FUN-damental mathematics in Pre-Kindergarten

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Math Everywhere

Read ABC of Early Math

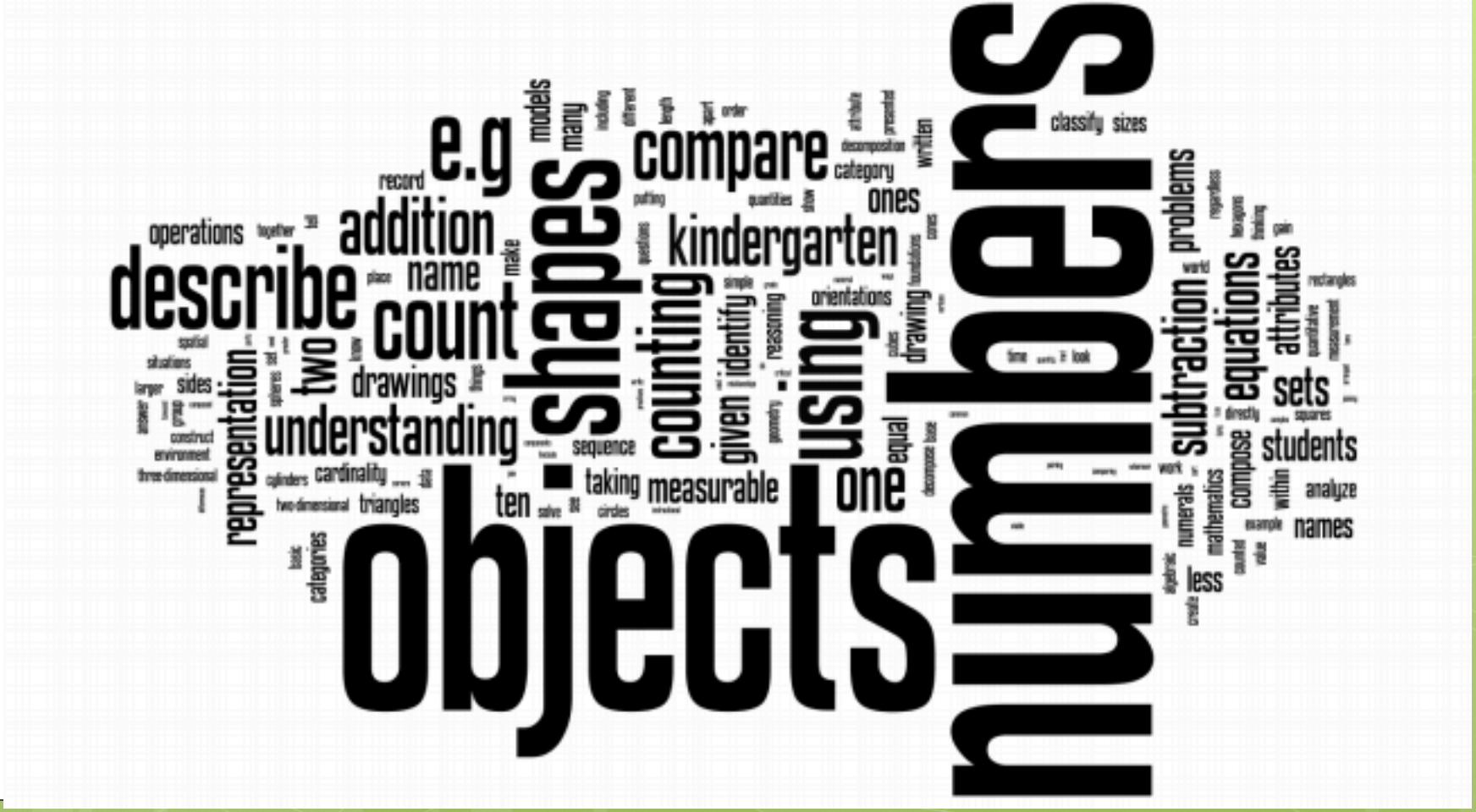
Scavenger Hunt_ Finding math in STEAM

GRAPHING TO KNOW YOU

Graphing mat

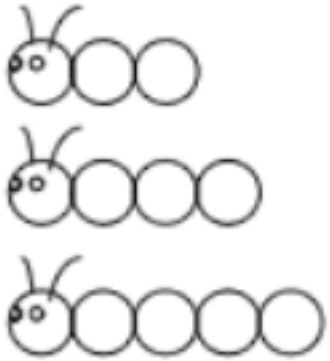
- Number of letters in your first name (write it, build it, compare!)
- Weather Pattern
- Favorite seasons

Fun-damental math in Kindergarten



Math Centers: Paterns

What "FUN"damental Math are you builiding at each center?



- Teacher Center:
- Repeating patterns
- Pattern Blocks
- Growing Patterns

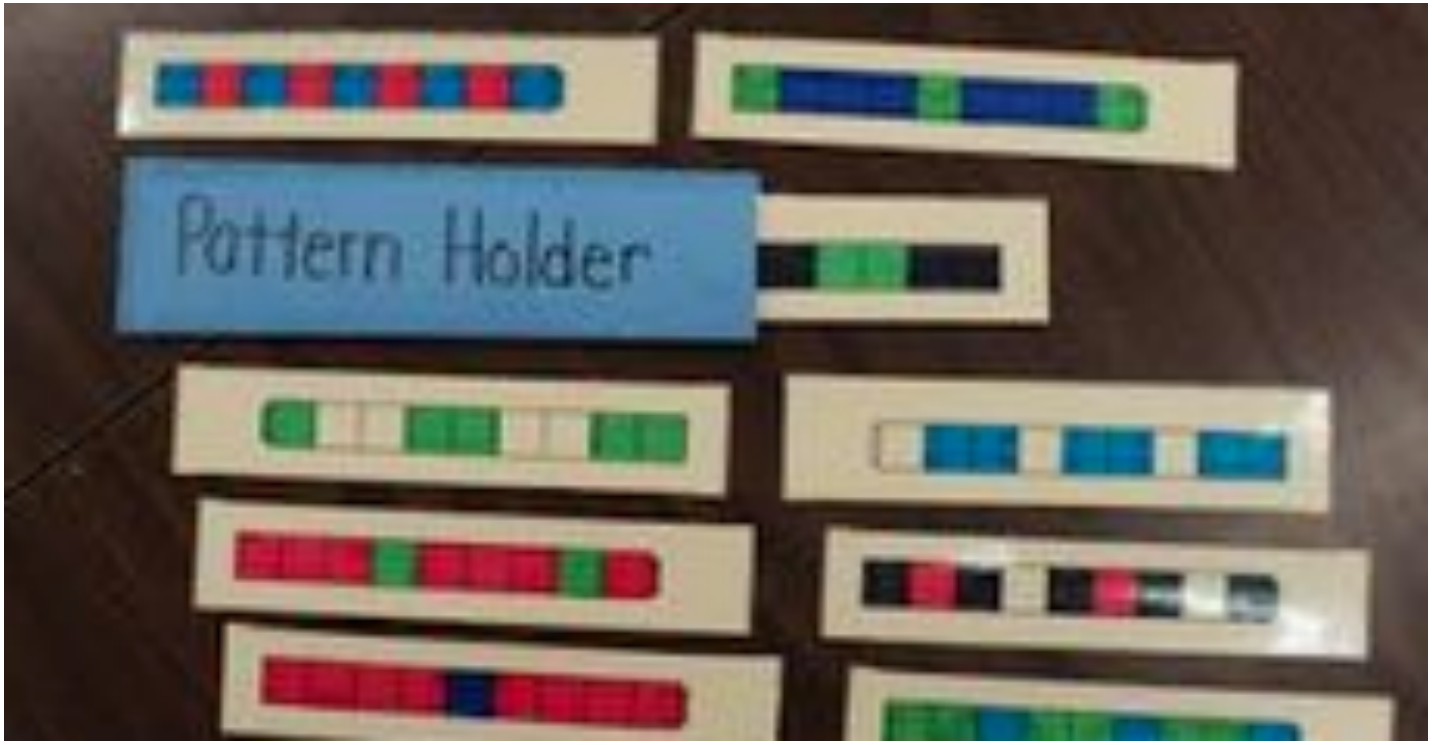
- Math Tech Center (Pattern blocks)

Prenumber concepts

- Patterns
  - Mathematics is the study of patterns.
  - Exploring patterns require active mental involvement and often physical involvement
  - In early grades, patterns help children develop number sense, ordering, counting, and sequencing
  - In later grades, it helps children develop thinking strategies for basic facts and algebraic thinking.

(Reys, Lindquist, Lambdin, & Smith, 2006)

Pattern Holder



I pull out one train, bit by bit, as we talk about and predict what the pattern might be. It's a great way to get the kiddies thinking about new patterns and to practice extending them.

Math Centers: Paterns

- Two of everything

Two of Everything by Lily Toy Hong recounts a Chinese folk tale. The farmer finds a magic pot which doubles everything that is put into it. This humorous story is a great introduction to function machines and input/output tables as teachers make the transition to the "doubling pot" and recording information in an input/output table. Next, teachers change the rule for the magic pot and keep it secret. Students supply input numbers and the teacher records the output numbers for each. Students try to guess the magic pot's current rule. This could then be extended to a growing pattern by simply using the last output as the next input, applying the rule and repeating the process.

Although most patterning experiences for young students will focus on repeating patterns, students can also begin to visualize and talk about growing patterns in the early grades.

A linear growing pattern is a pattern that increases or decreases by a constant difference. For example:

In this linear growing pattern, each row is one greater than the previous row.

Kindergarteners reinforce their understanding and ability to reason about counting numbers through examples of growing patterns.

NUMBER RELATIONSHIPS

Decomposing and recomposing numbers

Ideas about less than, greater than, in between

Subitizing and noticing patterns

- **Repeating Patterns** → → Emphasis is on the cyclical nature of the repetition and the id of the elements in the cycle.

  (e.g., blue, red, blue, red, blue, red, two elements (blue, red) that repeat)

- **Growing Patterns** → → Shows an arithmetic change between pairs of elements in the pattern or a progression from one step to the next.

  (e.g., 2, 4, 6 where each pair differs by 2)

Prenumber concepts

- Comparisons
  - Leads to one-to-one correspondence
  - Helps children become aware of relationships such as *more than, less (fewer) than and as many as*. (Reys, Lindquist, Lambdin, & Smith, 2006)
  - The concept of more is understood first.
  - The concept of less is more difficult for children to understand because children have more opportunities to use the word more.
  - To help children, pair less with the word more often.

MathWorks/MAEF, 2004

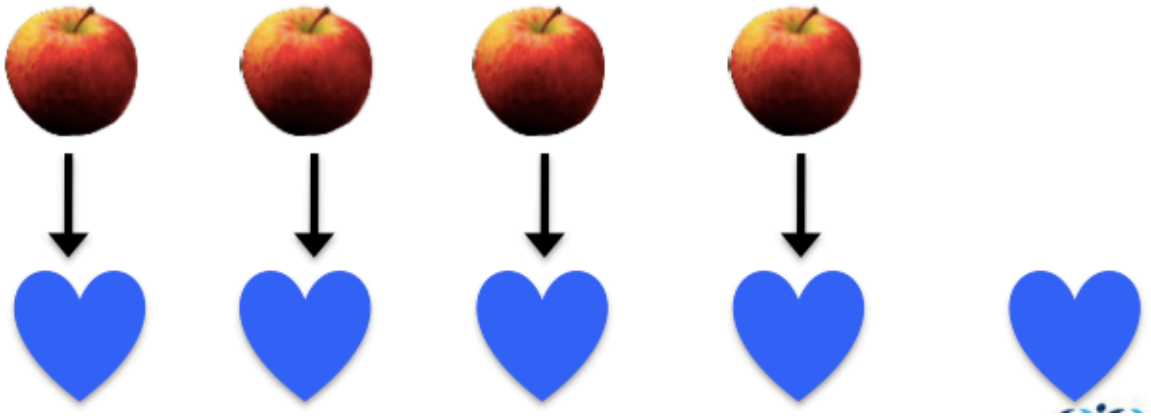
More or less

- Children need to become familiar with descriptions of relationships such as more than, less (fewer) than, and as many as.
  - Bonnie has *fewer* cups *than* Sammy.
  - Sammy has *more* cups *than* Sammy.
  - Bonnie has one *less* cup *than* Sammy.
  - Sammy has one *more* cup *than* Bonnie.

- Note that the child at the prenumerical stage has not yet developed the number concept to know that 6 is one more than 5, there are 5 ones in one 5 (lack of **quantitative reasoning**).

1. Counting
2. Physically comparing without counting

3. One-to-one



Number sense can be described as a good intuition about numbers. It develops gradually as a result of exploring numbers, visualizing them in a variety of contexts, and relating them in ways that are not limited by traditional algorithms.

(Howden, 1989)

Prenumber concepts

- *Subitizing* – Recognizing the Group

The skill to "instantly see how many" in a group is called *subitizing*, from the Latin word meaning "suddenly." Sight recognition of quantities up to five or six is important for several reasons:

- It saves time.
- It is a forerunner of some powerful number ideas.
- It helps develop more sophisticated counting skills.
- It accelerates the development of addition and subtraction.

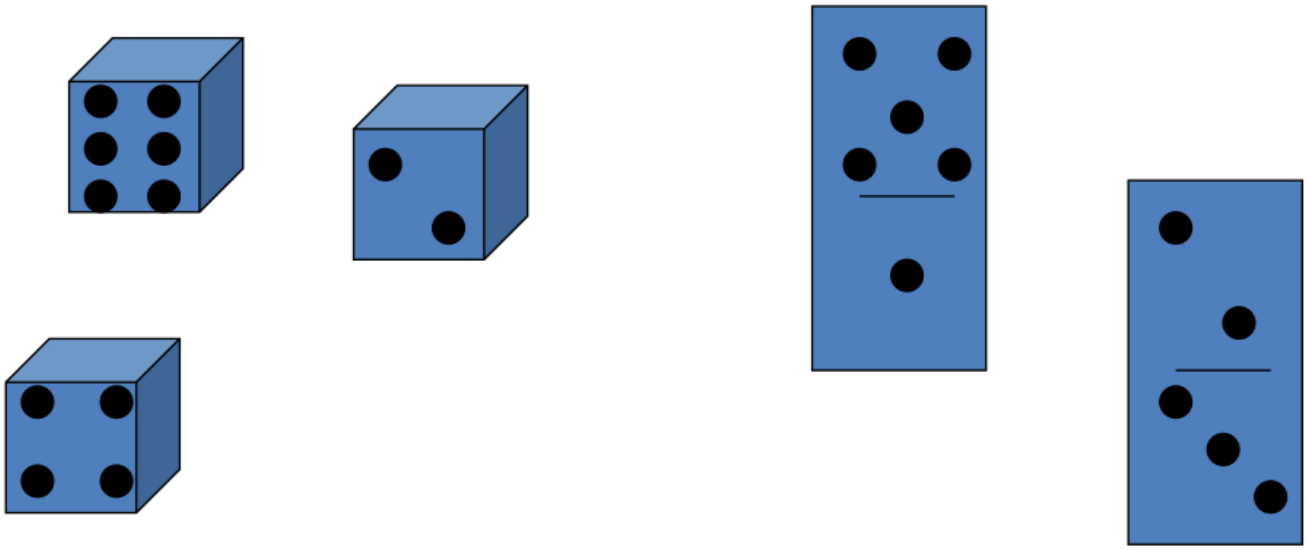
(Reys, Lindquist, Lambdin, & Smith, 2006)

Visual images

- Develop a strong visual sense of the structure of a number
- Develop understanding of how a number can be broken into parts
- Develop strategies for keeping track of and combining all parts to find the total number of dots.

MathWorks/MAEF, 200

Domino Flash
(Spatial subitizing)



Counting

- To count successfully, a learner must…
  - Know the verbal sequence
  - Demonstrate one – to – one correspondence
  - Keep track
  - Say the last number to answer "how many" (cardinality)

For children to orally count to 100, they need to know:

- ✓ the single –digit sequence 1 – 9;
- ✓ that 9 signals a transition;
- ✓ the decade vocabulary;
- ✓ each decade term is combined with the single-digit sequence 1 – 9; and
- ✓ there is an exception in the counting term between 10 and 20

Counting strategies

- **Counting On**: the child gives number names as counting proceeds and can start at any number and begin counting.
- **Counting Back**: when counting back, children give correct number names as they count backward from a particular point.
- **Skip Counting**: In skip counting, the child give correct names, but instead of counting by ones, counts by twos, fives, tens, or other values. The starting point and direction are optional.

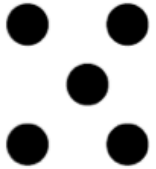
Relationships with numbers

- Anchoring Numbers to 5 and 10
- Part-part-Whole Relationships
- Numbers 10 through 20

Experience that helps build number sense

- Instant recognition of patterned sets

(dot arrangements, dot cubes, or dominos)



- 5 as a benchmark (5-frames)
- 10 as a benchmark (10 frames)
- 1 or 2 more, 1 or 2 less (dot patterns, flashing dots, domino trains)
- Part-part-total (shake and spill with bi-colored counters, part-part-total mats)

Place value

- Counting by Ones
- – Physical item worth a count of “one more”
- – Each item is a unit of one.
- – Items being counted compose the total.
- – Number word stand for its numerical value to represent the entire quantity.
- – Example: One, Two, Three, Four...Four blocks
- • Counting by Groups and Singles
  – A collection of items can be thought of as a group.
  – Groups can contain different quantity of items.
  – Example: One, two, three groups of two, and one, two, three, singles

Place value

- Counting by Tens and Ones
- – "Ten" is used as a unit.
- – Count by tens and ones: 10, 20, 30, 40, 41, 42, 43
- – Tens and Ones are dealt with separately.
- – Example: When I add 15 blocks with 17 blocks, I have two tens and 12 ones
- • Equivalent Groupings
  – "Ten" is used as a unit.
  – Tens and ones are dealt with simultaneously
  – Mental flexibility permits crossing between thinking of tens and ones – Example: Three tens and 13 ones is also equal to 43.

For Next Time:

- Try one of the activities from Kathy Richardson's book
- Bring an artifact to share!