Math In Focus, a Comprehensive Approach

0011 0010 1010 1101 0001 0100 1011

TDS Lower School Math Program

Presenter: Kelly Aguilar, 2/2016

Math Teaching: a VERY Brief History

- **Skill based instruction**
  - memorize and recall facts and procedures, develop computational skills.
  - Listen to teacher, fill out worksheets

1989 – NCTM declares,

"Promote Thinking rather than rule memorizing."

- **Whole language approach**
  - explain how you arrive at solutions, consider more than one way of solving problems.
  - Exploratory group work, not given rules/formulas, no clear repetition of strategies/reasoning from problem to problem.

Math in Focus

- *Research suggests it is not necessary for teachers to focus first on skill development and then move on to problem-solving. Both can be done together.*
  (Grouws, NCTM Achievement Award)

- Math in Focus is an authentic Singapore Math® curriculum—with problem solving as the center of math learning and concepts taught with a concrete–pictorial–abstract learning progression through real-world, hands-on experiences.

Math in Focus: Two – Fold

Derived from Singapore Math

- Mastering a limited number of concepts per year
- Sequence of Topics come from Child Development Research
- Includes a "Pictorial" piece.
- Adapted for US
  - Tech Cmpnt, Differentiated Instruction

Concrete – Pictorial - Abstract

Example:

Learning how to Add (K or 1): 6 + 4?

Past at TDS:

- Use unit cubes and/or tens frame (Concrete)
- 6 + 4 = 10 (Abstract)

Present at TDS:

- Use unit cubes/tens frame. (Concrete)
- Draw Number Bonds (Pictorial)
  - Reveal Commutative Property
  - Composing/Decomposing #
- 6 + 4 =10 (Abstract)

HOW (Skill) it works + WHY (Conceptual) it works = MASTERY

Content: TK – 2

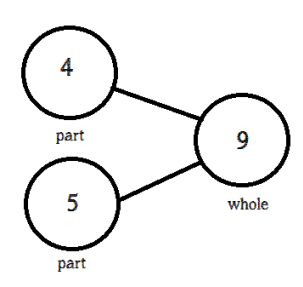
- Building a foundation
  - What mathematics is.
  - What it means to understand and “do” math.

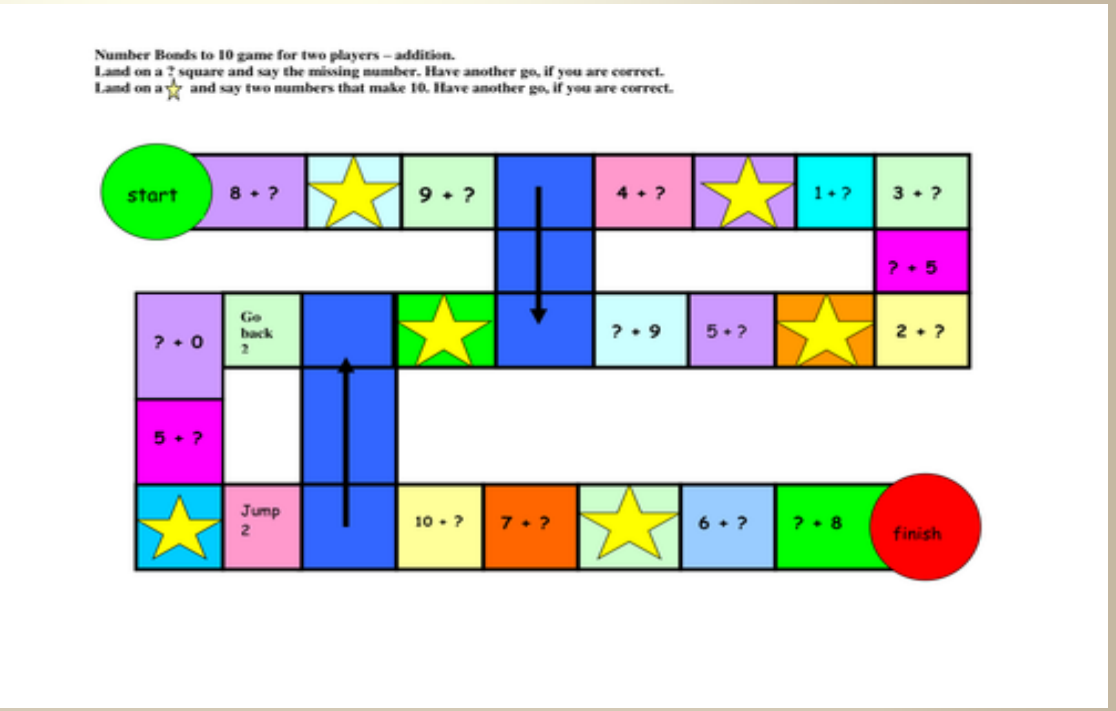
- Umbrella topics
  - Patterns (repeating, calendar, classifying, sorting, counting, graphs)
  - Measurement (length, weight, time, money)
  - Number Sense (composition/decomposition of number, addition & subtraction fluency (basic facts), place value through thousands, computation algorithms

Teaching Tools for K – 2

- Tens Frame

- Number Bonds





- Songs, Games, Smart Board Activities, Texts (1-2), Individual Workbooks (All), Manipulatives, Whole and Small Group Instruction, Centers, Periodic Assessments, Supplemental Resources

Content: 3 – 5

0011 0010 1010 1101 0001 0100 1011

Questioning and Investigating

- Skill fluency and consolidation
  - 4 arithmetic operators relate (+ , – , x, ÷)
- Emphasis on Problem Solving
- Depth of understanding in preparation for algebra

Umbrella Topics

- Fractions, Decimals, Ratios, Proportional Reasoning
- Expressions, equations, inequalities

Teaching Tools for 3 – 5

0011 0010 1010 1101 0001 0100 1011

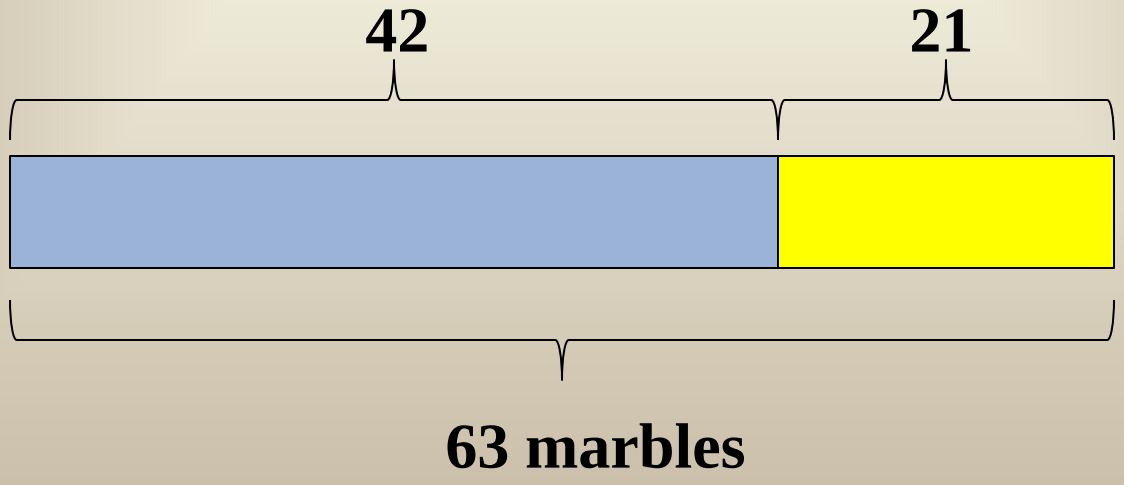
- Manipulatives, Text, Workbooks, games, centers, SmartBoard activities, Math Journals, Calculator, online component, Supplemental Resources (Math Superstars, etc.), Bar Modeling

- For Problem Solving:
  - Students receive coaching/modeling for framework
  - Repetition in strategies, vocabulary

Bar Modeling: 2nd – 5th Grades

- Example from Grade 2

  Grace has 42 marbles and Tony has 21 marbles. How many do they have together?

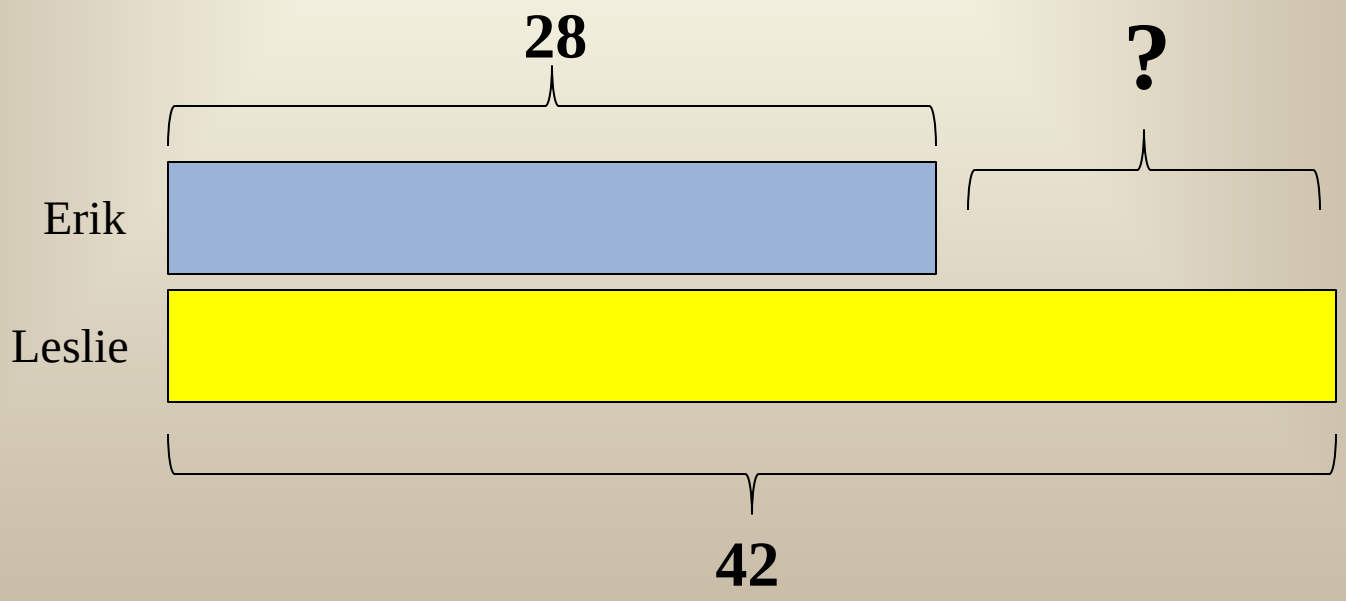


Leading to: 42 + 21 = ? ⟶ 42 + 21 = *x*

A little more depth…

- Example from Grade 3

  Erik has 28 balloons and Leslie has 42 balloons. How many more balloons does Leslie have?



$42 - 28 = ?$ OR $28 + ? = 42$

Teaching Subtraction

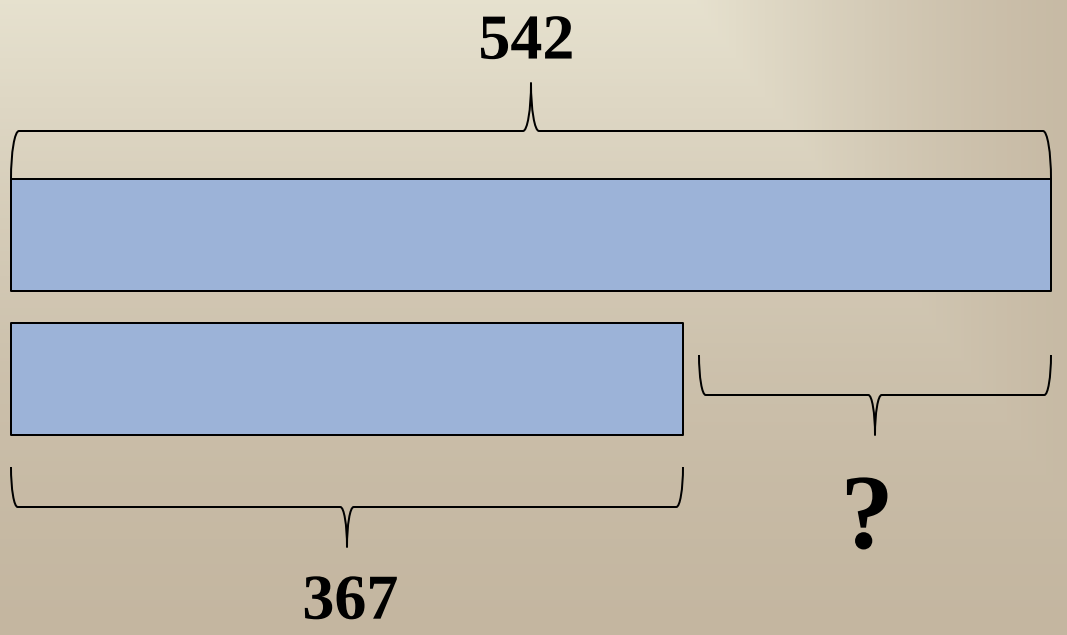
542 – 367 = ?

Concrete: Using your chart and chips

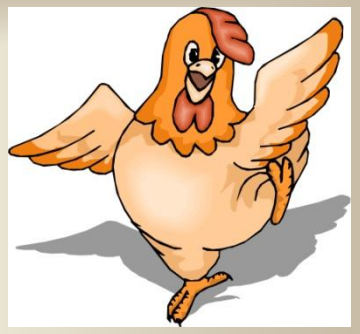
Abstract: 542 **REGROUP** (not borrow)

– 367

Bar Modeling:



Your Turn!



0011 0010 1010 1101 0001 0100 1011

Kindergarten

A farmer has chickens and cows. He has 10 animals in all. If he has the same number of chickens and cows, how many of each does he have? (Tens Frame)

1st Grade

A farmer has 14 animals. 8 are chickens. How many are cows? (Number bonds)

A farmer has 165 cows. He has 84 more cows than chickens.

0011 0010 1010 1101 0001 0100 1011

2nd Grade

How many chickens does he have? (bar modeling)

3rd Grade

How many animals does he have all together?

(bar modeling: 2-step)

Bar Modeling with fractions

4th Grade

A farmer has a total of 42 chickens and cows. He has 5 times as many chickens as cows. How many more chickens than cows does he have?

5th Grade

A farmer has twice as many cows as chickens. One unfortunate morning, the farmer realized that 3/8 of his animals ran away. He counted 120 animals left. How many chickens did he have before any ran away?

Content Progression

0011 0010 1010 1101 0001 0100 1011

- Developing Early Number Sense (TK,K)
- Number Bonds (K, 1)
- Numbers Greater than 10 (1, 2)
- Place Value (1, 2, 3)
- Addition (1, 2, 3, 4)
- Subtraction (1, 2, 3, 4, 5)
- Multiplication (2, 3, 4, 5)
- Division (3, 4, 5)

How can you support your child's math education?

- Learn the vocabulary – it may be different from when you were learning math (number bonds, tens frames, regroup, bar modeling, etc.).
- Take natural opportunities to discuss math together (speed limits while driving, cooking, etc.).
- Allow him/her to do hw independently.
  - *Encourage them to check their work and ask themselves, "do my answers make sense?"*
- Ask him/her questions if needed.
  - *Can you show me? Can you explain this? What is the difference between….? Can you teach me what you know?*