



KENTUCKY CENTER
FOR MATHEMATICS

Focus on Place Value with Bonny Davenport

Multi-digit Place Value

Welcome!

Your host

Bonny Davenport

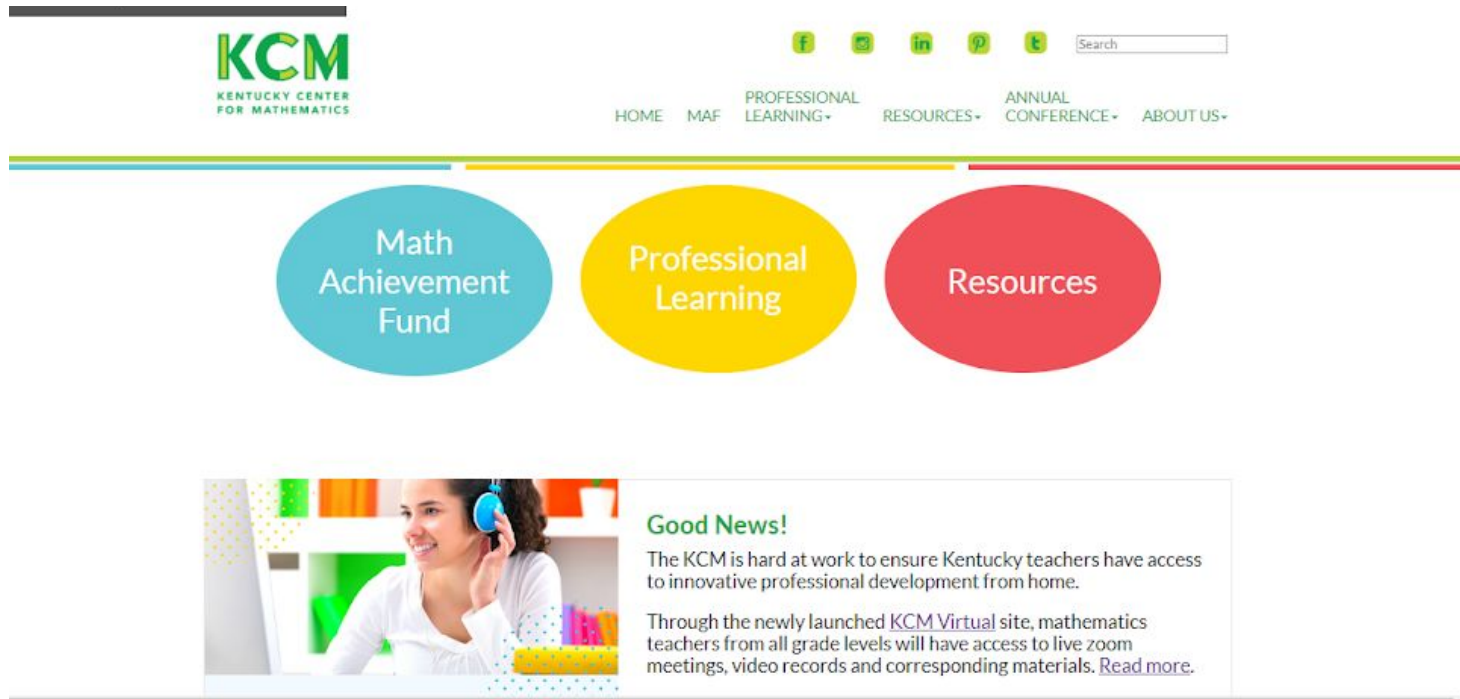
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About me!



KCM Website



<https://www.kentuckymathematics.org/>

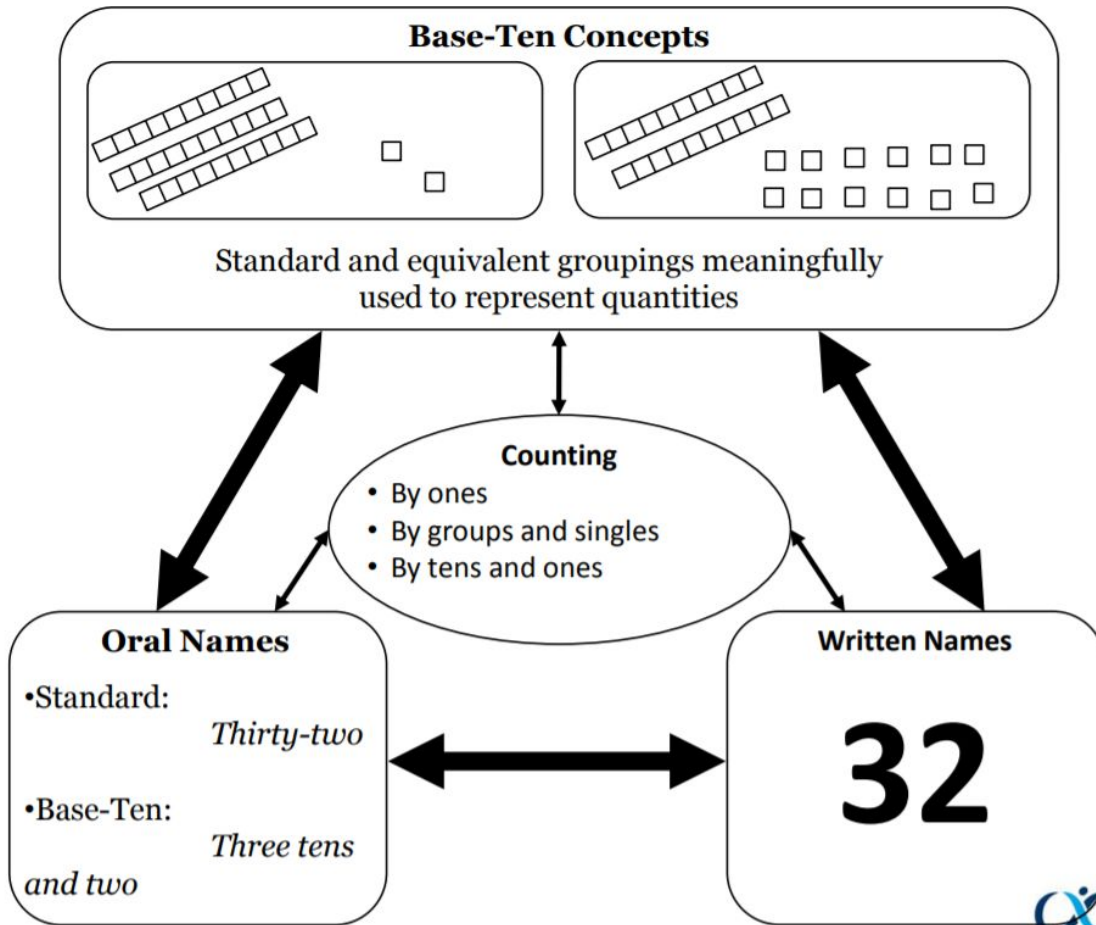
Agenda

- Standards
- Research
- Physical Representations
- Online Learning
 - Desmos for Elementary
 - Estimation 180
- Counting Collections & Numbers Around Us
- Print Resource: Place Value Game

Standards

Number and Operations in Base Ten	
Note: grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.	
Standards for Mathematical Practice	
<p>MP.1. Make sense of problems and persevere in solving them.</p> <p>MP.2. Reason abstractly and quantitatively.</p> <p>MP.3. Construct viable arguments and critique the reasoning of others.</p> <p>MP.4. Model with mathematics.</p>	<p>MP.5. Use appropriate tools strategically.</p> <p>MP.6. Attend to precision.</p> <p>MP.7. Look for and make use of structure.</p> <p>MP.8. Look for and express regularity in repeated reasoning.</p>
Cluster: Generalize place value understanding for multi-digit whole numbers.	
Standards	Clarifications
<p>KY.4.NBT.1 Recognize in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.</p> <p>MP.7</p>	<p>Students recognize the relationship of same digits located in different places in a whole number. For example, in the number 435, the digit 5 in the ones place, while the digit 5 in 652 is in the tens place. The five in 652 is ten times greater than the five in 435.</p> <p style="text-align: right; color: red;">Coherence KY.2.NBT.1 → KY.4.NBT.1 → KY.5.NBT.1</p>
<p>KY.4.NBT.2 Represent and compare multi-digit whole numbers.</p> <p>a. Read and write multi-digit whole numbers using base-ten numerals, number names and expanded form.</p> <p>b. Compare two multi-digit numbers based on meanings of the digit in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>MP.2, MP.7</p>	<p>a. Students write numbers in three different forms. For example, 435, four hundred thirty-five, $400 + 30 + 5$.</p> <p>b. Students use different forms of the number to help compare. For example, when students are comparing numbers, they determine that 453 is greater than 435 because the 5 is worth 50 in 453, while the tens place only has 3 worth 30 in 435.</p> <p>So $453 > 435$.</p> <p style="text-align: right; color: red;">Coherence KY.4.NBT.2 → KY.5.NBT.3</p>
<p>KY.4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place.</p> <p>MP.2, MP.6</p>	<p>Students go beyond the application of a procedure when rounding. Students demonstrate a deeper understanding of number sense and place value when they explain and reason about the answers they get when rounding.</p> <p style="text-align: right; color: blue;">KY.4.OA.3</p> <p style="text-align: right; color: red;">Coherence KY.3.NBT.1 → KY.4.NBT.3 → KY.5.NBT.4</p>

Research



“The multiplicative structure of the number system should be generalized. That is, ten in any position makes a single thing (group) in the next position. The oral and written patterns for numbers in three digits are duplicated in a clever way for every three digits to the left.”

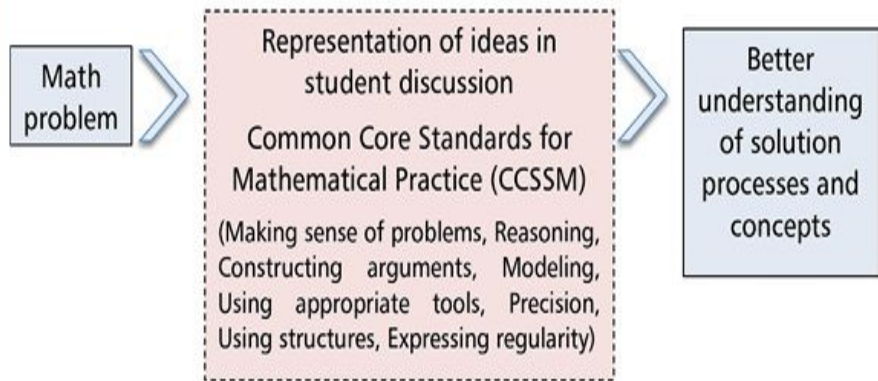


NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

Standards for Mathematical Practices

FIGURE 1

Discussing ideas and representing them during the problem-solving process help students bridge problem contexts and abstract mathematics concepts.



Murata, Aki and Stewart, Chana. Facilitating Mathematical Practices through Visual Representations. Teaching Children Mathematics. March 2017, Vol. 23, Issue 7

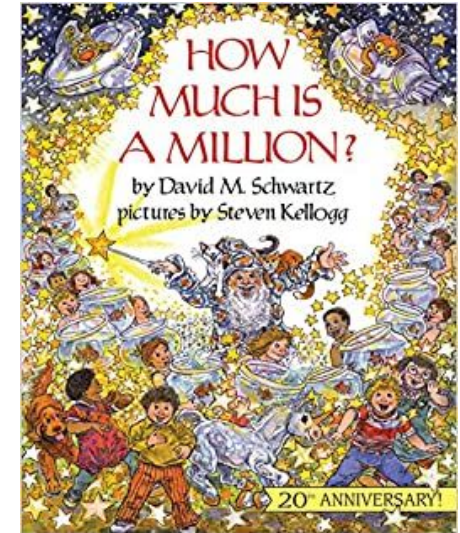
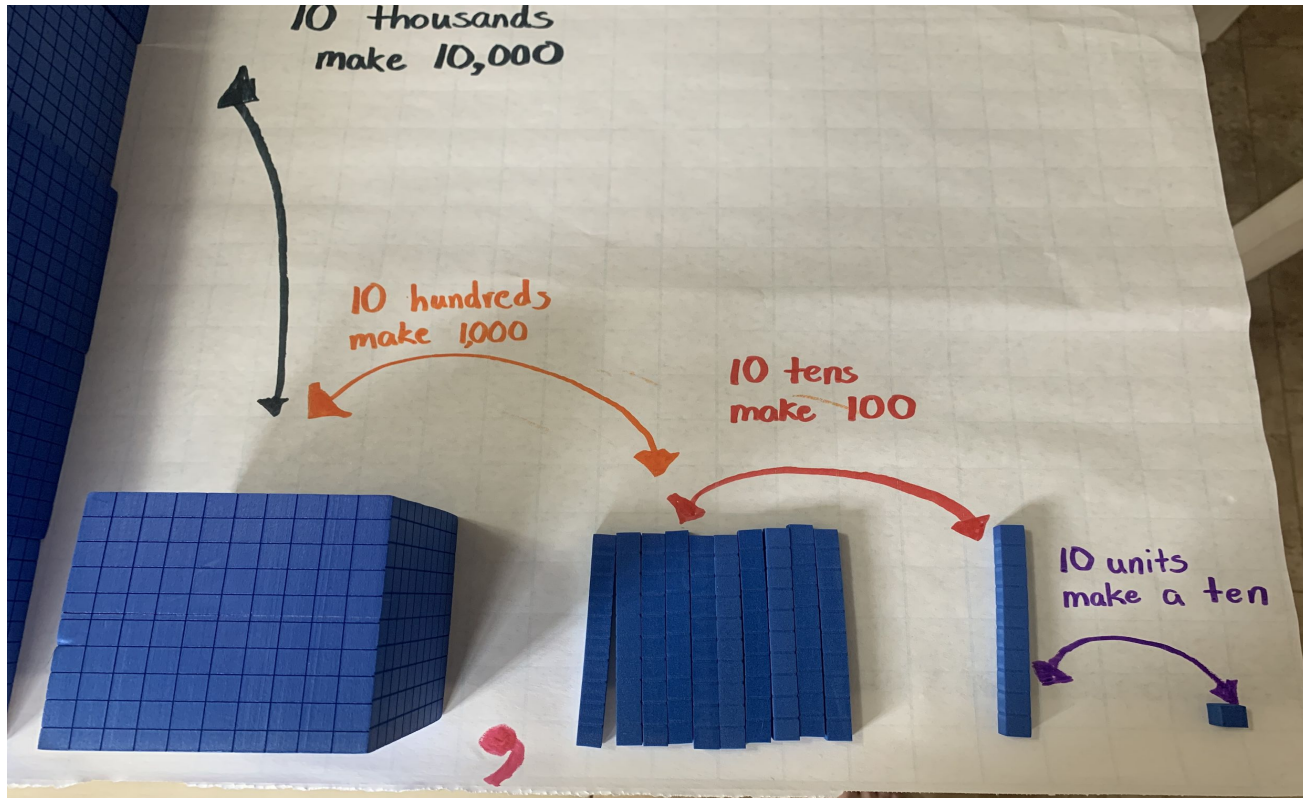
TABLE 2

Representations can support the Common Core's Standards for Mathematical Practice (SMP) (CCSSI 2010, pp. 6–8).

Visual representations and mathematical practices

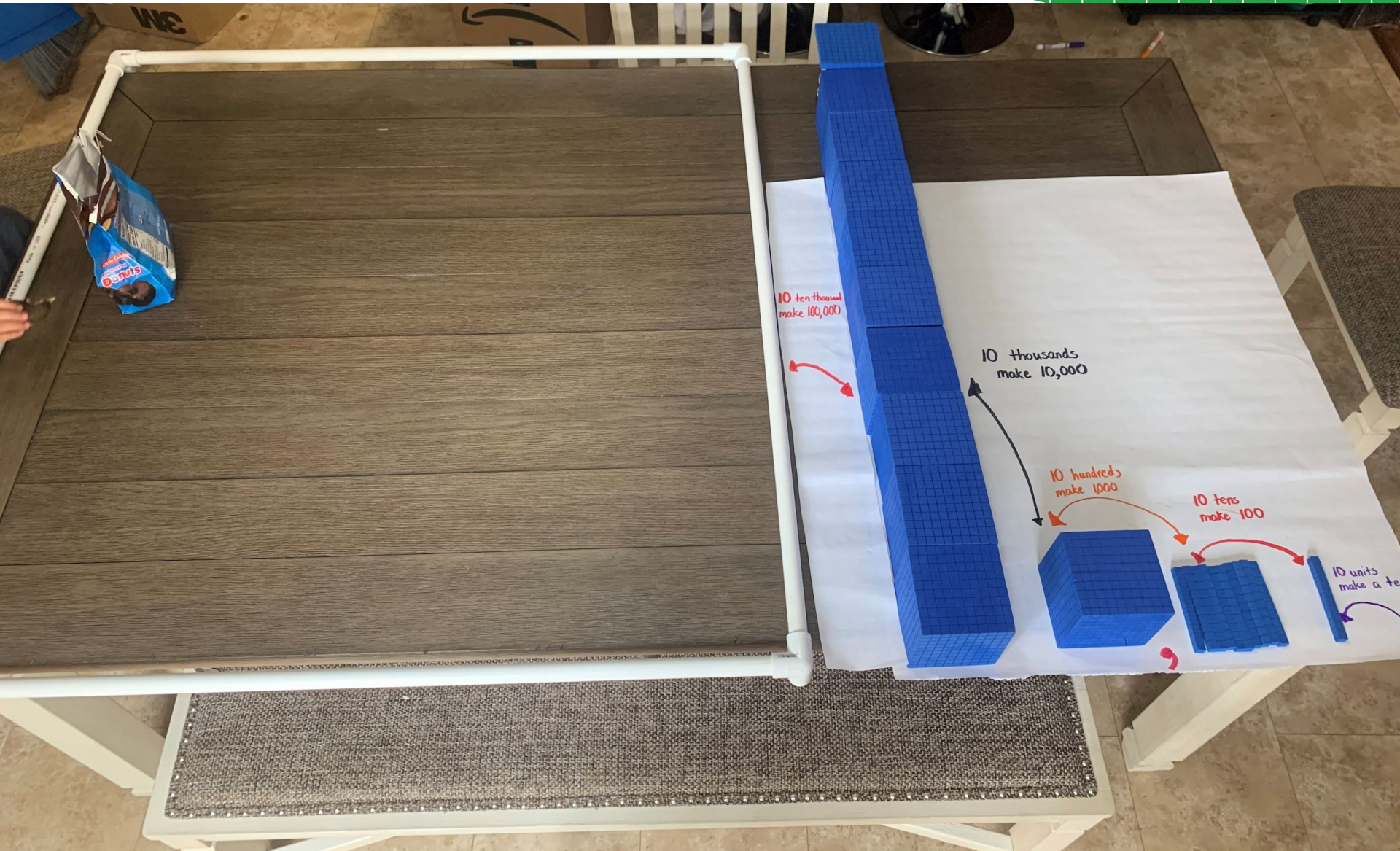
Mathematical practices	How representations will help students
1. Make sense of problems and persevere in solving them	Identifying relationships among different aspects in the problem to make the problem context clearer
2. Reason abstractly and quantitatively	Emphasizing the mathematics concept and relationships away from the immediate problem context, to be seen and reasoned more abstractly
3. Construct viable arguments and critique the reasoning of others	Making mathematical relationships in the problem visible, to help construct arguments, and to critique ideas on the basis of relationships
4. Model with mathematics	Representing the mathematical relationships
5. Using appropriate tools strategically	Choosing appropriate representations Representing mathematical relationships will help students determine appropriate solution tools (and operations).
6. Attend to precision	Helping students visibly ensure the accuracy of the problem-solution process Checking answers
7. Look for and make use of structures	Making mathematical structures visible in the problem-solution process
8. Look for and express regularity in repeated reasoning	Using similar representations across different problems and contexts will help students learn the value of repeated reasoning.

How Much is a Million?

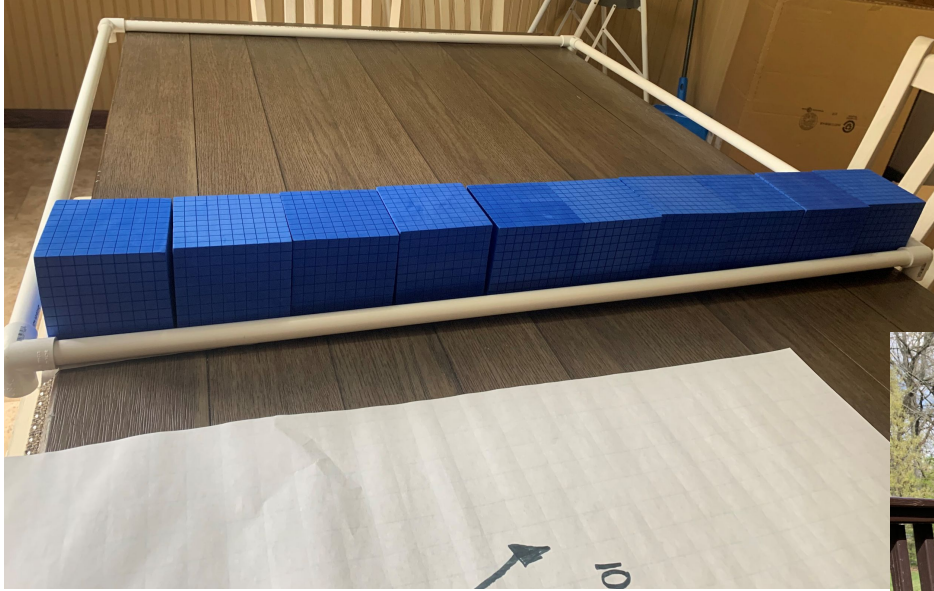


Place value at its core is a multiplicative relationship. The capacity to reason in scale about creating units of units, coordinating the units as they transform, and thinking simultaneously are attributes of place value and the numerical operation of multiplication.

Brickwedde, James. *Place Value as a Rate of Ten*. Teaching Children Mathematics. September 2018, Vol. 25, Issue 1



Can You Visualize 100,000?

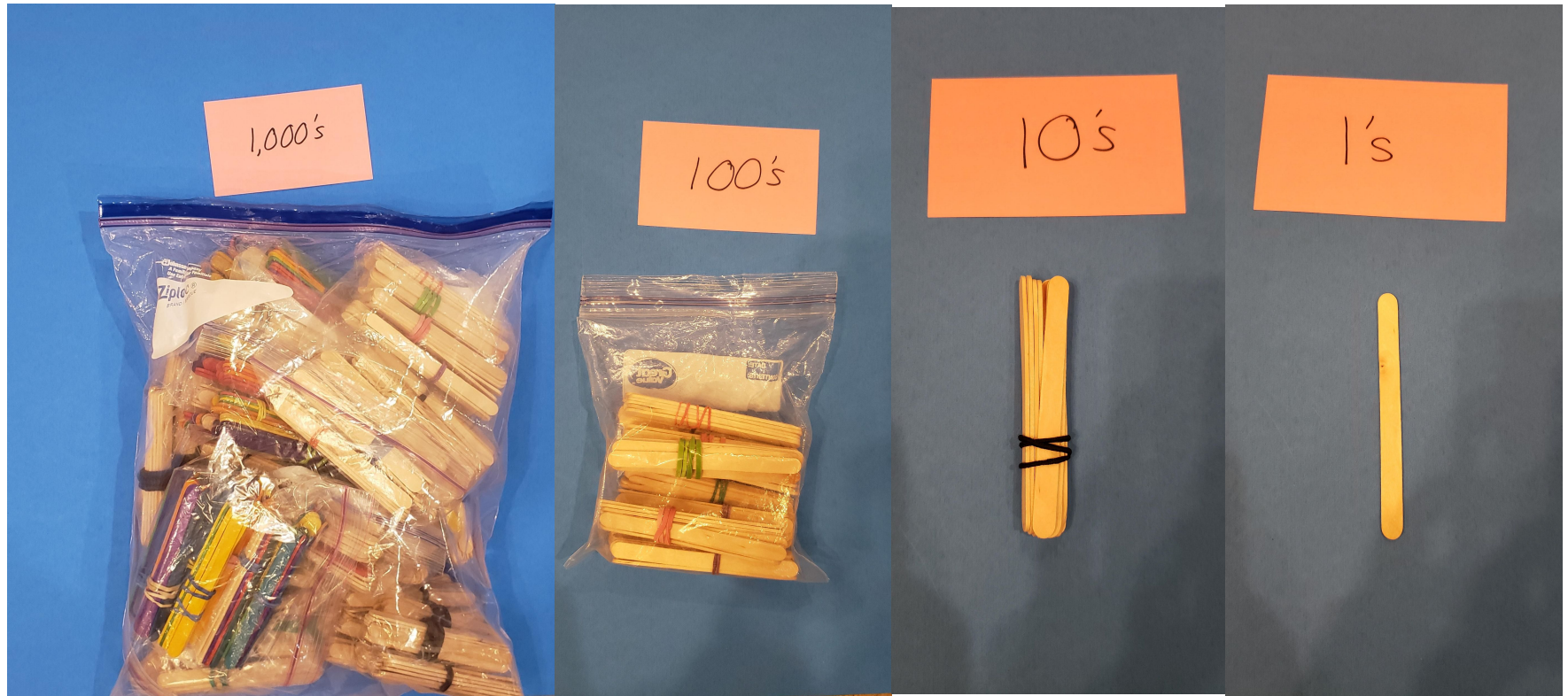


Or 1,000,000?



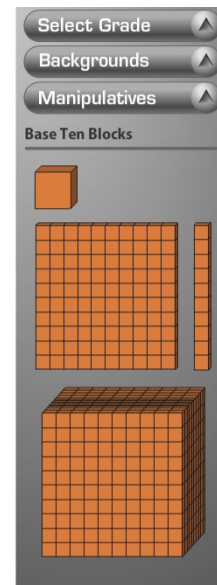
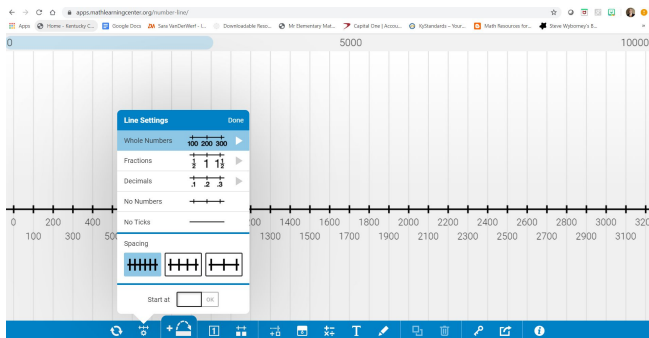
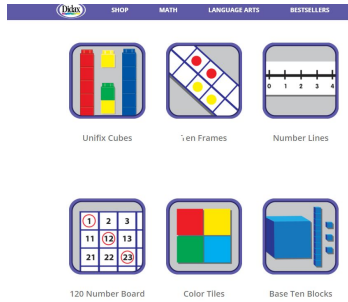
Sticks & Bundles for Larger Numbers

Janna Archer- MIT South Marshall Elementary



Being able to recognize and generate equivalent representations of the same number will help students during tasks that require estimation, comparison or computation. This flexibility in dealing with numbers will enable students to generate representations that best fit the situation and make their work easier.

Virtual Number Lines and Place Value Blocks



Desmos for Elementary

3 Digit Place Value Sort

Place Value of Multi Digit Whole Numbers

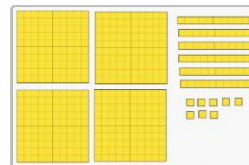
Sort the cards into 2 or more groups.

52 tens, 1 one

$200 + 7$

207

$500 + 20 + 1$



$400 + 60 + 8$

521

Estimation 180



Building number sense one day at a time.

Not using visuals in math class prevented students access to math conversations. Visual math landscapes are an invitation for both students and teachers to enjoy learning math together.

- Andrew Stadel

How many **cheeseballs** come in the container?



ESTIMATION180.com

Other estimates

Make an estimate.

* Required

What's too LOW? *

What's too HIGH? *

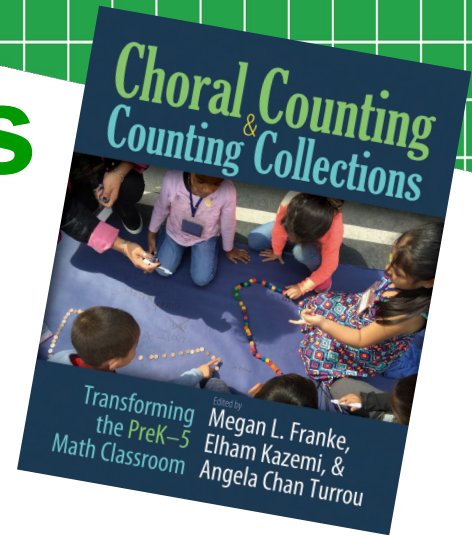
Your estimate. *

Your reasoning. *

Do better than "I guessed." Try "I noticed"

Your name.

Counting Collections



Benefits of Counting Collections

- Everyone has an entry point! Easy to differentiate based on the interests and needs of students. Students can be challenged by the amount in the collection, sophistication of how they count the items, and how they record their thinking.
- Provides a window into the thinking of students. Through observation and questioning, teachers can assess student understanding of place value, number relationships and many other mathematical concepts.
- Students build number sense, develop an understanding of place value, learn how to build and write larger numbers, develop multiplicative reasoning, compare quantities, grow estimation skills, and build computational fluency.
- Addresses multiple Standards for Mathematical Practice:
 - Make sense of problems and persevere in solving them
 - Reason abstractly and quantitatively
 - Construct viable arguments and critique the reasoning of others
 - Model with mathematics
 - Use appropriate tools strategically
 - Attend to precision
 - Look for and make use of structure
 - Look for and express regularity in repeated reasoning

Numbers Around US



Consumers use approximately 10 sheets of paper per toilet use.

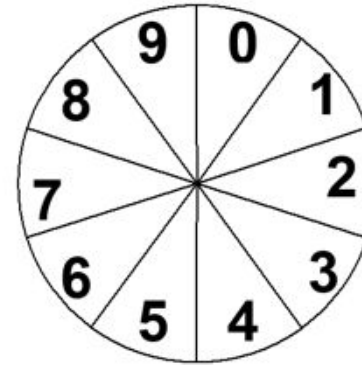
How many uses would you get out of this roll of toilet paper?

How many sheets are in a case of ten rolls?

We use an average of **50 sheets** of toilet paper a day!
How many days would this roll last?

Print Resources

The Place Value Game



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Math Tools

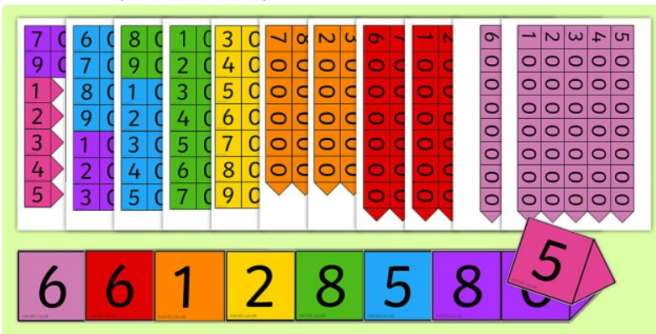
Arrow Cards

- Blank arrow cards - [document](#)
- Arrow cards for developing conceptual place value for 1 digit, 2 digit, and 3 digit numerals - [document](#)
- Expanded set for developing conceptual place value to 4 digit and 5 digit numerals - [document](#)

Place Value Arrow Cards | Maths Resource

★★★★★ (135 member reviews)

Free



Player 1 Number Built:

Player 2 Number Built:

Spin	Value
1	
2	
3	
4	
Total	

Spin	Value
1	
2	
3	
4	
Total	



Upcoming Virtual Professional Learning

APRIL 13 - 17
2:00-2:30 PM EST



Focus on Place Value!

w/ KY Math Leaders

Monday, April 13 - Place Value to 10

Tuesday, April 14 - Place Value to 100

Wednesday, April 15 - More Place Value to 100

Thursday, April 16 - Place Value with Multi-digit Numbers

Friday, April 17 - Place Value with Decimals

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https://www.kentuckymathematics.org/kcm_virtual.php



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KCM Virtual



At this time of social distancing due to COVID-19, the KCM wants to do our part to support Kentucky teachers, students and mathematics education. So we are providing free online mini-classes to educators. No registration is required. Just click "Join Live Session" to participate in the live class via Zoom or, if you aren't available at the class time, click "View Recorded Session" to view the recorded session when it becomes available.

KCM is here to support you!

Contact me:



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