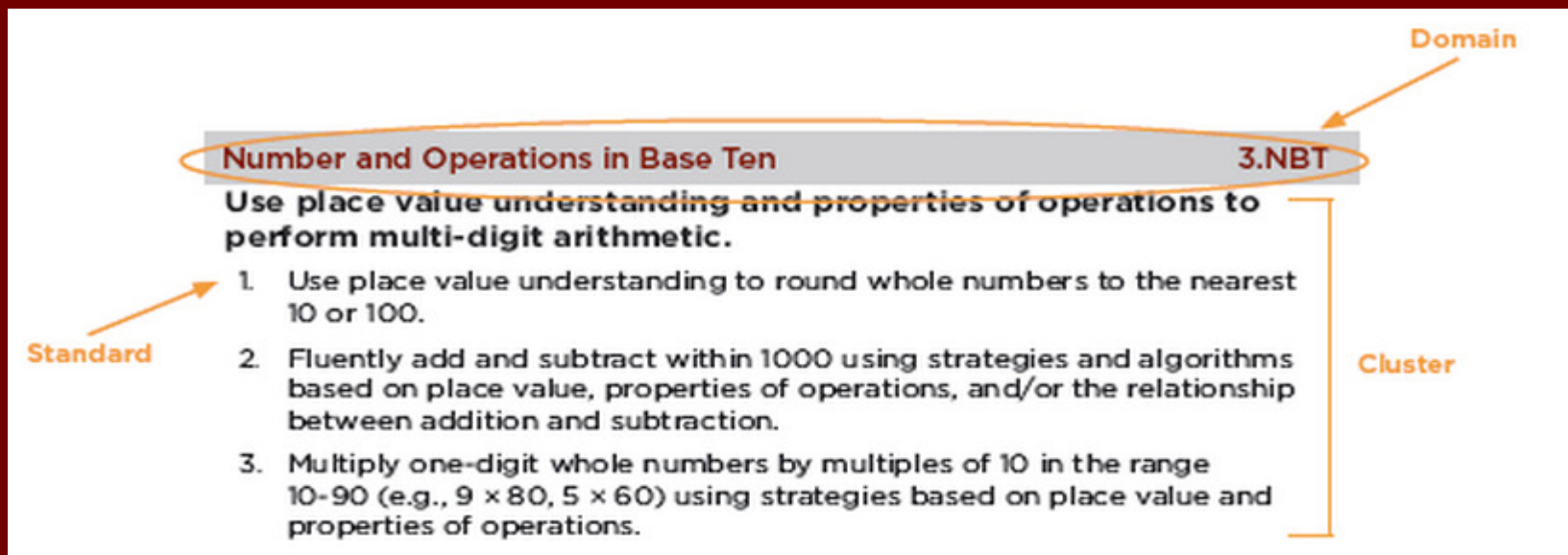# Help I'm Lost!

You Are Here

Math and the Common Core

Common Core Drive By

- The Common Core State Standards for Mathematics are comprised of 2 sets of standards.
  - The Standards for Mathematical Content
  - The Standards for Mathematical Practice

■ The Standards for Mathematical Content
  – **Domains** are large groups of related standards.
  – **Clusters** are smaller groups of related standards.
  – **Standards** define what students should understand and be able to do.

Domain

Number and Operations in Base Ten   3.NBT

Use place value understanding and properties of operations to perform multi-digit arithmetic.

Standard

1. Use place value understanding to round whole numbers to the nearest 10 or 100.

2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Cluster

Common Core Drive By

- **Standards for Mathematical Content – Domains**

K–8 Domain Progressions in the CCSSM

Domains	K	1	2	3	4	5	6	7	8
Counting and Cardinality	■								
Operations and Algebraic Thinking	■	■	■	■	■	■			
Number and Operations in Base Ten	■	■	■	■	■	■			
Number and Operations-Fractions				■	■	■			
Ratio and Proportional Relationships							■	■	
The Number System							■	■	■
Expressions and Equations							■	■	■
Functions									■
Measurement and Data	■	■	■	■	■	■			
Geometry	■	■	■	■	■	■	■	■	■
Statistics and Probability							■	■	■

Key Areas of Focus in Mathematics

Grade	Focus Areas in Support of Rich Instruction and Expectations of Fluency and Conceptual Understanding
K–2	Addition and subtraction - concepts, skills, and problem solving and place value
3–5	Multiplication and division of whole numbers and fractions – concepts, skills, and problem solving
6	Ratios and proportional reasoning; early expressions and equations

Critical Areas of Focus for Mathematics Grades K - 2

Kindergarten

Develop the concept of number with respect to:
Counting Sequences
Counting to tell the number of objects
Represening quantities

Introduce addition and subtraction of whole numbers
and
model simple joining and separating situations with objects

Build basic geometric concepts by using the student's physical world to identify and describe shapes

Grade 1

Develop place value understanding with two-digit numbers and properties of operations to deepen student's understanding of whole number relationships

Apply previous experiences with counting to develop a rich understanding of additon and subtraction

Reason about the attributes of and compose and decompose geometric shapes
and
develop an understanding of linear measurement

Grade 2

Expand student's understanding of place value, addition, and subtraction

Apply understanding of addition and subtraction to solve problems

Lay the foundation for geometric concepts such as area and volume
and
develop an understanding for the need for standard units of linear measurement

Critical Areas of Focus for Mathematics Grades 3 - 5

Grade 3

Expand student's understanding of number to include fractions, especially unit fractions

Develop an understanding of the meaning of and strategies for the operations of multiplication and division making frequent connections to the concept of area

Reason with shapes and their attributes

Grade 4

Apply previous experiences with multiplication, division, and place value to develop an understanding of multi-digit factors and multi-digit dividends

Apply previous experiences with addition, subtraction, multiplication, and fraction equivalence to operate on fractions with like denominators and multiplying a fraction by a whole number

Classify geometric figures by specific properties

Grade 5

Apply student's knowledge of place value and operations on whole numbers to decimal fractions and two-digit divisiors

Apply previous experiences with operations on fractions to extend to unlike denominators, multiplying two fractions, and using the relationship between multiplication and division to understand ideas surrounding the division of fractions

Develop an understanding of volume

Critical Areas of Focus for Mathematics Grades 6 - 8

Grade 6

Apply previous experiences with multiplication, division, and fractions to develop understanding of rate and ratio as well as completing concepts concerning dividing fractions

Expand student's understanding of the number system with the introduction of negative integers
and
introduce algebraic expressions and equations

Develop statistical thinking

Grade 7

Build on previous experiences with ratio to introduce proportional relationships and apply this understanding to scale drawings

Apply student's knowledge of the four basic operations and inverse relationships to rational numbers and solve linear equations

Solve problems with two- and three-dimensional figures, area, surface area, and volume
and
draw statistical inferences from sample populations

Grade 8

Apply previous experiences with linear expressions and equations to extend to systems of equations
and
use this understanding to represent, analyze, and solve a variety of problems

Build on student's experiences with linear equations to introduce the concept of function as a description of a relationship where one quantity is determined by another

Investigate the geometric concepts of similarity, congruence, and the Pythagorean Theorem

Common Core Fluency Standards for Mathematics Grades K – 6
All students must achieve these standards by the end of the school year.

Grade K
K.OA5 – Fluently add and subtract within 5.

Grade 1
1.OA.6 – Add and subtract within 20, *demonstrating fluency for addition and subtraction within 10*.

Grade 2
2.OA.2 - Fluently add and subtract within 20, by the end of Grade 2, know from memory all sums of two one-digit numbers.

Grade 3
3.NBT.2 - Students fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
3.OA.7 - Students fluently multiply and divide within 100. By the end of grade 3, they know all products of two one-digit numbers from memory.

Grade 4
4.NBT.4 - Students fluently add and subtract multidigit whole numbers using the standard algorithm.

Grade 5
5.NBT.5 - Students fluently multiply multidigit whole numbers using the standard algorithm

Grade 6
6.NS.2 - Students fluently divide multidigit numbers using the standard algorithm. This is the culminating standard for several years' worth of work with division of whole numbers.
6.NS.3 - Students fluently add, subtract, multiply, and divide multidigit decimals using the standard algorithm for each operation. This is the culminating standard for several years' worth of work relating to the domains of Number and Operations in Base Ten, Operations and Algebraic Thinking, and Number and Operations — Fractions.

Standards of Mathematical Practices

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 of Mathematical Practices

When you ask ...	Students ...
• What is the problem asking? • How will you use that information? • What other information do you need? • Why did you choose that operation? • What is another way to solve that problem? • Have you solved a problem similar to this one? • When did you realize your first method would not work for this problem? • How do you know your answer makes sense?	Make sense of problems and persevere in solving them.
• What is a situation that could be represented by this equation? • Why does that operation represent this situation? • What is another operation you could have used to represent the situation? • What properties did you use to find the answer? • How do you know your answer is reasonable?	Reason abstractly and quantitatively
• Will that method always work? • How do you know? • What do you think about what she said? • Who can tell us about a different method? • What do you think will happen if ...? • When would that not be true? • Why do you agree/disagree with what he said? • What do you want to ask her about her work? • How does that drawing support your work? • Justify your solution.	Construct viable arguments and critique the reasoning of others.

Standards of Mathematical Practices

When you ask ...	Students ...
• Why is that a good model for this problem? • How can you use a simpler problem to help you find the answer? • What conclusions can you make from your model? • How would you change your model if ...?	Model with mathematics.
• What could you use to help you solve the problem? • What strategy could you use to make that calculation easier? • How would estimation help you solve the problem? • Why did you decide to use ...	Use appropriate tools strategically.
• How do you know your answer is reasonable? • How can you use math vocabulary in your explanation? • How do you know those answers are equivalent? • What does that mean?	Attend to Precision
• How did you discover that pattern? • What other patterns can you find? • What rule did you use to make this group? • Why can you use that property in this problem? • How is this like ...?	Look for and make use of structure.
• What do you remember about ...? • What happens when ....? • What if you ... instead of ....? • What might be a shortcut for ....?	Look for and express regularity in repeated reasoning.

Grouping the practice standards

1. Make sense of problems and persevere in solving them

6. Attend to precision

2. Reason abstractly and quantitatively

3. Construct viable arguments and critique the reasoning of others

Reasoning and explaining

4. Model with mathematics

5. Use appropriate tools strategically

Modeling and using tools

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

Seeing structure and generalizing

Processing the SMP

You have been given one of the 8 Standards for Mathematical Practice. Using your SMP handout, provide an example on how you would plan to implement your given SMP for a lesson of your choosing.

SMP Activity

- SMP #6   Attending to Precision

  A student is asked to provide the math when you multiply Six times Four and then add Five.

  The Student provides

  6 x 4 = 24 + 5 = 29

5 Minute Break
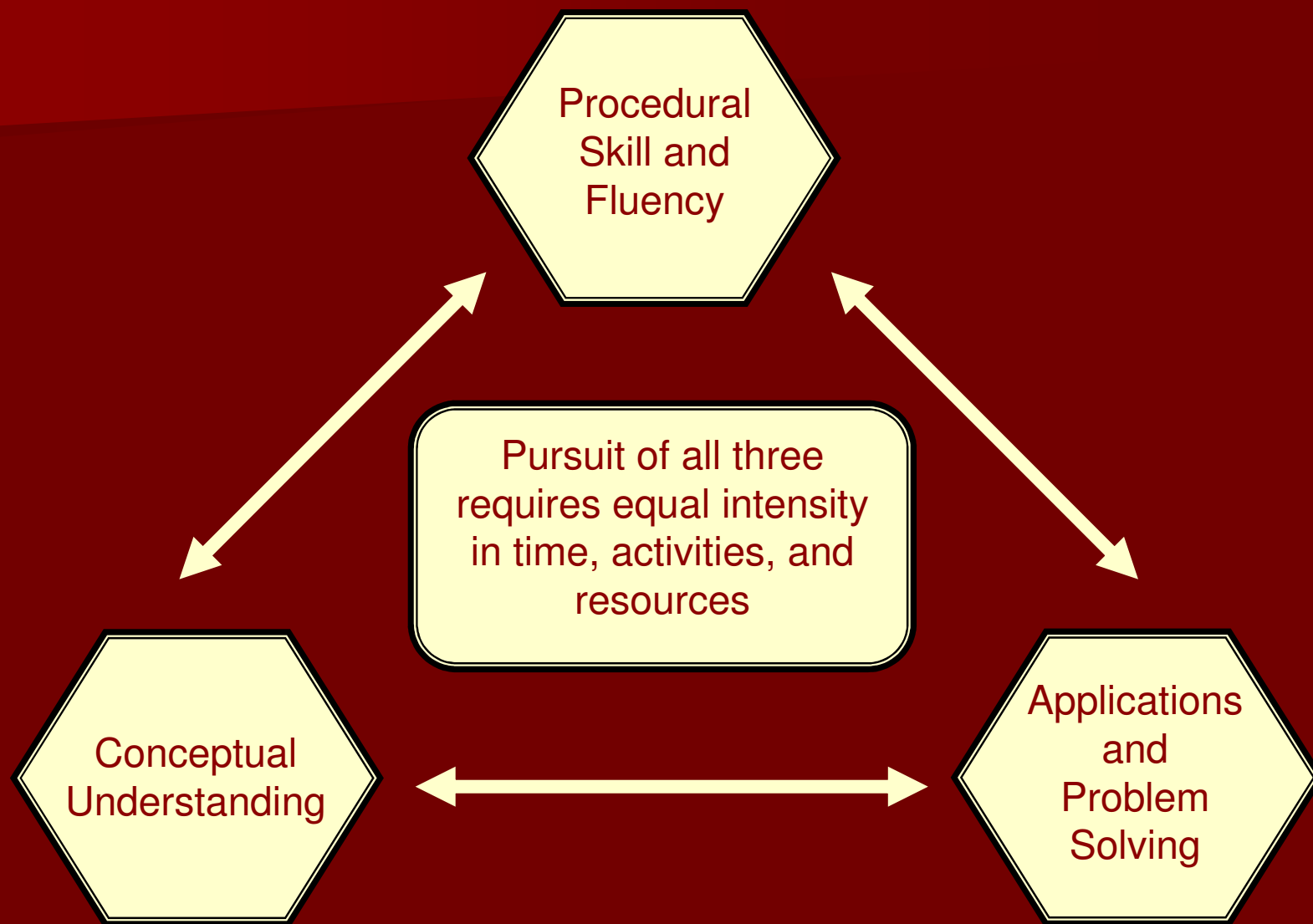
Knowing vs Understanding

Show Grade 3

What is the difference between knowing and understanding?

Students know 4 x 6 = 24

Students understand 4 x 6 = 24

What does 5 x 6 =   ?

What is Conceptual Understanding?

Students demonstrate conceptual understanding in mathematics when they provide evidence that they can recognize, label, and generate examples of concepts; use and interrelate models, diagrams, manipulatives, and varied representations of concepts; identify and apply principles; know and apply facts and definitions; compare, contrast, and integrate related concepts and principles; recognize, interpret, and apply the signs, symbols, and terms used to represent concepts.

Balka, Hull, and Miles
http://www.mathleadership.com/sitebuildercontent/sitebuilderfiles/conceptualUnderstanding.pdf

What Does Conceptual Understanding Look Like?

- Pick one of the following products as an example, what can you do in your class to develop **conceptual understanding** in regards to learning multiplication?

Grade 3 6 x 4

Grade 4 63 x 4

Grade 5 63 x 42

Grade 6 6.3 x 4.2

6 x 4 = ?

6 x ? = 24

4 people can sit in a car how many can sit in 6 cars?

Is 6 x 4 the same as 4 x 6?

Sue has six stickers, Jan has four times as many stickers. How many stickers does Jan have?

Jack arranges his cars into 4 rows . Each row has 6 cars. How many cars does he arrange?

Matt wants to place 24 tiles into 6 rows. How many tiles are in each row?

Which of the following are correct?

- $6 \times 4 = 24$ $6 \times 4 = 8 \times 3$
- $6 \times 4 = 4 \times 6$ $6 \times 4 = 6 + 6 + 6 + 6$
- $6 \times 4 = (6 \times 2) + (6 \times 2)$

Using the standard algorithm, develop a 2-digit by 2-digit multiplication problem with an error and pose a question to assess the student's understanding.

$$
\begin{array}{r}
2\ 3 \\
\times \\
\hline
1\ 6\ 1
\end{array}
$$

Why?

How do you know?

Can you explain?

Give them TIME!
(we are working to make it available)

What do I do Next?

Implement the Standards of Mathematical Practice Daily

Provide opportunities for your students to build conceptual understanding.

Be on the lookout for Rich Problems and use them!

13. Is the quotient $4.5 \div 0.9$ greater or less than 4.5? Why?

_____

_____

9. Which of the following quotients has the greatest value?

A. $0.075 \div 6$ C. $0.75 \div 0.06$

B. $7.5 \div 0.006$ D. $0.75 \div 0.6$
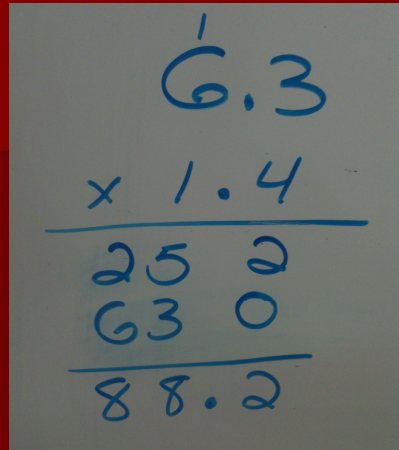
Ask
Why?   How do you Know?   Can you Explain?
and provide TIME

Use Student Errors as a Teaching Tool

Use the resources on the internet

www.cpsed.net – District's Math Website

www.ride.ri.gov – Learning CCSS

"Implementing the Standards of Mathematical Practice for _____"

"Developing Conceptual Understanding of _____"