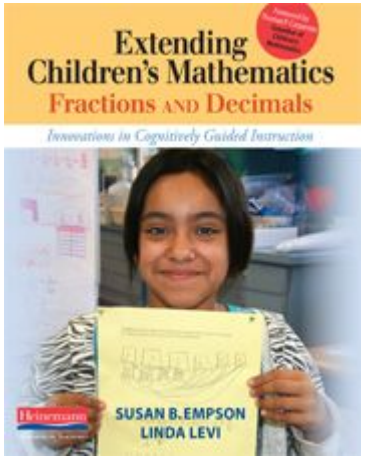
Go to the Penny Arcade at TD Bank!

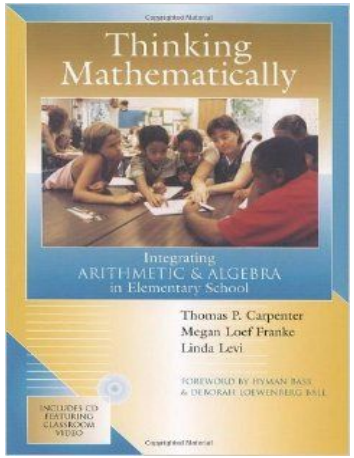


Cognitively Guided Instruction

SMP.4 - Model with mathematics

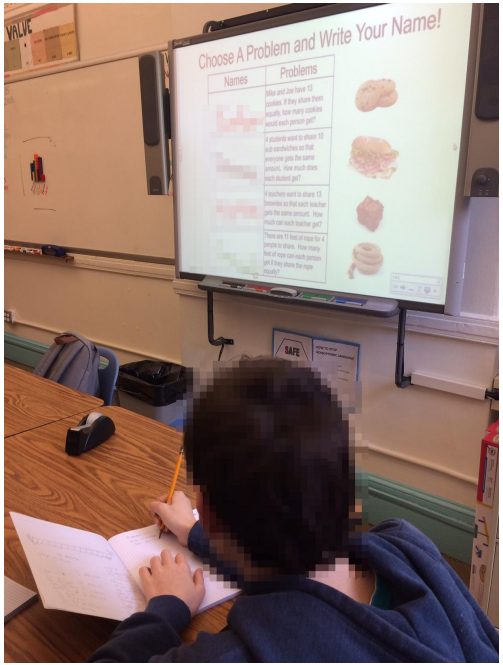


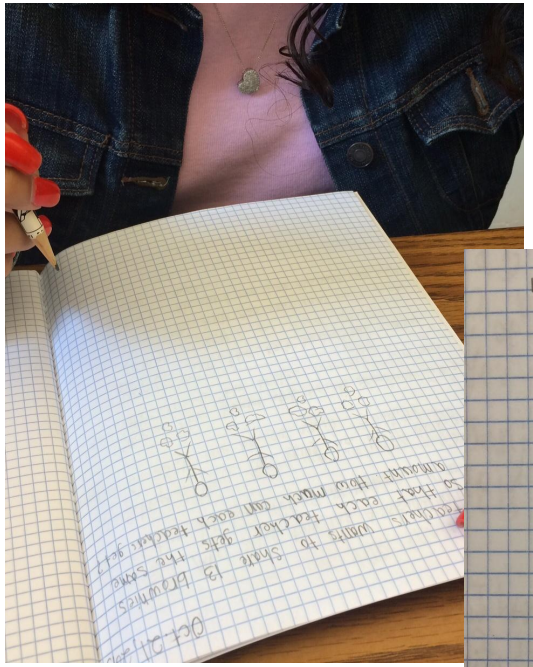




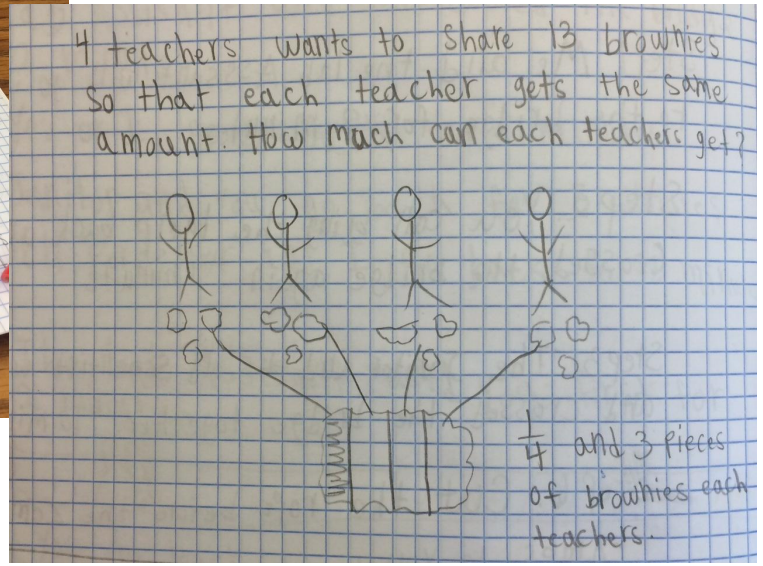
Cognitively Guided Instruction

Using CGI
in the classroom





Modeling with
drawings

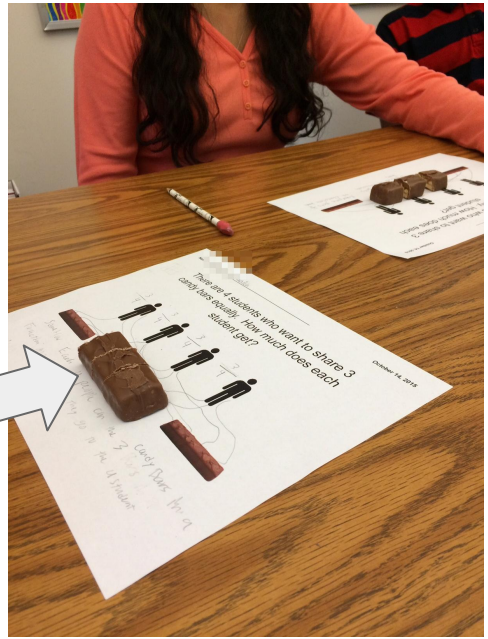


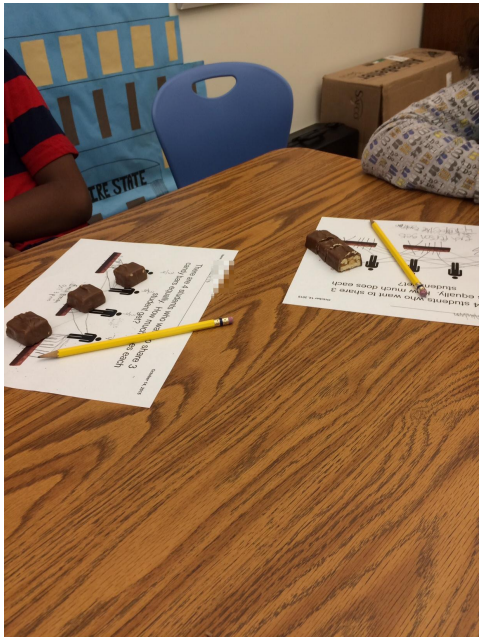
What We've Done...

Make the real world contexts even more concrete!

CGI Problem: There are 4 students who want to share 3 candy bars evenly. How much would each student get?

Yeah! Those are candy bars!





Contemplate Then Calculate

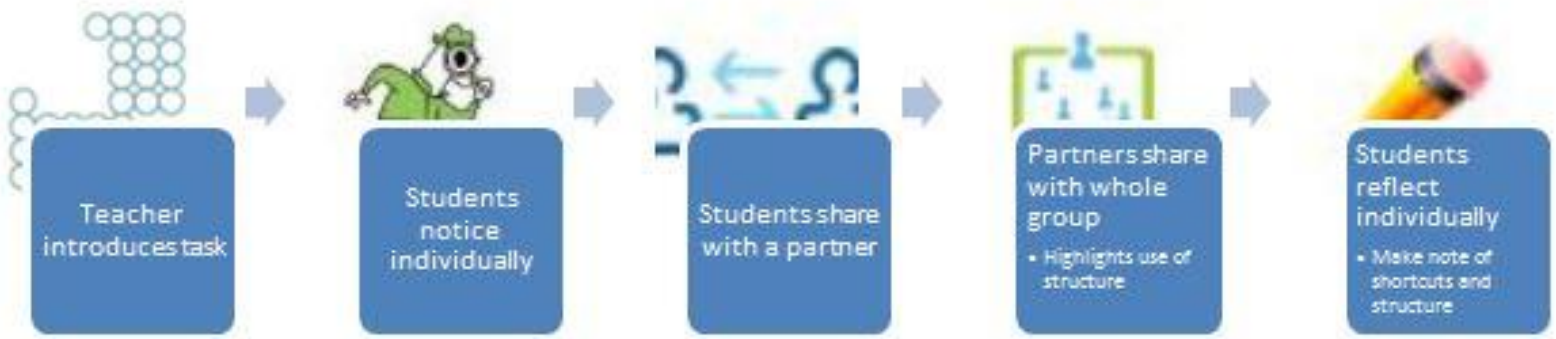
SMP.7 - Look for and make use of structure

More info at

TEDD.org

Contemplate then Calculate

Contemplate then Calculate is a highly structured routine giving students multiple opportunities to engage with a task and multiple ways to express their thinking and get feedback



Need Modifications?

There's a graphic organizer!

BPE | BOSTON TEACHER RESIDENCY

Task:

Name:_____ Date:_____

1. Contemplate:

Ask yourself...

- What symbols do I see?
- What operations (i.e., multiplication, division, addition, subtraction, exponents) are in the problem?
- What do I notice about the numbers in the problem?

I notice…	My partner noticed…

2. Calculate:

Ask yourself...

- How can I use one of the noticings to find a shortcut?
- What could I change to make this problem easier to solve?
- Is there anything I can chunk together or break apart?

Shortcut(s) my partner and I found:

3. Discuss:

Ask yourself...

- How do I know this shortcut works?
- What parts of the problem did they pay attention to (i.e., numbers, operations, symbols)?

Properties or rules used to find shortcuts:

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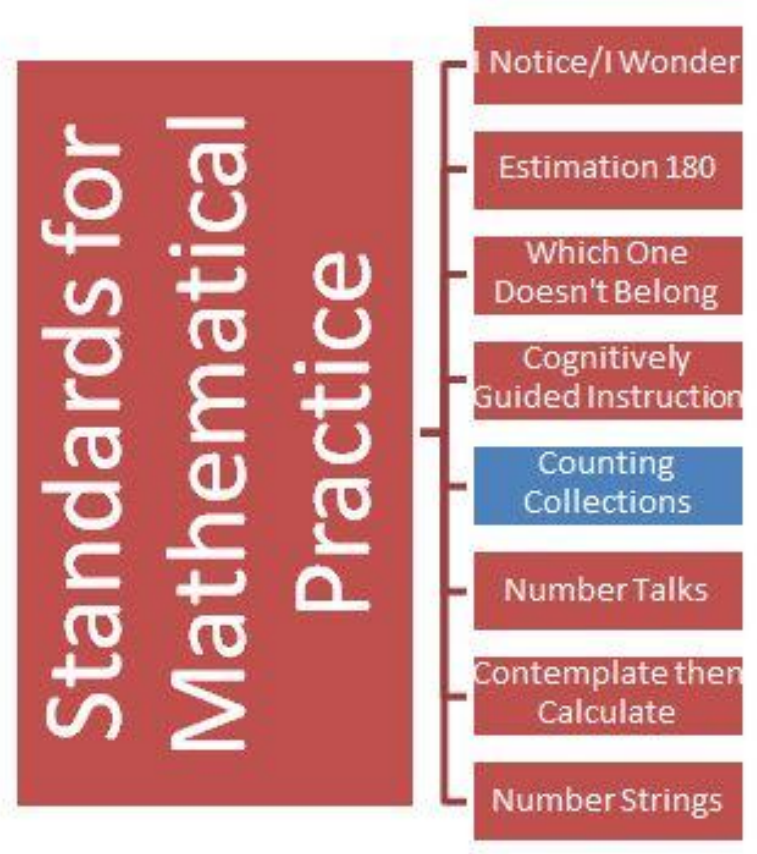

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PEOPLE LEARNING MATH TOGETHER

ESTIMATION 180

Which One Doesn't Belong?

BOSTON TEACHER RESIDENCY

CONTEXTS for mathematics FOR LEARNING

Counting Collections

SMP.5 - Use appropriate tools strategically

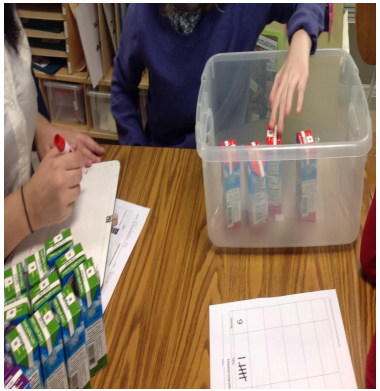
More info at

TEDD.org

What We've Done...

Count collections using realia in life skills contexts

School Store



Money

Community Supported Agriculture (CSA)

(Pictures by Danielle Egic & Andrew Gael)

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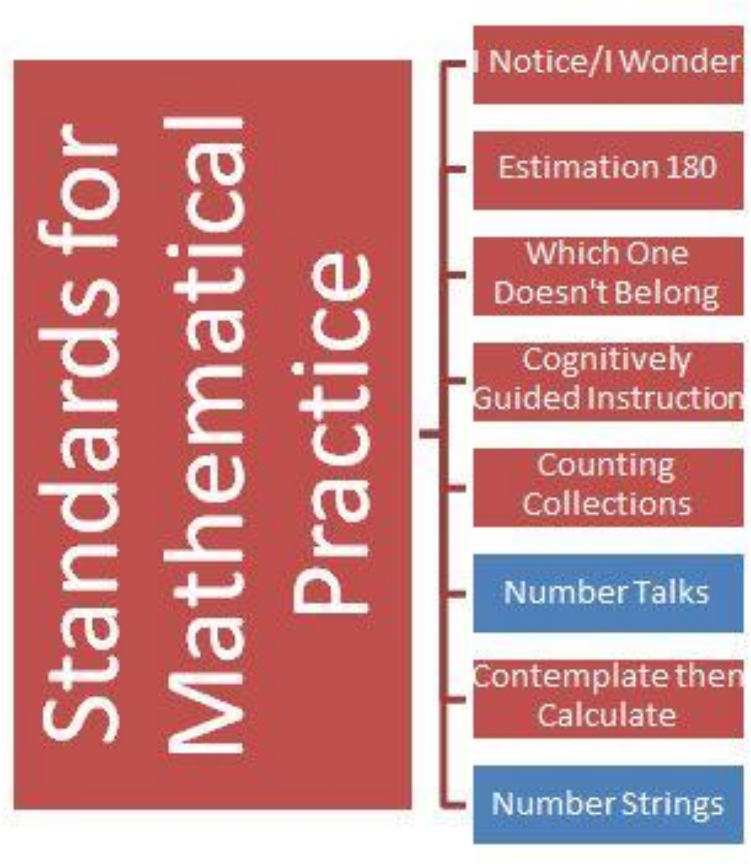

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ESTIMATION 180

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BOSTON TEACHER RESIDENCY

CONTEXTS for mathematics FOR LEARNING

The Mathematical Focus...

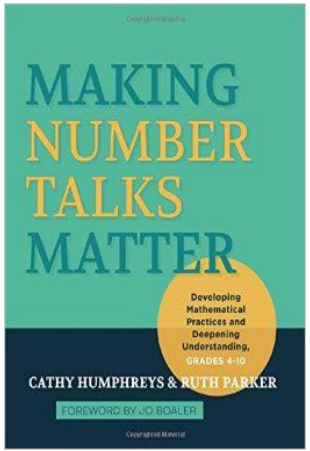
Mathematically proficient students “start by using everyday language to express their mathematical ideas, realizing that they need to select words with clarity and specificity rather than saying, for example, “it works" without explaining what ‘it’ means. As they encounter the ambiguity of everyday terms, they come to appreciate, understand, and use mathematical vocabulary. Once young students become familiar with a mathematical idea or object, they are ready to learn more precise mathematical terms to describe it.”

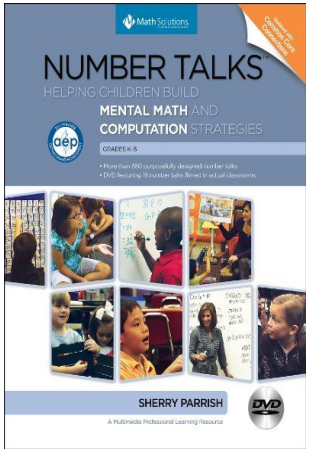
From Illustrative Mathematics. (2014, February 12). Standards for Mathematical Practice: Commentary and Elaborations for K-5. Tucson, AZ.

Number Talks & Number Strings

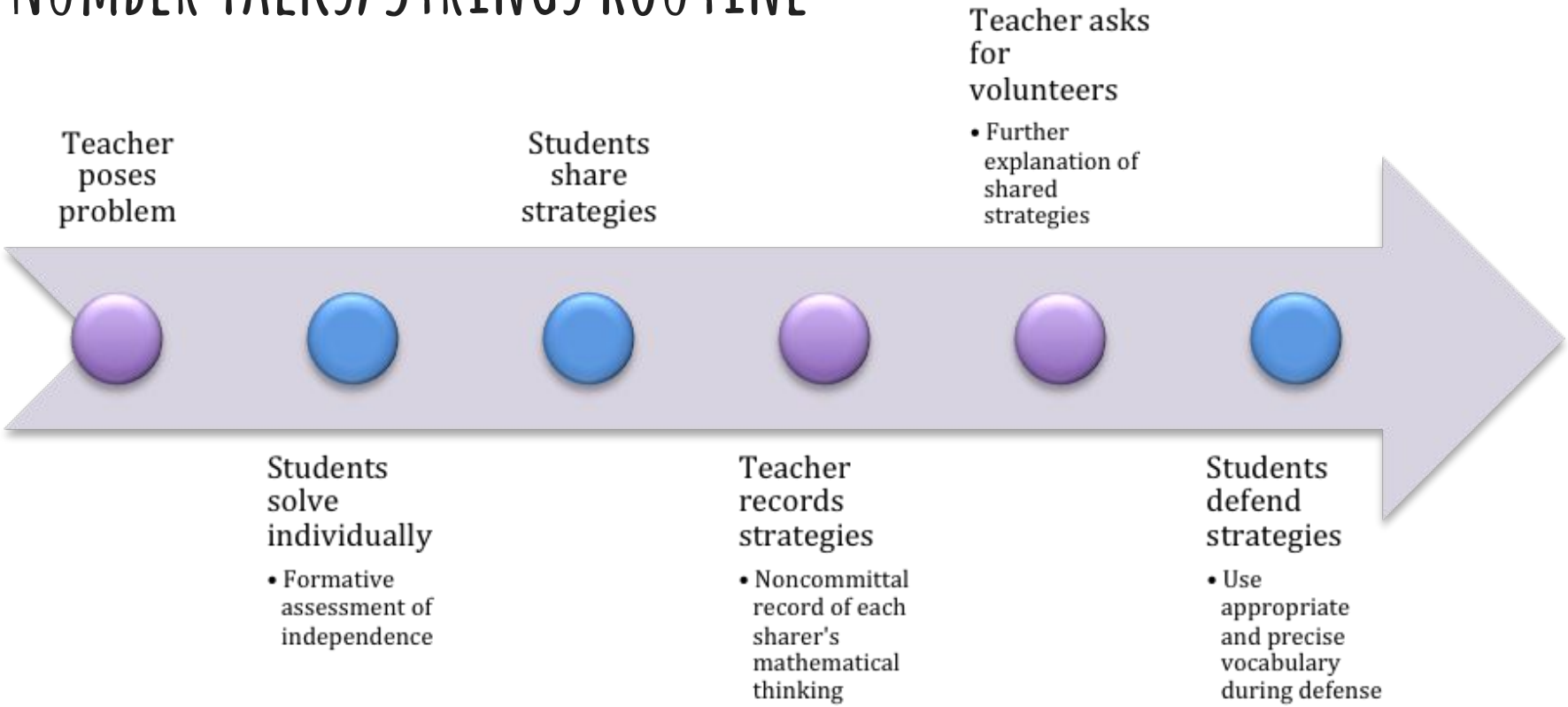
SMP.6 - Attend to precision

SMP.8 - Look for and express regularity in repeated reasoning

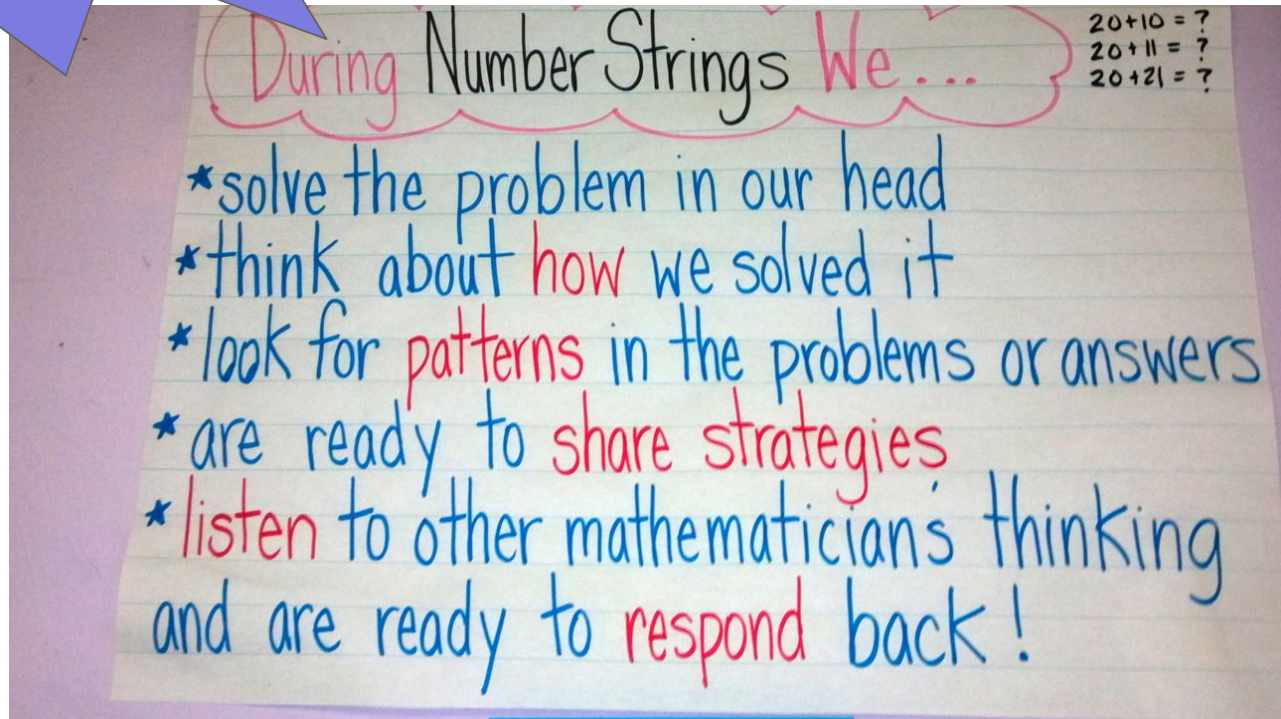




Number Talks/Strings Routine

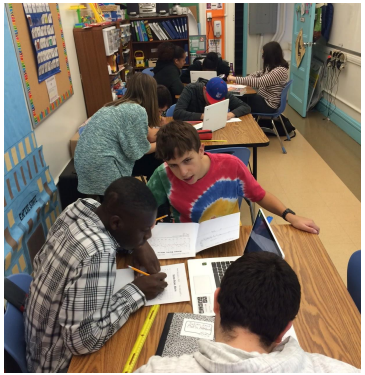


Developing Norms is Critical!



What We've Done...

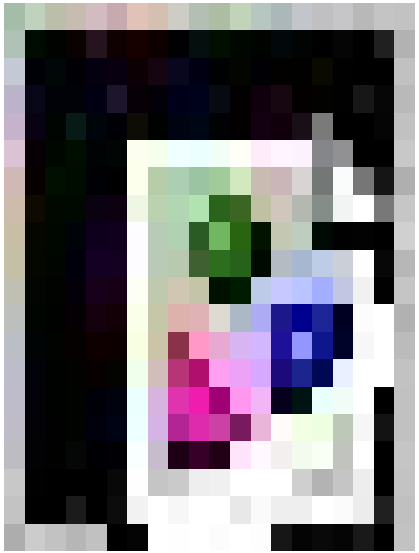
Use personal whiteboards to assist in the expression of strategies and thinking

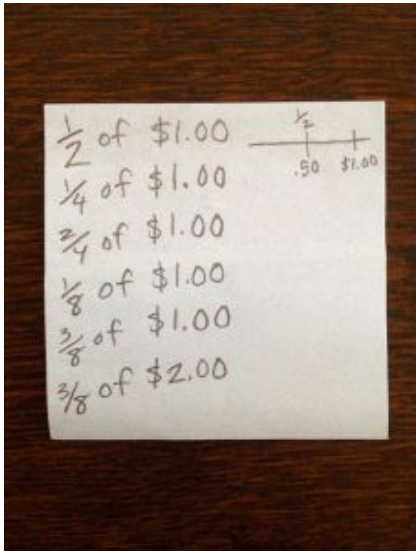


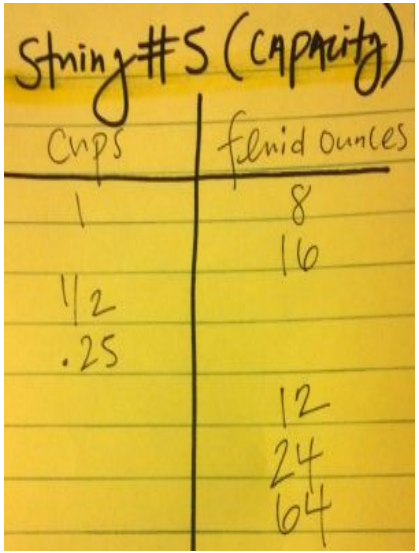
Do Number Talks/Strings in small groups before sharing with the whole group

What We've Done...

Put Number Talks/Strings into life skills contexts







(Strings from Kara Imm & Rachel Lambert at numberstrings.com)

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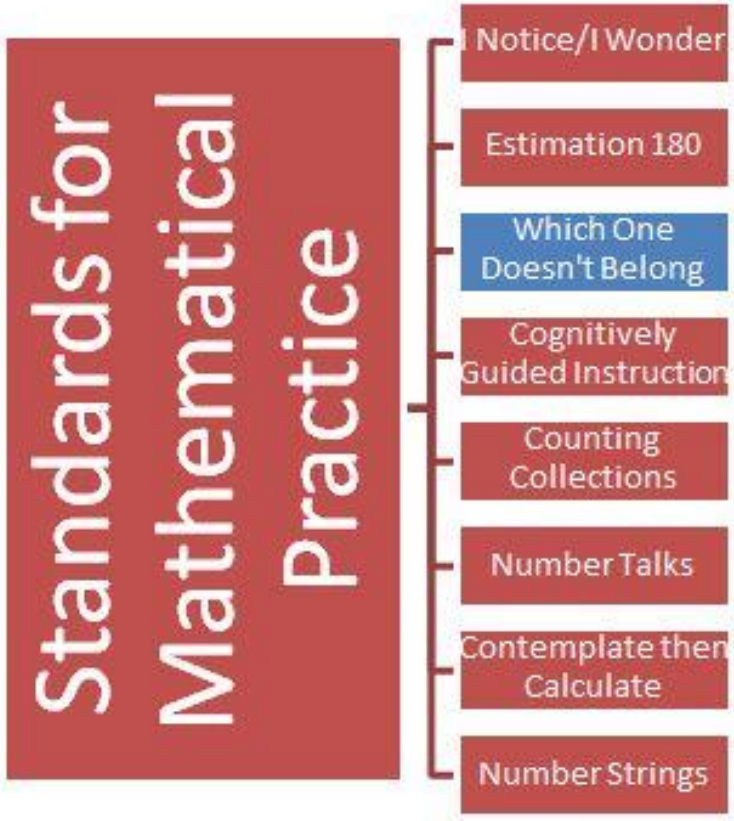

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ESTIMATION 180

Which One Doesn't Belong?

BOSTON TEACHER RESIDENCY

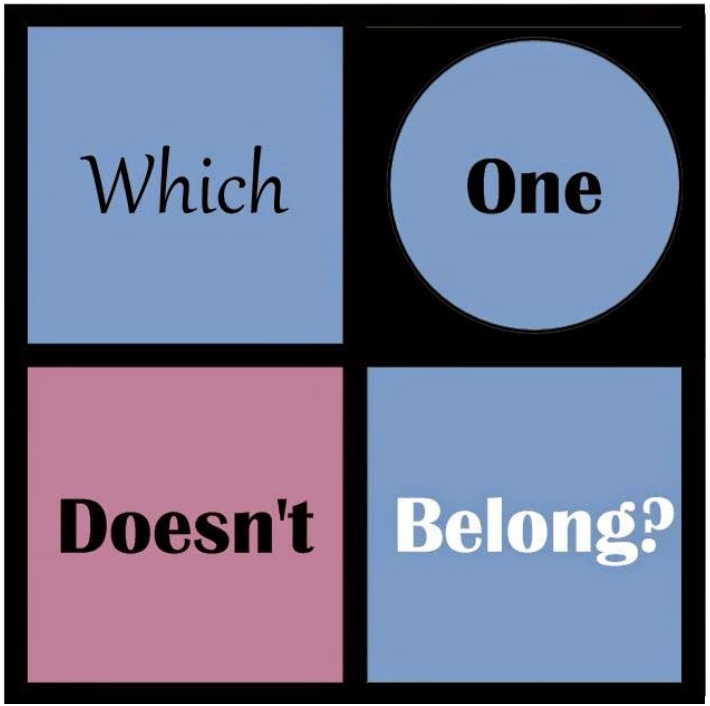
CONTEXT for mathematics FOR LEARNING

Which One Doesn't Belong?

SMP.3 - Construct viable arguments and critique the reasoning of others

Which One Doesn't Belong?

There's a website!



What We've Done...

Create them with a life skills focus!

How To Integrate It...

You can use Mary's website as a daily warm-up

OR

What We've Done...

Use a graphic organizer!

Name:_____ Date:_____

Which One Doesn't Belong?

Why Doesn't THIS One Belong?

Why Doesn't THIS One Belong?

Why Doesn't THIS One Belong?

Why Doesn't THIS One Belong?

Which One Doesn't Belong?

What You'll Do...

Make your own!

You Can Find More Resources On My Blog...

The Learning Kaleidoscope

@bkdidact

agael@cookecenter.org

thelearningkaleidoscope.wordpress.com