Welcome back to Erikson Early Math iNNOVATIONS!

Please place your name card somewhere in our attendance rack.

How many people are here today?

Content Focus

- October: *Numerosity & Number Sense*
- November: *Counting, Cardinality & Number Sense*
- January: *Number Composition*

Strategy Focus

- October: *Turn & Talk*
- November & January: *Learners rephrase other learners' thinking*

Focus for Today

- Content: ***Number Operations***

- Strategy: ***Sharing multiple solutions or strategies without comment***

What are ***operations***?

All operations tell a story.

Basic Types of Addition & Subtraction Number Stories

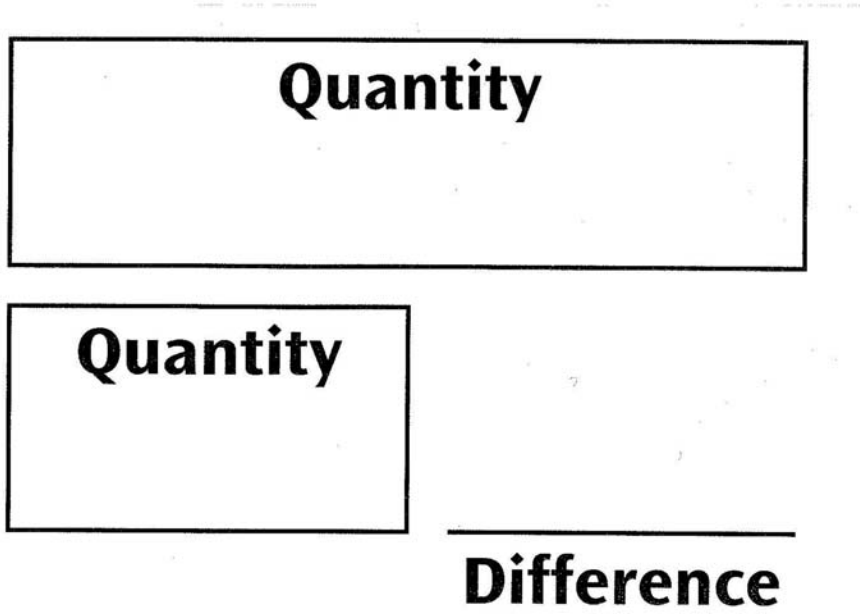
- Change Situations
  - Join
  - Separate
- Relationships
  - Compare
  - Part-Part-Whole

By varying the unknown within each type of number story, many different problem situations can be constructed.

Change Situation

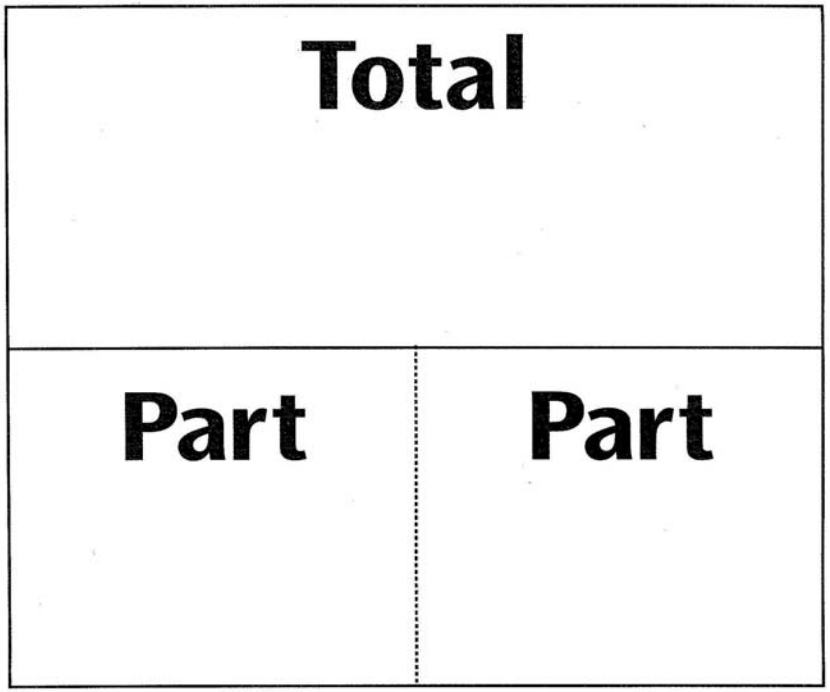
- Result Unknown - *How many in the end?*
- Change Unknown - *How many were added or taken away?*
- Start Unknown - *How many were there at first?*

Comparison Situation



- Difference Unknown - *How many more or less?*
- Quantity Unknown - *How many in the set?*

Part-Part-Whole Situation



- Whole Unknown - *How many altogether?*
- Part Unknown - *How many to complete the whole?*

Children's Solution Strategies

- Direct Modeling Strategies
  - Use of objects (manipulatives), fingers or drawings to directly model the action or relationship described in the problem
- Counting Strategies
  - Use the counting sequence itself to figure out the solution
  - Usually involves a strategy to keep track of counts
- Derived Facts Strategies
  - Use "friendly" numbers first: doubles, sums of tens
  - Over time, children learn many number facts at recall level

Focus Strategy:
Sharing multiple solutions or strategies without comment

- Why is it effective?
- How does it develop children's thinking, problem solving & communication?
- How can you make it work for mathematics in your classroom?

Big Ideas about Operations

Topic	Big Ideas	Examples
Joining & Separating 	•A collection can be made larger by adding items to it and made smaller by taking some away from it.	*•You have 2 balls and I have 3 balls. How many balls do we have altogether?* *•You had 60 cards, and you gave your friend 5. How many do you have now?*
Grouping & Partitioning 	•One can quantify a collection by grouping items into equal sets.	*•Chris has 2 boxes of crayons with 4 in each box. How many crayons does Chris have altogether?* *•There are 20 children in the 2nd grade class. Sandy brings 40 cookies so each child can have two.* *•How many hands does it take to show 20 fingers?* *•How can 3 children share 9 toy cars fairly?*
Composing & Decomposing 	•A quantity (whole) can be "broken apart" (decomposed) into parts, and the parts can be combined (composed) to form the whole.	*•How many ways can you show 5 with fingers on both hands?* *• 100 can be 50 & 50 or 70 & 30 or 90 & 10.*
Comparing 	•When comparing quantities, there are two possible results – equality or greater than/less than.	*•I have a handful of raisins; Chris has a bowl-ful. Chris has more!* *•I have 1 pear and 1 peach; you have 2 apples. We have the same number of fruits.* *•Avery has 3 dirty plates, and Tracy has 4 dirty bowls. Who has fewer dishes to wash?* *•There are 6 fish and 3 snails in our aquarium. We have twice as many fish as snails.*
Solving Problems 	•The four arithmetic operations (addition, subtraction, multiplication & division) are tools for solving problems about numbers. •In order to choose which operation to use, the solver must understand what is happening in the problem situation.	*•There is usually more than one way to solve the same problem. For example, subtraction or counting up are equally valid ways to find the difference between two numbers.* *•All word problems tell a story.*

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Using good books to help students explore numerosity & number sense

- Where's the math in the book?
  - What are the Big Ideas?
- How can you bring the math out of the book?
  - What kind of activities could you use to develop children's thinking about the math of the book?