Breaking Down Division in Grades 3, 4 & 5

3.OA.2, 4.NBT.6 & 5.NBT.6

Susan Jensen and Cheryl Akers, HCPSS

4.NBT.6	5.NBT.6
Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Using Rectangular Arrays for Sharing Division

You know the total amount and the number of groups and you need to find out how many are in each group.

Jody has 42 apples. She puts them into 6 equally sized groups. How many are in each group? There are 7 in each group.

Rectangular Arrays

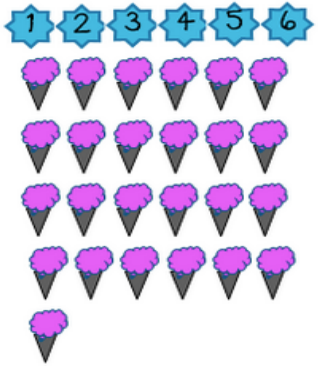
Big Ideas

Visualizing the problem is helpful when creating arrays for division.

To do this there are 3 questions to ask yourself...

25 ÷ 6

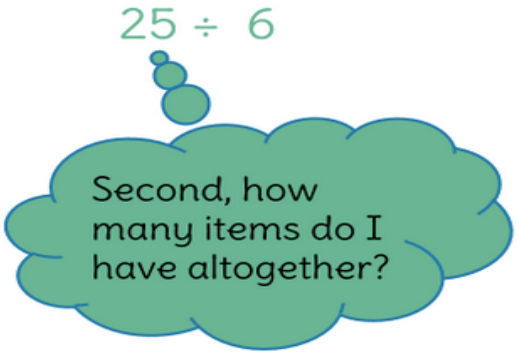
First, how many equal groups do I need to make?



This tells me how many columns to make!

Rectangular Arrays

Big Ideas



This tells me when to stop placing items in my columns!

Rectangular Arrays

Big Ideas

25 ÷ 6

Third, how many are left over?

I circle my equal groups, and look to see how many are left over.

My final answer is:

25 ÷ 6 = 4 R1

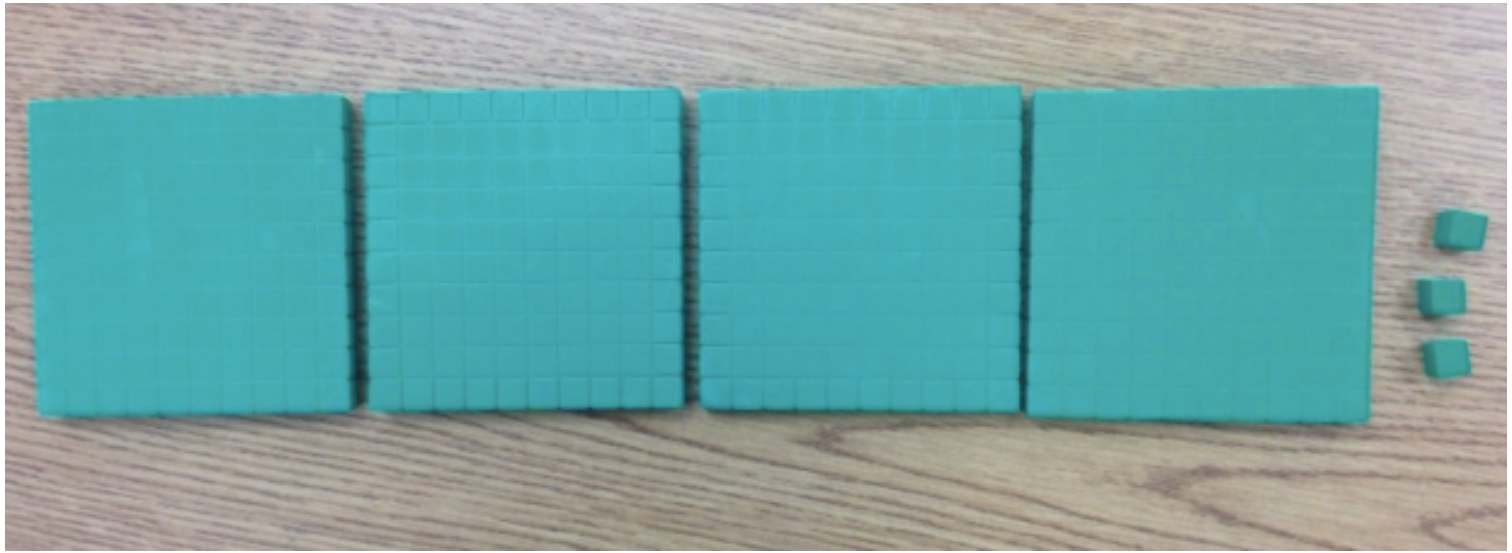
How do students expand their knowledge of arrays when working with larger numbers in division?

Area Model with Base Ten Blocks

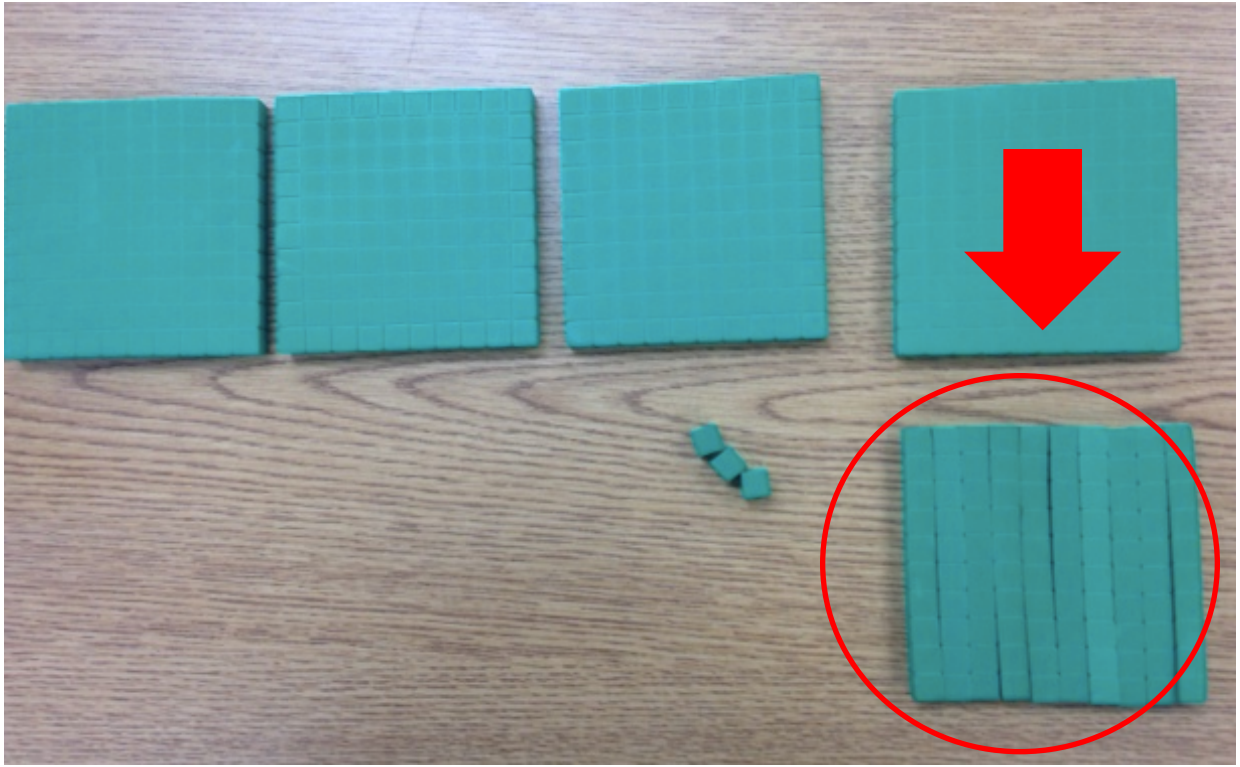
403 ÷ 13 = ?

Create a visual representation to help you solve this problem.

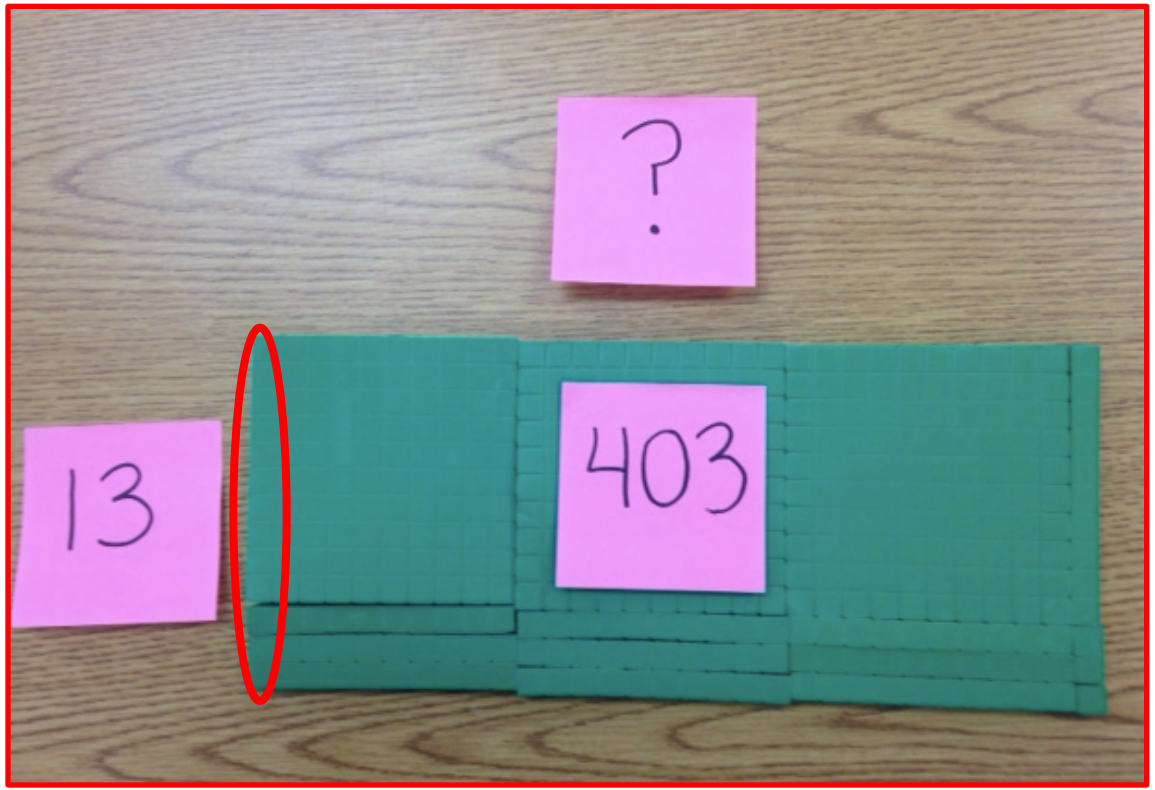
Area Model



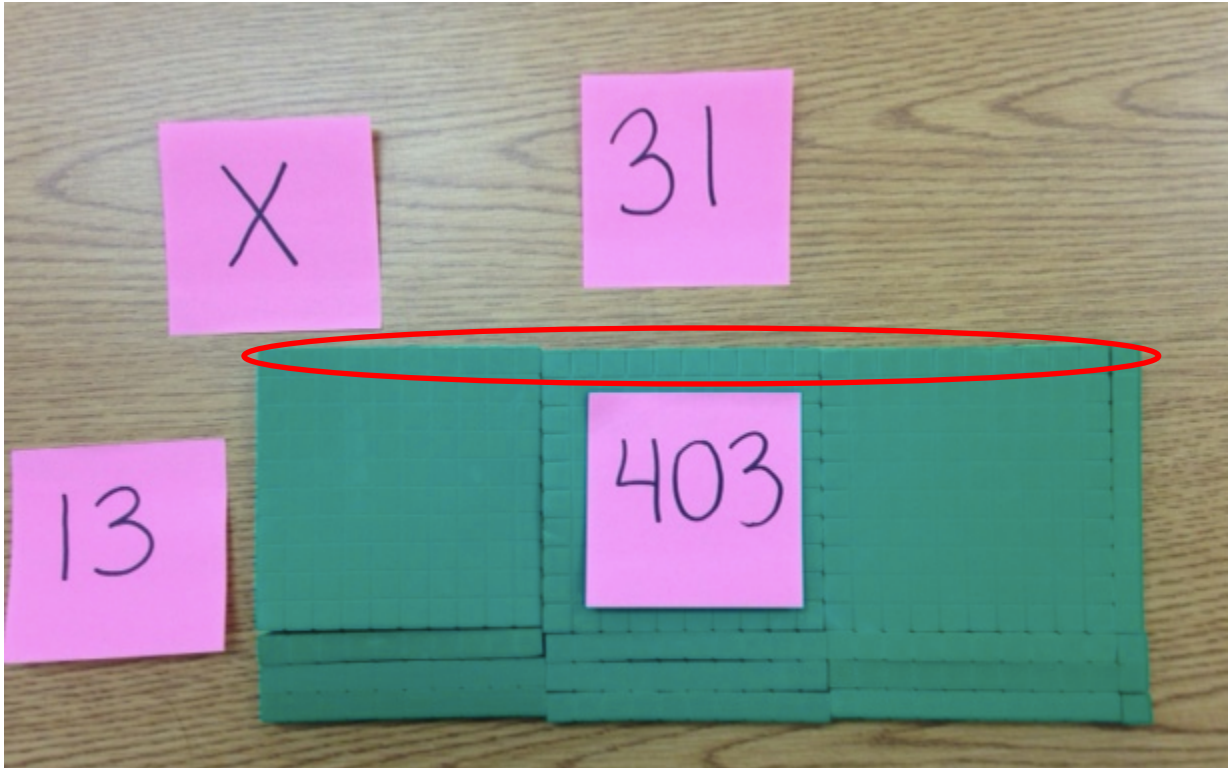
Area Model



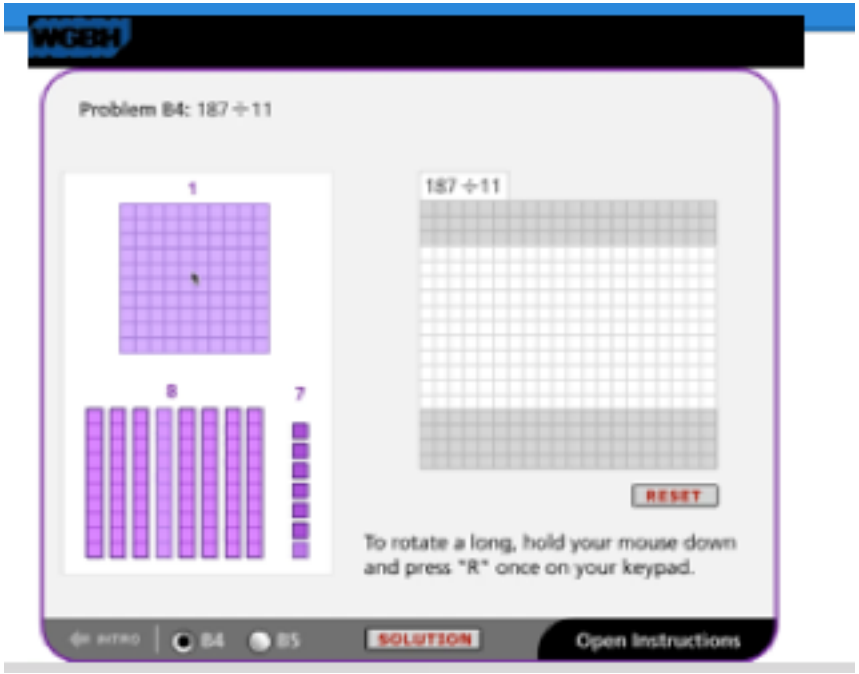
Area Model



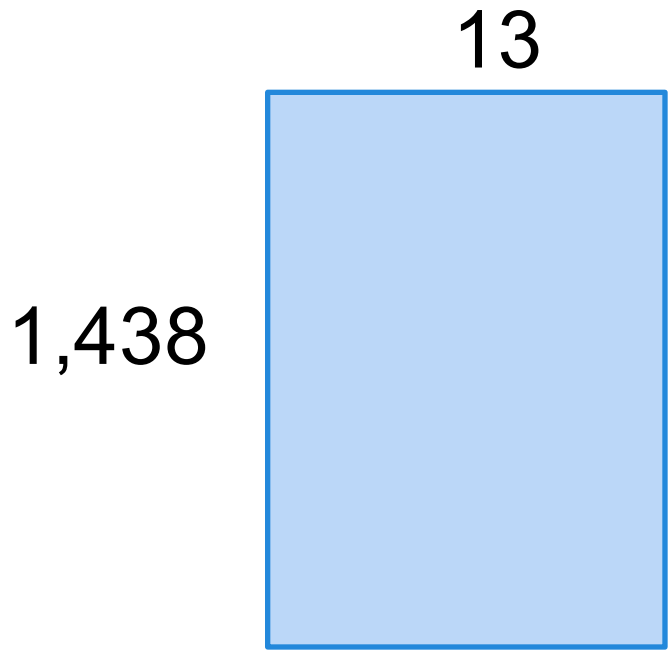
Area Model



Area Model-http://www.pbslearningmedia.org/asset/mgbh_int_divmodel/



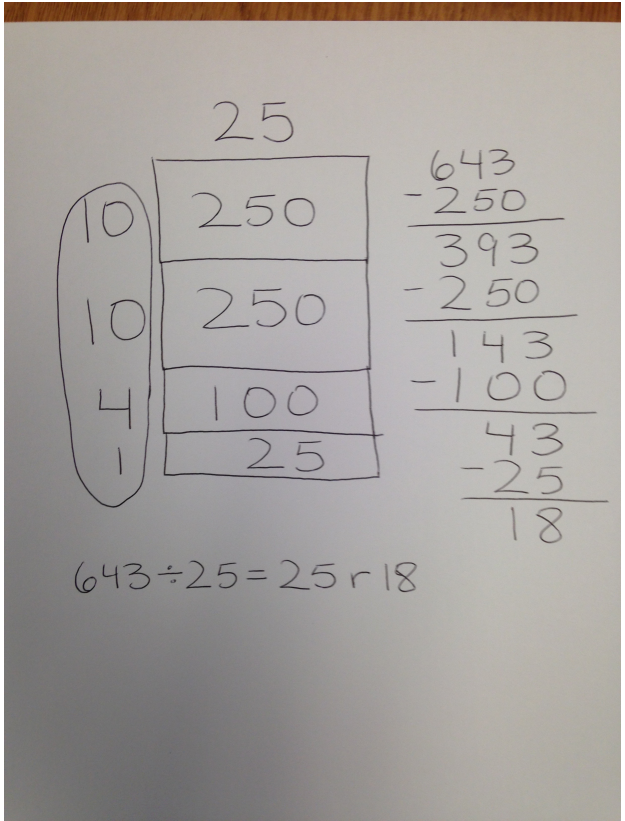
Open Array/Area for 1,438 ÷ 13



Let’s Take a look at a LearnZillion lesson: LZ552

Let's try another example:

643 ÷ 25



Partial Quotients

What is it?

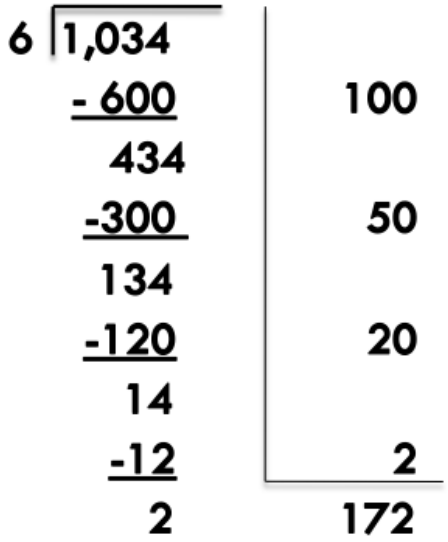
Students use several steps to find the quotient by relying on known facts and multiples of 10. The process ends by adding all of the partial quotients together.

When do you use it?

This strategy can be used to solve more complex division problems.

Partial Quotients

1,034 ÷ 6=



Think: How many [6s] are in 1,034? At least 100

The first partial quotient is 100. There are 100 groups of 6 in 1,034. Since 100 x 6 = 600, subtract 600 from 1,034.

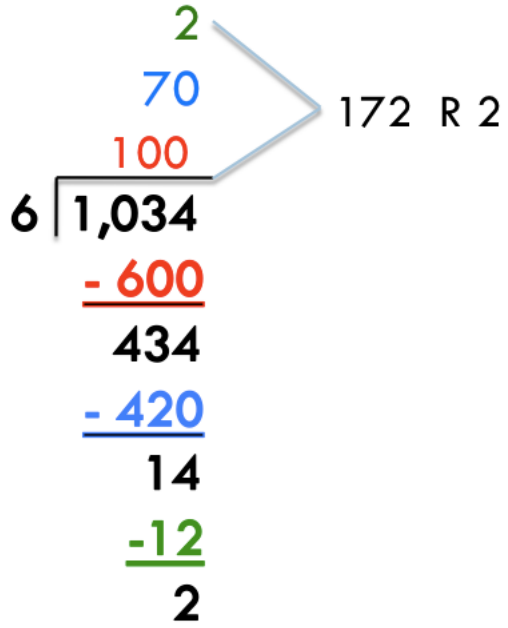
Think: How many [6s] are left? At least 50. The second partial quotient is 50. Since 50 x 6=300, subtract 300.

Think: How many [6s] are left? At least 20. The third partial quotient is 20. Since 20 x 6 = 120, subtract 120

Think: What basic fact do I know that is close to 14? 6 x 2. The fourth partial quotient is 2. Since 6 x 2 = 12, subtract 12. Add the partial quotients.

Partial Quotients (Chimney)

1,034 ÷ 6=



Quotient Cafe-http://illuminations.nctm.org/activity.aspx?id=4197

Distributive Property

The distributive property for division basically means you can split your quantity up into smaller chunks that are easier to divide.

This property forms the basis of the written algorithm for long division.

It is important to note that the commutative, associative, identity and inverse properties do not apply to division.

Distributive Property in Action

Let’s take 176 ÷ 8 as an example. It’s easier for students to consider questions in context, so think of putting 176 apples into 8 bags.

Distributive Property

If we take the first 80 apples, then it's easier to see that would be split up into 10 apples into each bag. 80 ÷ 8 is a much easier question. The next 80 apples are divided up, adding another 10 to each bag. That leaves 16 apples, which when divided up into 8 bags makes 2 each.

So what we've done is split 176 ÷ 8 into:

80 ÷ 8

80 ÷ 8

16 ÷ 8

Distributive Property

Mike said, “721 ÷ 7 is the same as 700 ÷ 7 + 21 ÷ 7.”

How is Mike’s statement related to the long-division algorithm?

In what different ways would fourth- and fifth-grade students be likely to respond to Mike?

QuickTime Player File Edit View Window Help 91% Tue 8:58 PM Cheryl Akers

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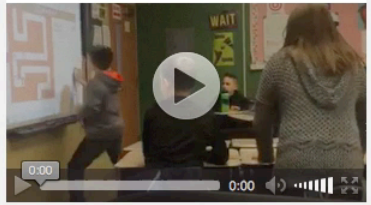
VIDEO OF THE WEEK: Ms. Coopersmith's students playing Ten Frame Mania!

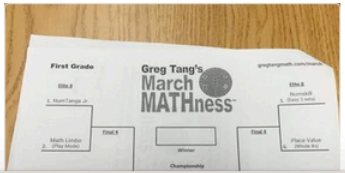


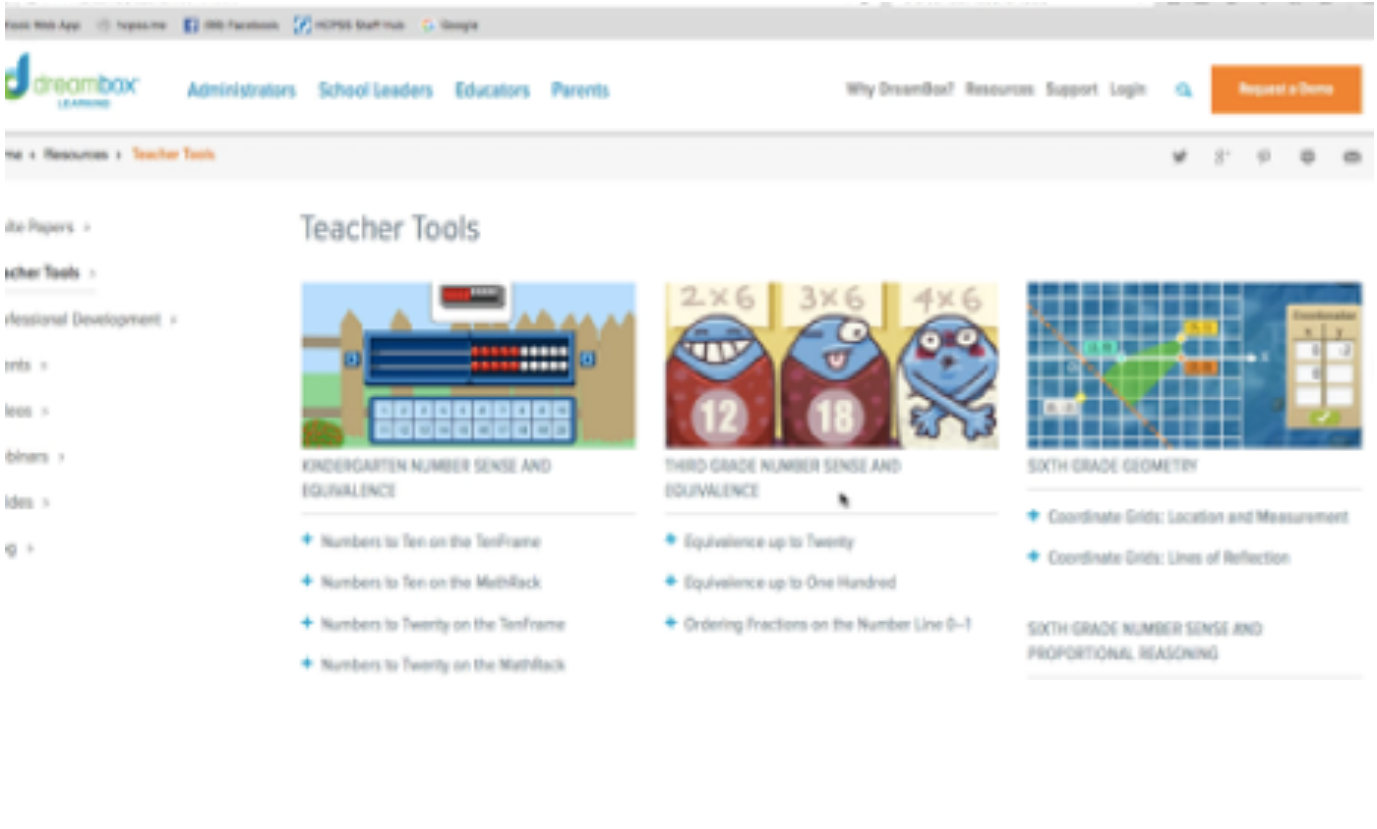
Tweets by @gregtangmath

Greg Tang Retweeted

Mrs.Micele's1stGrade
@MrsMicele

Discussing our March MATHness brackets! Who do you think will be in the final four?? @gregtangmath

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Numbers to Twenty on the TenFrame
Numbers to Twenty on the MathRack
THIRD GRADE NUMBER SENSE AND EQUIVALENCE
Equivalence up to Twenty
Equivalence up to One Hundred
Ordering Fractions on the Number Line 0–1
SIXTH GRADE GEOMETRY
Coordinate Grids: Location and Measurement
Coordinate Grids: Lines of Reflection
SIXTH GRADE NUMBER SENSE AND PROPORTIONAL REASONING

What connections can you make between the models?