Transitioning Instruction and Assessment in K-5 Mathematics to Support TEKS Implementation

Janet Dodd

District Instructional Specialist, Elementary Mathematics
President, Texas Association of Supervisors of Mathematics

jdodd@pasadenaisd.org


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Transitioning Instruction and Assessment in K-5 Mathematics

- Pasadena ISD: District Instructional Specialist, Elementary Mathematics (K-4)
  - 35 Elementary Campuses
    - ~1,100 Teachers (K-4) & ~22,000 Students (K-4)
  - Our Student Demographics (District)
    - African-American ~7%
      Asian ~4%
      Hispanic ~77%
      White ~12%
      Free/Reduced ~75%


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Transitioning Instruction and Assessment in K-5 Mathematics

- Texas Association of Supervisors of Mathematics (TASM): President
  - Membership
    - 452 members from campus, district, education service center, college/university, and other roles
  - Executive Board
    - 5 Elected Officers & 8 Appointed Positions
  - Fall/Spring/Summer Business Meetings
  - Fall/Spring Professional Development Meeting

@MathLeaders

Transitioning Instruction and Assessment in K-5 Mathematics

- Goal
  - "Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. … Teachers help students make, refine, and explore conjectures on the basis of evidence and use a variety of reasoning and proof techniques to confirm or disprove those conjectures. … Students are flexible and resourceful problem solvers. … (Students) value mathematics and engage actively in learning it."

Principles and Standards for School Mathematics (NCTM, 2000) pg. 3

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- Goal
  - Explore how two of the four critical PLC (Professional Learning Communities) questions
    - **What do we expect each student to learn?**
    - **How will we know when each student has learned it?**

    can be used to transition our curriculum, instruction, and assessment to the 2012 Revised Mathematics TEKS.
    - So that we don't have to imagine …

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- Norms
  - Contribute to collaborative conversations
  - Contribute to a professional learning environment
    - Stay focused
    - Monitor distractions
    - Honor an attention signal

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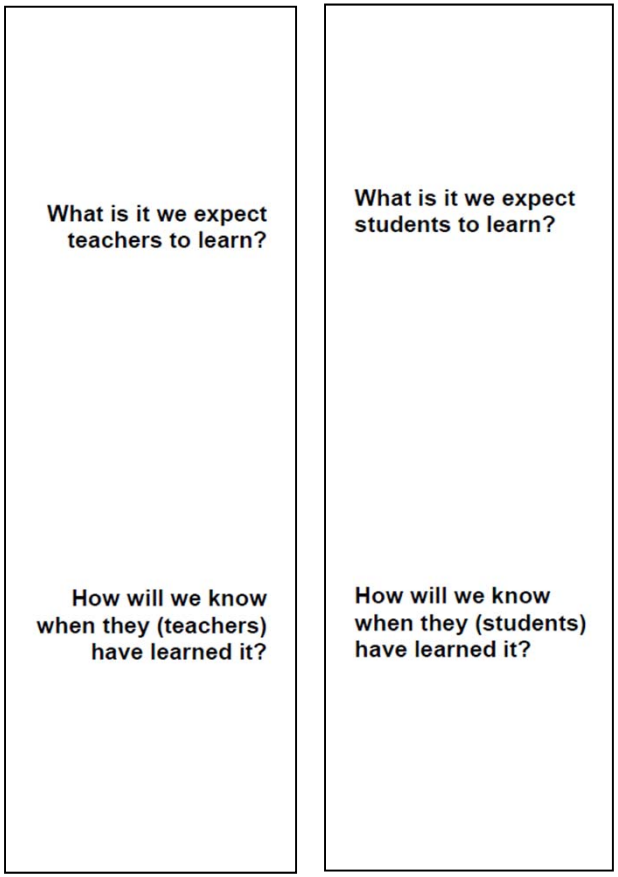
- Let’s get started



RME 2014 Research-to-Practice

Transitioning Instruction and Assessment in K-5 Mathematics to Support TEKS Implementation

02.28.14

K	1	2	3	4	5

What is it we expect students to learn?

What is it we expect teachers to learn?

Card	Big Ideas

How will we know when they (students) have learned it?

How will we know when they (teachers) have learned it?

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What is it we expect teachers to learn?

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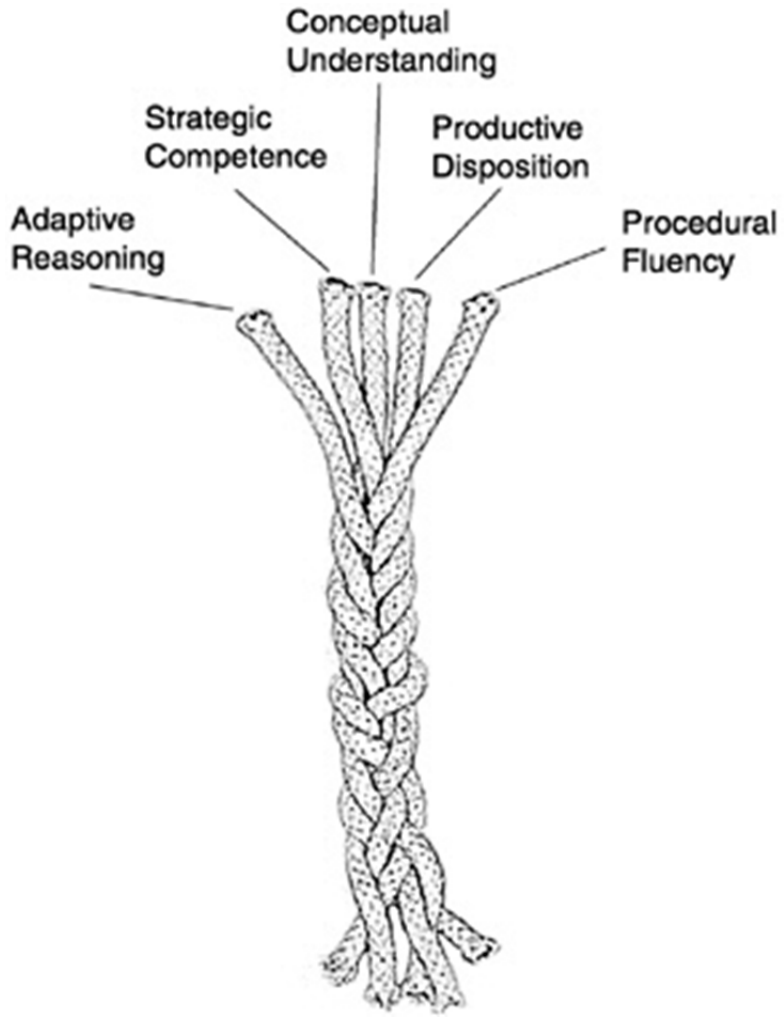

Reference: Adding it Up (National Research Council, 2001)

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President, Texas Association of Supervisors of Mathematics
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What is it we expect students to learn?

How will we know when they (students) have learned it?

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- What is it we expect teachers to learn?
  - Card Sort: 2012 Mathematics TEKS (Data Analysis)
  - Confirm Card Sort

What is it we expect teachers to learn? Vertical Alignment of SEs (Card Sort)

(Representing Data/Drawing Conclusions & Solving Problems Using Representations of Data)

Card A The student is expected to solve one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot.	Card B The student is expected to summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals.
Card C The student is expected to solve one- and two-step problems using data in whole number, decimal, and fraction form in a frequency table, dot plot, or stem-and-leaf plot.	Card D The student is expected to draw conclusions and generate and answer questions using information from picture and bar-type graphs.
Card E The student is expected to use data to create real-object and picture graphs.	Card F The student is expected to represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.
Card G The student is expected to draw conclusions from real-object and picture graphs.	Card H The student is expected to solve one- and two-step problems using categorical data represented with a frequency table, dot plot, pictograph, or bar graph with scaled intervals.
Card I The student is expected to organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.	Card J The student is expected to use data to create picture and bar-type graphs.
Card K The student is expected to draw conclusions and make predictions from information in a graph. The student is expected to write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one.	Card L The student is expected to represent data on a frequency table, dot plot, or stem-and-leaf plot marked with whole numbers and fractions.

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- What is it we expect teachers to learn?
  - Kindergarten

Card E	Card G
K.8B The student is expected to use data to create real-object and picture graphs.	**K.8C The student is expected to draw conclusions from real-object and picture graphs.**

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect teachers to learn?
  - Grade 1

Card J	Card D
1.8B The student is expected to use data to create picture and bar-type graphs.	**1.8C The student is expected to draw conclusions and generate and answer questions using information from picture and bar-type graphs.**

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- What is it we expect teachers to learn?
  - Grade 2

Card I	Card K
2.10B The student is expected to organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.	**2.10D The student is expected to draw conclusions and make predictions from information in a graph.** **2.10C The student is expected to write and solve one-step word problems involving addition or subtraction using data represented within pictographs and bar graphs with intervals of one.**

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect teachers to learn?
  - Grade 3

Card B	Card H
3.8A The student is expected to summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals.	**3.9B The student is expected to solve one- and two-step problems using categorical data represented with a frequency table, dot plot, pictograph, or bar graph with scaled intervals.**

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- What is it we expect teachers to learn?
  - Grade 4

Card L	Card C
4.9A The student is expected to represent data on a frequency table, dot plot, or stem-and-leaf plot marked with whole numbers and fractions.	**4.9B The student is expected to solve one- and two-step problems using data in whole number, decimal, and fraction form in a frequency table, dot plot, or stem-and-leaf plot.**

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- What is it we expect teachers to learn?
  - Grade 5

Card F	Card A
5.9A The student is expected to represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.	**5.9C The student is expected to solve one- and two-step problems using data from a frequency table, dot plot, bar graph, stem-and-leaf plot, or scatterplot.**

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- What is it we expect teachers to learn?
  - Think, Pair, Share:
    - So … what will teachers need to learn?

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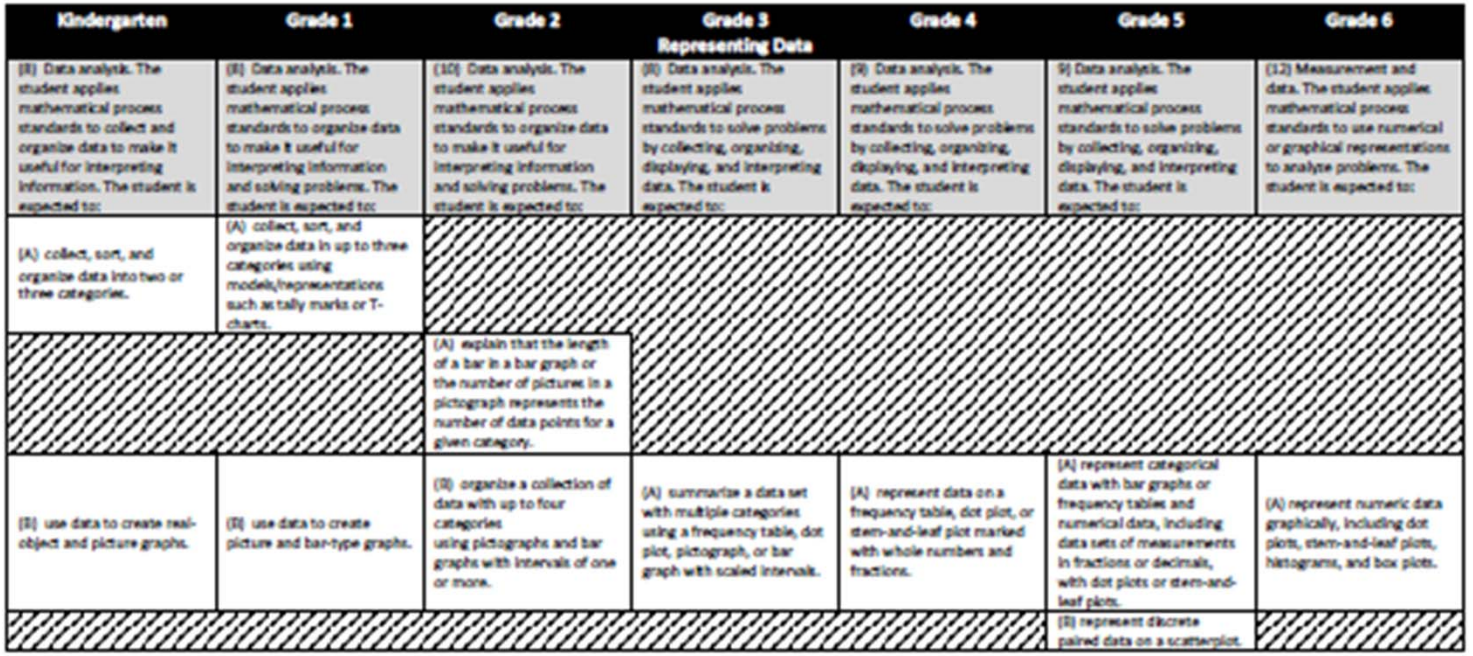
- What is it we expect teachers to learn?
  - What will teachers need to do?
    - Examine Vertical Alignment
      - TEA Vertical Alignment Documents http://tinyurl.com/p2rqc2e



Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
			Representing Data			
(8) Data analysis. The student applies mathematical process standards to collect and organize data to make it useful for interpreting information. The student is expected to:	(8) Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:	(10) Data analysis. The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:	(8) Data analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data. The student is expected to:	(9) Data analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data. The student is expected to:	9) Data analysis. The student applies mathematical process standards to solve problems by collecting, organizing, displaying, and interpreting data. The student is expected to:	(12) Measurement and data. The student applies mathematical process standards to use numerical or graphical representations to analyze problems. The student is expected to:
(A) collect, sort, and organize data into two or three categories.	(A) collect, sort, and organize data in up to three categories using models/representations such as tally marks or T-charts.					
		(A) explain that the length of a bar in a bar graph or the number of pictures in a pictograph represents the number of data points for a given category.				
(B) use data to create real-object and picture graphs.	(B) use data to create picture and bar-type graphs.	(B) organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.	(A) summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals.	(A) represent data on a frequency table, dot plot, or stem-and-leaf plot marked with whole numbers and fractions.	(A) represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots.	(A) represent numeric data graphically, including dot plots, stem-and-leaf plots, histograms, and box plots.
					(B) represent discrete paired data on a scatterplot.	

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- What is it we expect teachers to learn?
  - What will teachers need to do?
    - Examine Curriculum Focal Points
      - TEA Curriculum Focal Point Documents http://tinyurl.com/mfy6xgg

TEXAS RESPONSE TO CURRICULUM FOCAL POINTS FOR GRADE 3 MATHEMATICS REVISED 2013	
Understanding and applying place value and properties of operations to solve problems involving addition and subtraction of whole numbers within 1,000 Students extend their understanding of the base-10 system to numbers up to 100,000 and represent addition and subtraction of numbers within 1,000 using pictorial models, number lines, and equations. They use efficient, accurate, and generalizable methods based on place value, properties of operations, and the relationship between addition and subtraction to solve problems involving addition and subtraction of whole numbers within 1,000.	
Related Grade 3 TEKS:	
3(1)(A)-(G)	The student uses mathematical processes to acquire and demonstrate mathematical understanding.
3(2)(A)	The student is expected to compose and decompose numbers up to 100,000 as a sum of so many ten thousands, so many thousands, so many hundreds, so many tens, and so many ones using objects, pictorial models, and numbers, including expanded notation as appropriate.
3(2)(B)	The student is expected to describe the mathematical relationships found in the base-10 place value system through the hundred thousands place.
3(2)(C)	The student is expected to represent a number on a number line as being between two consecutive multiples of 10; 100; 1,000; or 10,000 and use words to describe relative size of numbers in order to round whole numbers.
3(2)(D)	The student is expected to compare and order whole numbers up to 100,000 and represent comparisons using the symbols >, <, or =.
3(4)(A)	The student is expected to solve with fluency one-step and two-step [multi-step] problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction.
3(4)(B)	The student is expected to round to the nearest 10 or 100 or use compatible numbers to estimate solutions to addition and subtraction problems.
3(4)(C)	The student is expected to determine the value of a collection of coins and bills.
3(5)(A)	The student is expected to represent one- and two-step problems involving addition and subtraction of whole numbers to 1,000 using pictorial models, number lines, and equations.
3(7)(C)	The student is expected to determine the solutions to problems involving addition and subtraction of time intervals in minutes using pictorial models or tools such as a 15-minute event plus a 30-minute event equals 45 minutes.
3(8)(A)	The student is expected to summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals.
3(8)(B)	The student is expected to solve one- and two-step problems using categorical data represented with a frequency table, dot plot, pictograph, or bar graph with scaled intervals.

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- What is it we expect teachers to learn?
  - What will teachers need to do?

"Instructional time is then measured not by exposure to individual student expectations, but to engagement in building the connections among the groups of student expectations to provide the important foundational mathematical understandings."

Texas Response to the Curriculum Focal Points (TEA, 2013) pg. 2, 3

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- What is it we expect teachers to learn?
  - Why?
    - "You need to know where the topic fits in the full span of the mathematics curriculum."
    - "Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well."

Developing Essential Understanding of Addition & Subtraction (NCTM, 2011) pg. vii
Principles and Standards for School Mathematics (NCTM, 2000) pg. 16

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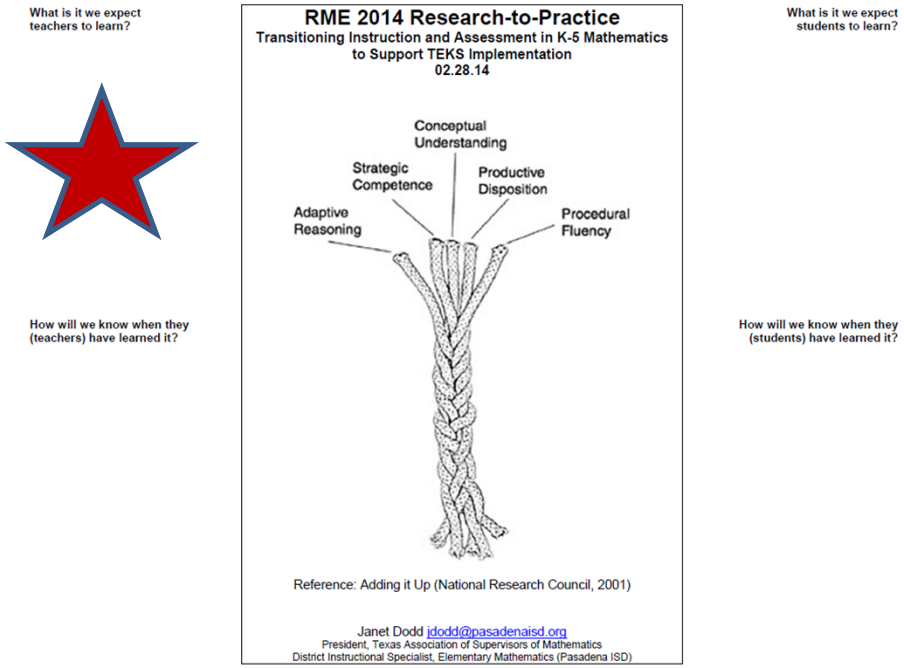
- What is it we expect teachers to learn?
  - Individual Reflections: What does this mean for me and the role in which I serve?



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- How will we know when they (teachers) have learned it?
  - Response Cards: Agree/Disagree
  - Partner Talk: Justify your response

Agree

Disagree

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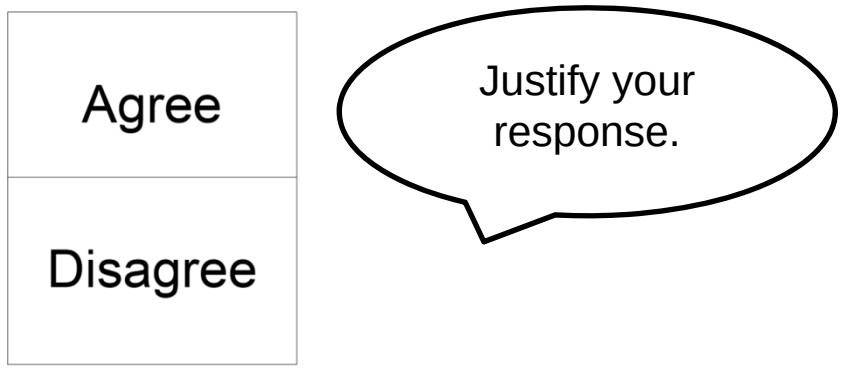
- How will we know then they (teachers) have learned it?
  - While engaging students in lessons, the teacher anticipates the students' perplexities, helps the students avoid known pitfalls, and recognizes and dispels misconceptions.



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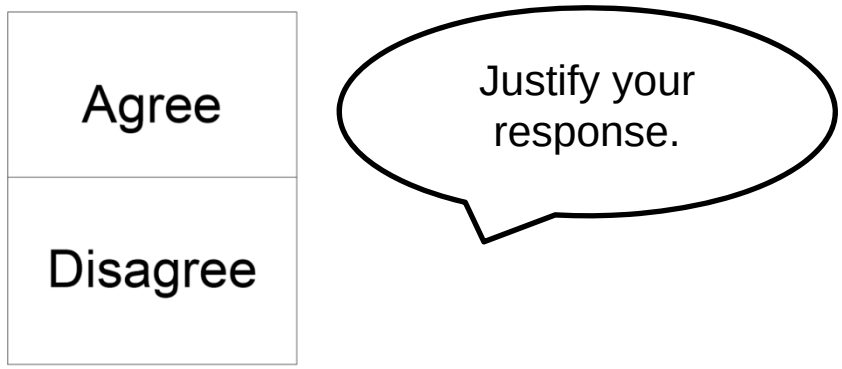
- How will we know when they (teachers) have learned it?
  - The teacher's understanding is sufficiently versatile and allows him/her to represent the mathematics in different ways to students who didn't understand it the first time.



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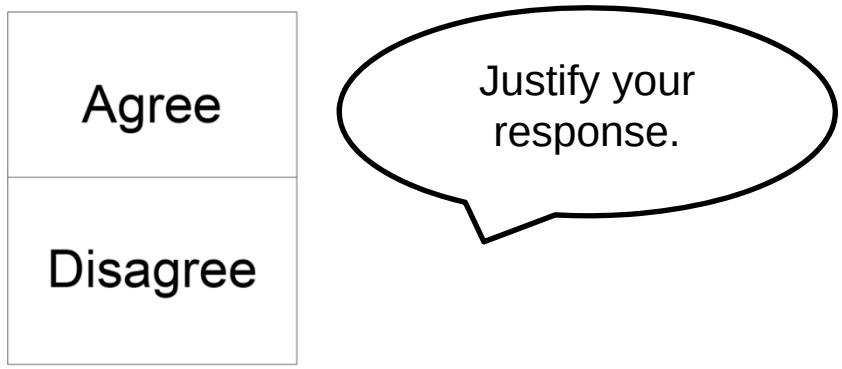
- How will we know then they (teachers) have learned it?
  - The teacher chooses “good” problems – ones that invite exploration of an important mathematical concept and allow students the chance to solidify and extend their knowledge.



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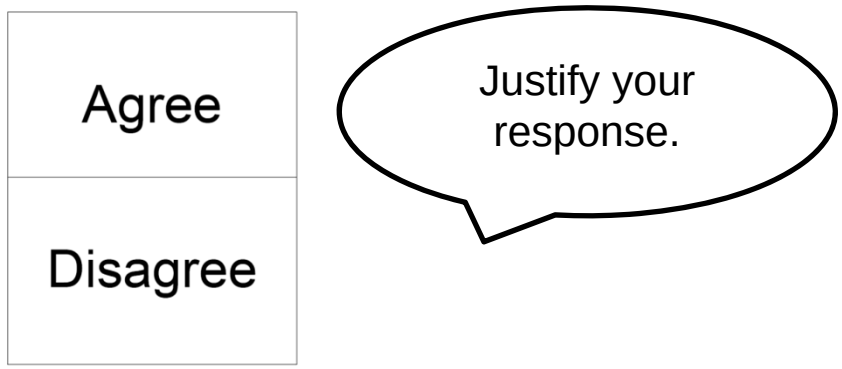
- How will we know then they (teachers) have learned it?
  - As the teacher chooses and implements learning tasks, he/she knows what to emphasize and why those ideas are mathematically important.



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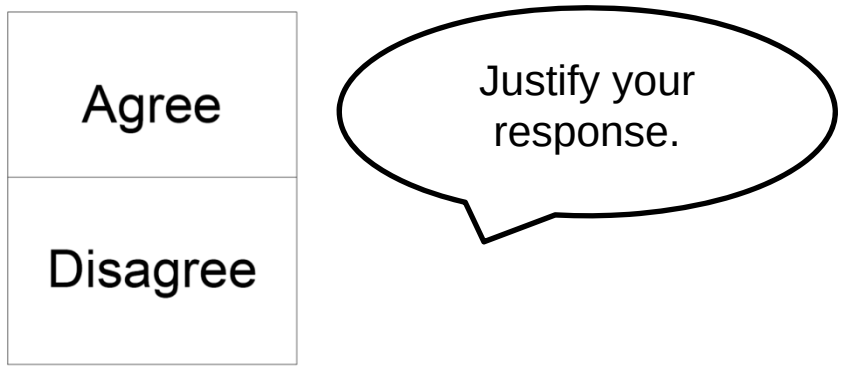
- How will we know when they (teachers) have learned it?
  - The students are using a variety of representations, such as pictures, tables, graphs, and words for their mathematical thinking.



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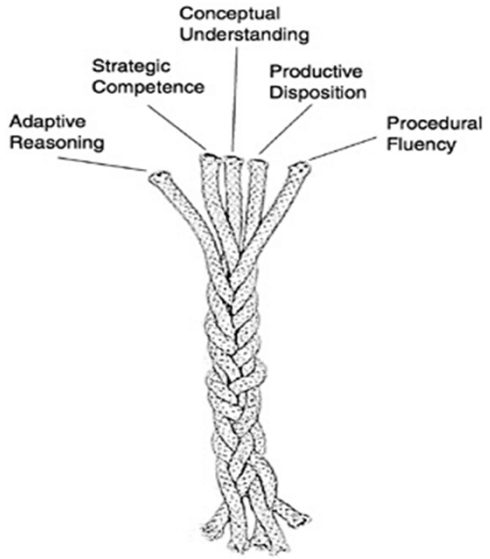
- How will we know then they (teachers) have learned it?
  - Think, Pair, Share:
    - So … how will we know when they (teachers) have learned it?

Developing Essential Understanding of Addition & Subtraction (NCTM, 2011) pg. vii
Administrator's Guide: How to Support and Improve Mathematics Education in Your School (NCTM, 2003) pg. 9

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (teachers) have learned it?
  - What will teachers do?
    - Develop Mathematical Proficiency



Adding it Up (National Research Council, 2001)

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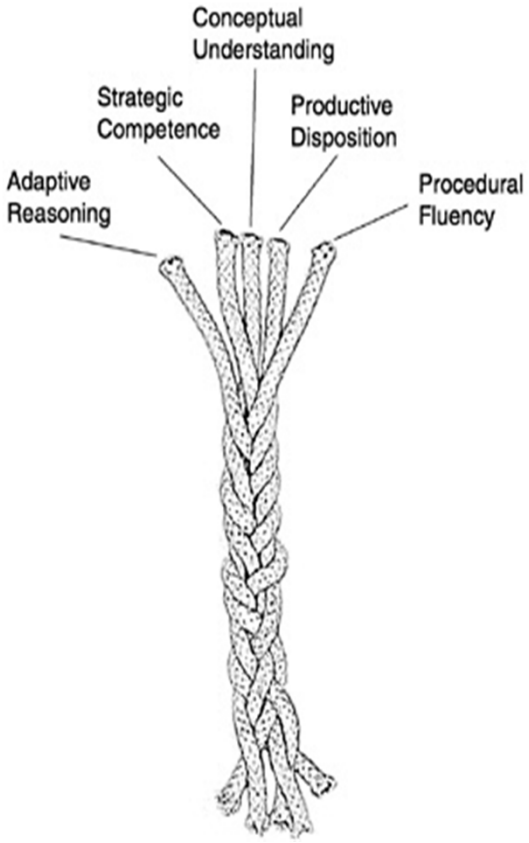
- Mathematical Proficiency



Conceptual Understanding: comprehension of mathematical concepts, operations, and relations

Procedural Fluency: skill in carrying out procedures flexibly, accurately, efficiently, and appropriately

Strategic Competence: ability to formulate, represent, and solve mathematical problems

Adaptive Reasoning: capacity for logical thought, reflection, explanation, and justification

Productive Disposition: habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy

Adding it Up (National Research Council, 2001)
http://www.nap.edu/openbook.php?record_id=9822&page=5

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (teachers) have learned it?
  - What will teachers do?
    - Work Collaboratively
      - Share teaching strategies and analysis of the effectiveness of those strategies
      - Acquire information from common assessments in order to (1) inform individual and collective practice and (2) respond to students who need additional time and support

NCSM Position Paper “Improving Student Achievement by Leading Effective and Collaborative Teams of Mathematics Teachers”
Learning by Doing (DuFour, DuFour, Eaker, & Many, 2010) pg. 250

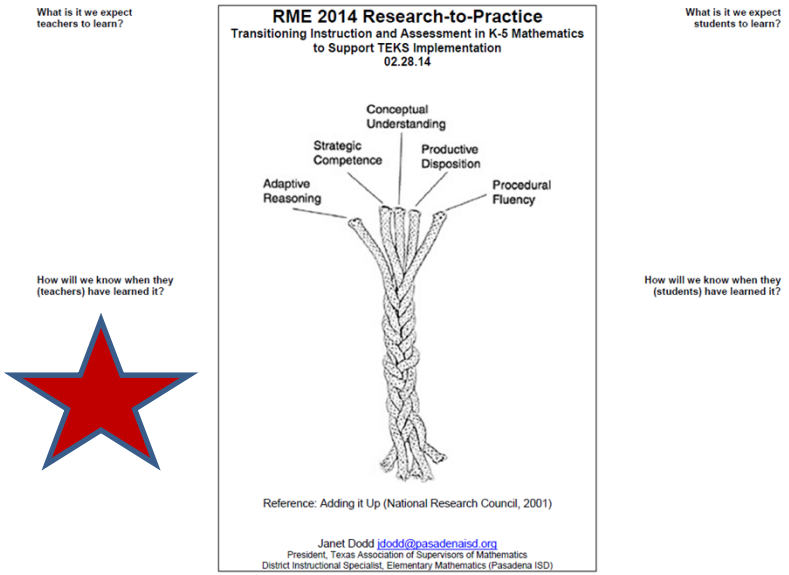
Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (teachers) have learned it?
  - What will teachers do?
    - Work Collaboratively
      - Provide multiple opportunities for students to demonstrate learning
      - Utilize PLC guiding questions
        - **What do we expect each student to learn?**
        - **How will we know when each student has learned it?**

NCSM Position Paper “Improving Student Achievement by Leading Effective and Collaborative Teams of Mathematics Teachers”
Learning by Doing (DuFour, DuFour, Eaker, & Many, 2010) pg. 250

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (teachers) have learned it?
  - Individual Reflections: What does this mean for me and the role in which I serve?



Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - Card Sort: Operations

K	1	2	3	4	5

Card	Big Ideas

Card A **Grade Level(s):**

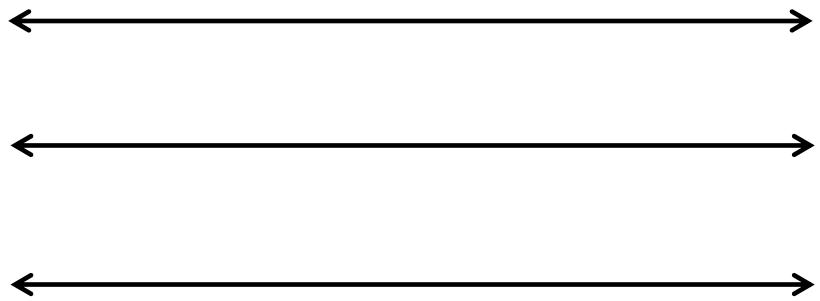
- Use counters to solve the word problem below.

Maria had 4 counters. Her teacher gave her 5 more counters. How many counters does Maria have now?

- Record a picture that shows your strategy.
- Record a number sentence that represents your strategy.
- Record words that describe your strategy.

Card B **Grade Level(s):**

- Record three different ways to use an open number line to determine the sum of 125+375.



Card C **Grade Level(s):**

- Record your solution to the problems below.

296 ×53	9,407÷32=

Card D **Grade Level(s):**

- Record at least two different ways to determine the sum of the numbers below.

19+42+27+51

Strategy 1	Strategy 2

Card E **Grade Level(s):**

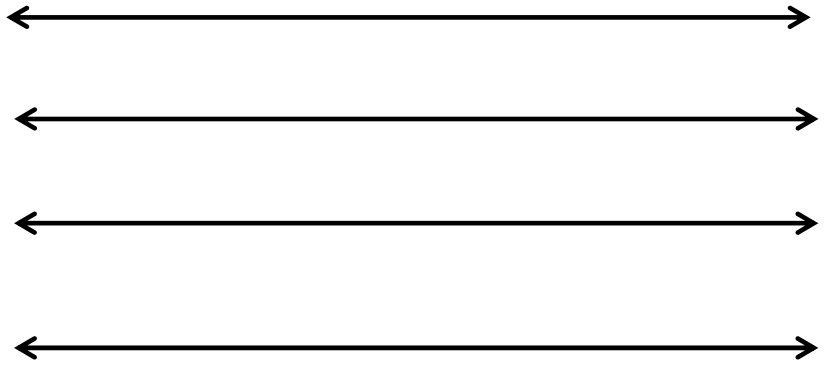
- Record six different ways to determine the product of:

6×4

Repeated Addition	Equal-Sized Groups	Arrays
Area Models	Number Line	Skip-Counting

Card F **Grade Level(s):**

- Record four different ways to use an open number line to determine the difference of $59 - 32$.



Card G **Grade Level(s):**

- Record four different ways to determine the product of:

32×5

Standard Algorithm	Partial Products
Associative Property	Distributive Property

Card H **Grade Level(s):**

- Record at least two different ways to determine the solution to the problem below.

Ms. Zamora had 500 counters. 125 counters were red, 175 counters were green, and the rest of the counters were blue. How many counters were blue?

Strategy 1	Strategy 2

Card I **Grade Level(s):**

- Record four different ways to determine the product of:

32×25

Standard Algorithm	Partial Products
Associative Property	Distributive Property

Card J **Grade Level(s):**

- Use counters to solve the word problem below.

Caden had 8 counters. His teacher gave him some more counters. Now he has 17 counters on his desk. How many counters did Caden's teacher give him?

- Record a picture that shows your strategy.

- Record a number sentence that represents your strategy.

- Record words that describe your strategy.

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - Confirm Card Sort

Grade	K	1	2	3	4	5
Card(s)	A	J	D, F, H	B, E, G, H	I	C

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - Process Standards (2012 Mathematics TEKS)
    - Turn & Talk: What in the process standards supports these instructional activities?

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
(1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:						
(A) apply mathematics to problems arising in everyday life, society, and the workplace.						
(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.						
(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems.						
(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.						
(E) create and use representations to organize, record, and communicate mathematical ideas.						
(F) analyze mathematical relationships to connect and communicate mathematical ideas.						
(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.						

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- What is it we expect students to learn?
  - Think, Pair, Share:
    - So … what will students need to learn?

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - What will students do?
    - K.2(I) Compose and decompose numbers up to 10 with objects and pictures
    - 1.3(D) Apply basic fact strategies to add and subtract within 20, including making 10 and decomposing a number leading to a 10
    - 2.4(B) Add up to four two-digit numbers and subtract two-digit numbers using mental strategies and algorithms based on knowledge of place value and properties of operations;

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - What will students do?
    - 3.5(A) Represent one- and two-step problems involving addition and subtraction of whole numbers to 1,000 using pictorial models, number lines, and equations;
    - 4.4(D) Use strategies and algorithms, including the standard algorithm, to multiply up to a four-digit number by a one-digit number and to multiply a two-digit number by a two-digit number. Strategies may include mental math, partial products, and the commutative, associative, and distributive properties;
    - 5.3(B) Multiply with fluency a three-digit number by a two-digit number using the standard algorithm;

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - What will students do?
    - Compose/Decompose Numbers
      - "Number sense develops as students understand the size of numbers, develop multiple ways of thinking about and representing numbers, use numbers as referents, and develop accurate perceptions about the effects of operations on numbers."
        Principles and Standards for School Mathematics (NCTM, 2000) pg. 80
      - "Taking numbers apart and recombining them in flexible ways is a significant skill for computation."
        Elementary and Middle School Mathematics (Van de Walle, 2004) pg. 178

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- What is it we expect students to learn?
  - What will students do?
    - Flexible Strategies/Thinking
      - "Invented strategies are grounded in students' understanding of number, and they support and reflect the students' mathematical proficiency."
      - "Research suggests that students who use invented strategies prior to any standard algorithm have a better grasp of place value and are more flexible in using prior knowledge to extend it to novel situations and problems."

Developing Essential Understanding of Addition & Subtraction (NCTM, 2011) pg. 75-76

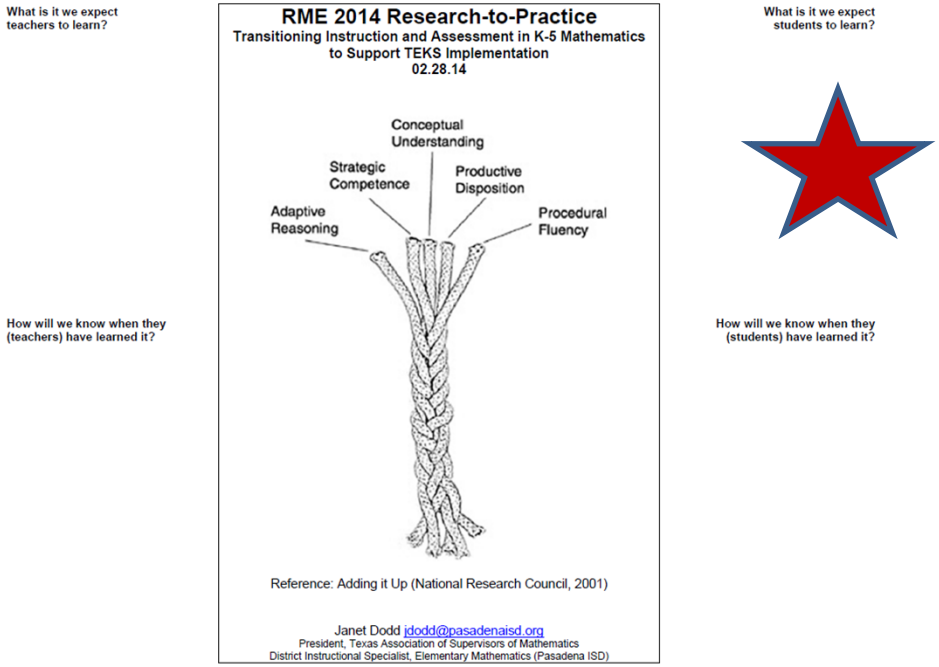
Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - Why?
    - “Developing number sense, understanding number and operations, and gaining fluency in arithmetic computation form the core of mathematics education for the elementary grades.”

Principles and Standards for School Mathematics (NCTM, 2000) pg. 32

Transitioning Instruction and Assessment in K-5 Mathematics

- What is it we expect students to learn?
  - Individual Reflections: What does this mean for me and the role in which I serve?



Transitioning Instruction and Assessment in K-5 Mathematics

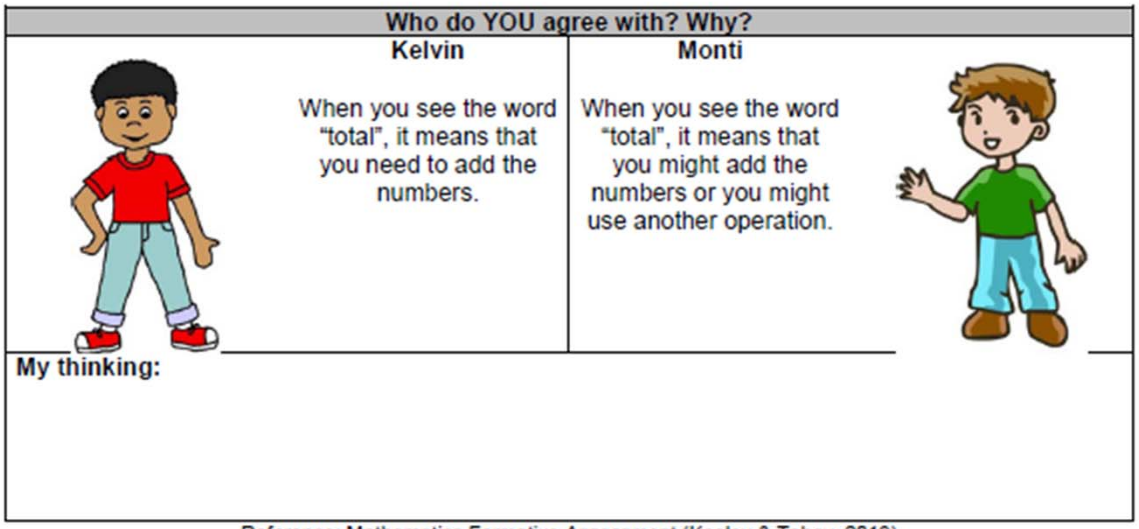
- How will we know when they (students) have learned it?
  - Formative Assessment: A&D Statements

A&D Statements: What Do You Think?	How Could You Find Out?
1. If two fractions have the same denominator, the fraction with the greatest numerator is the larger fraction. Agree | Disagree | It Depends | Not Sure My thinking:	
2. If two fractions have the same numerator, the fraction with the greatest denominator is the larger fraction. Agree | Disagree | It Depends | Not Sure My thinking:	
3. The larger the denominator, the greater the fraction. The smaller the denominator, the smaller the fraction. Agree | Disagree | It Depends | Not Sure My thinking:	

Reference: Mathematics Formative Assessment (Keeley & Tobey, 2013)

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - Formative Assessment: Opposing Views

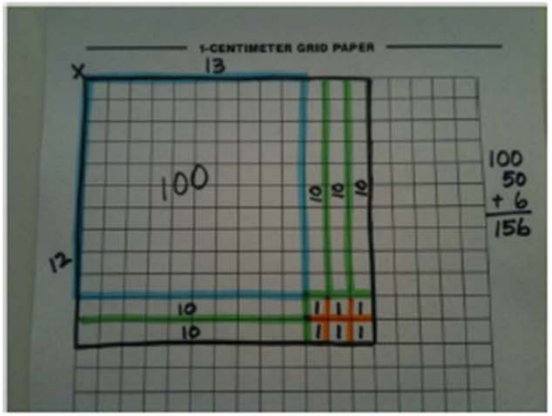


Reference: Mathematics Formative Assessment (Keeley & Tobey, 2013)

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - Formative Assessment: A Picture Tells a 1,000 Words

A Picture is Worth a 1,000 Words



What were you doing? What did you learn?

Reference: Mathematics Formative Assessment (Keeley & Tobey, 2013)

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - Academic Language: Novice/Expert

Novice/Expert	
Novice	**Expert**
• How do you …? • What is …? • I don't understand why you …?	• The first step is … • It is important to … • Let me clarify that for you …

STAAR 2013 Released Assessment Grade 4 (Current SE 4.4E)

9 Terrell spent $306 on a television and 3 video games. He spent $243 on the television. Each video game was the same price. How much did Terrell spend on each video game?

STAAR 2013 Released Assessment Grade 3 (Current SE 3.4B)

32 Willis has 5 bags of marbles that have 18 marbles each. He also has 3 bags of marbles that have 13 marbles each. What is the total number of marbles in these 8 bags?

Reference: 38 Great Academic Language Builders (Seidlitz & Kenfield, 2011)

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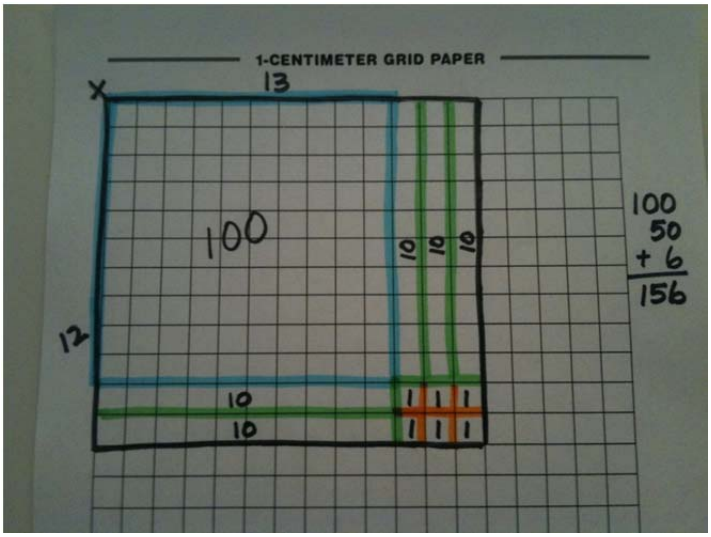
3. The larger the denominator, the greater the fraction. The smaller the denominator, the smaller the fraction. Agree | Disagree | It Depends | Not Sure My thinking:	

Reference: Mathematics Formative Assessment (Keeley & Tobey, 2013)

Who do YOU agree with? Why?			
	**Kelvin** When you see the word "total", it means that you need to add the numbers.	**Monti** When you see the word "total", it means that you might add the numbers or you might use another operation.	
My thinking:			

Reference: Mathematics Formative Assessment (Keeley & Tobey, 2013)

A Picture is Worth a 1,000 Words



What were you doing? What did you learn?

Reference: Mathematics Formative Assessment (Keeley & Tobey, 2013)

Novice/Expert

Novice	Expert
• How do you …? • What is …? • I don't understand why you …?	• The first step is … • It is important to … • Let me clarify that for you …

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Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - Process Standards (2012 Mathematics TEKS)
    - Turn & Talk: What in the process standards supports these assessment activities?

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - Think, Pair, Share
    - So … how will we know when they (students) have learned it?

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - What will students do?

"(use formative assessment to) … monitor their own learning by helping them predict outcomes, explain ideas to themselves, note areas where they have difficultly understanding mathematical concepts, activate prior knowledge and background information, and recognize experiences that help or hinder their learning."

Mathematics Formative Assessment (Tobey, 2011) pg. 7

Transitioning Instruction and Assessment in K-5 Mathematics

"Assessment and instruction are often conceived as curiously separate in both time and purpose. The key to high-quality formative assessment is to intertwine the two. What teachers and students need is assessment and instruction that are conceived as a unit, employed as a unit, and applied as a unit."

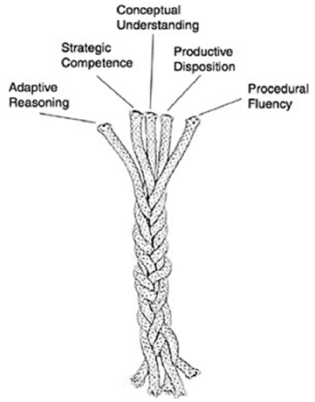
Graue (1993, pg. 4) in Greenstein (2010, pg. 24)

Transitioning Instruction and Assessment in K-5 Mathematics

- How will we know when they (students) have learned it?
  - Individual Reflections: What does this mean for me and the role in which I serve?

What is it we expect teachers to learn?

RME 2014 Research-to-Practice
Transitioning Instruction and Assessment in K-5 Mathematics to Support TEKS Implementation
02.28.14



Reference: Adding it Up (National Research Council, 2001)

Janet Dodd jdodd@pasadenaisd.org
President, Texas Association of Supervisors of Mathematics
District Instructional Specialist, Elementary Mathematics (Pasadena ISD)

What is it we expect students to learn?

How will we know when they (teachers) have learned it?

How will we know when they (students) have learned it?

Transitioning Instruction and Assessment in K-5 Mathematics

- Goal
  - "Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. … Teachers help students make, refine, and explore conjectures on the basis of evidence and use a variety of reasoning and proof techniques to confirm or disprove those conjectures. … Students are flexible and resourceful problem solvers. … (Students) value mathematics and engage actively in learning it."

Principles and Standards for School Mathematics (NCTM, 2000) pg. 3

Transitioning Instruction and Assessment in K-5 Mathematics

- Goal
  - Explore how two of the four critical PLC (Professional Learning Communities) questions
    - **What do we expect each student to learn?**
    - **How will we know when each student has learned it?**

    can be used to transition our curriculum, instruction, and assessment to the 2012 Revised Mathematics TEKS.
    - So that we don't have to imagine …