Pre-K Math:

Practicing Basic Skills While Introducing More Challenging Concepts

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About Me

- Classroom Teacher, Here in D.C.
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- 11 years of teaching Pre-K, various curricula
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Agenda

- State of Pre-K as it pertains to math education
- Basic Pre-K Math Skills
- More Advanced Math for Pre-K
- Science and Math Connections for Pre-K

Expectations

- Questions or comments: raise a hand
- Disagreement is okay. Skepticism in encouraged.
- Respect diverse perspectives, especially from people who represent marginalized populations

"The natural man inevitably rebels against mathematics, a mild form of torture that could only be learned by painful processes of drill."

-Woodrow Wilson

Academics Vs. Play: A False Dichotomy

- Small, daily doses of high quality academic instruction increases the quality of play.
- My goal: **constructivist learning**
  - Give students some base knowledge, then let them play with it.

Stipek, D. (2011). "Classroom Practices and Children's Motivation to Learn." In *The Pre-K Debates: Current Controversies and Issues*, edited by W. S. Gilliam, E. F. Zigler and W. Barnett, 98–103. Baltimore, MD: P. H. Brooks.

Basic Pre-K Math

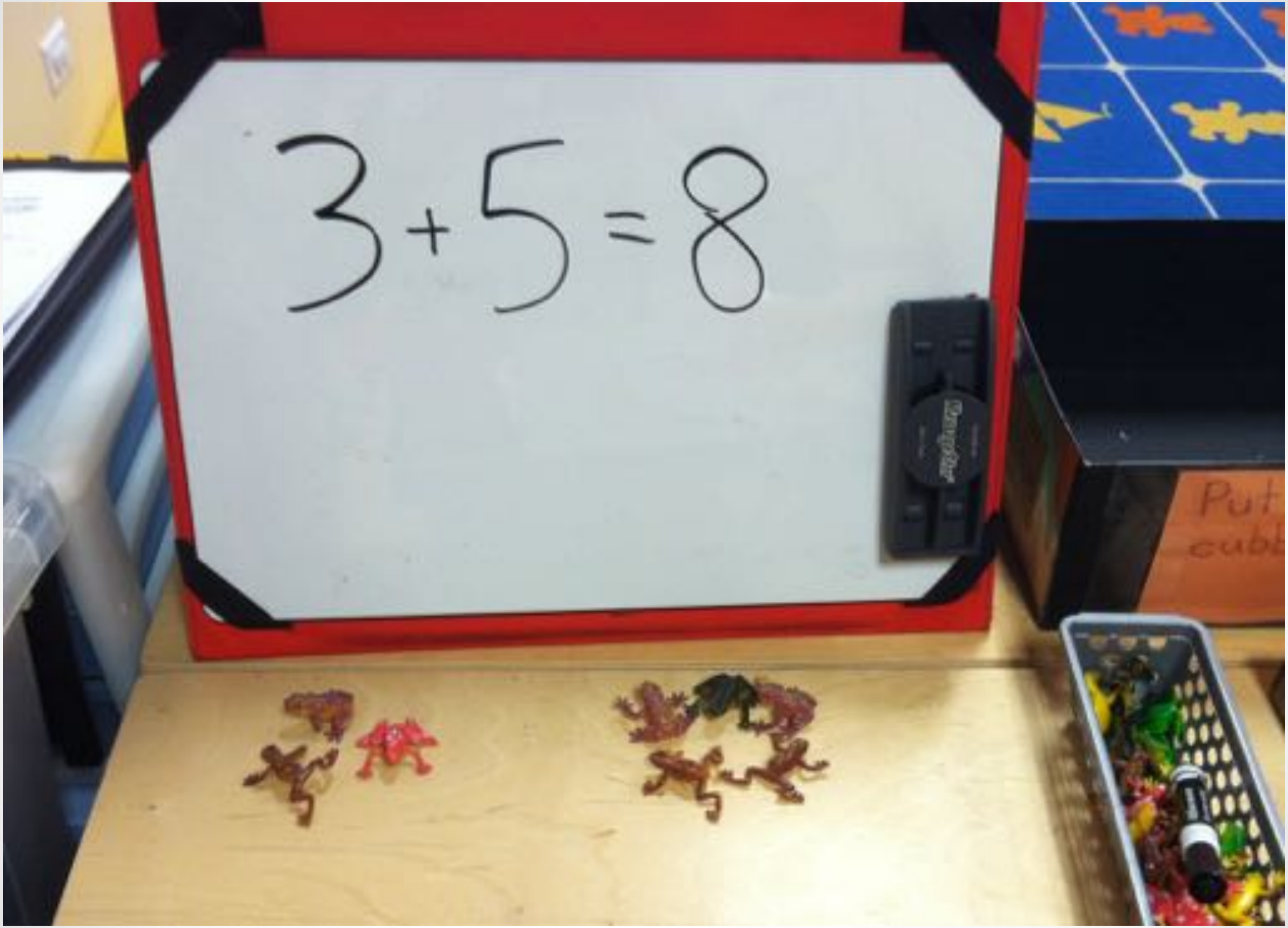
What's on your list of basic math skills for Pre-K?

Basic Pre-K Math: My List

- **Counting**: rote counting, one-to-one correspondence, cardinality
- **Number Recognition**
- **Subitization**
- **Spatial Reasoning & Geometry**
- **Patterning**
- **Sorting**

High Expectations

- Pre-K students can acquire a broad range and depth of math skills.
- Pre-K students **can** think abstractly
- We can teach more advance math skills while still developing mastery of the more basic skills.
- Further reading:
  - Clements, D. H., & Sarama, J. (2007). Effects of a pre-school mathematics curriculum: Summative research on the *Building Blocks* project. *Journal for Research in Mathematics Education, 38*(2), 136-163.
  - Stipek, D. (2013). Mathematics in early childhood education: revolution or evolution? *Early Education and Development, 24*, 431–435.


3+5=8

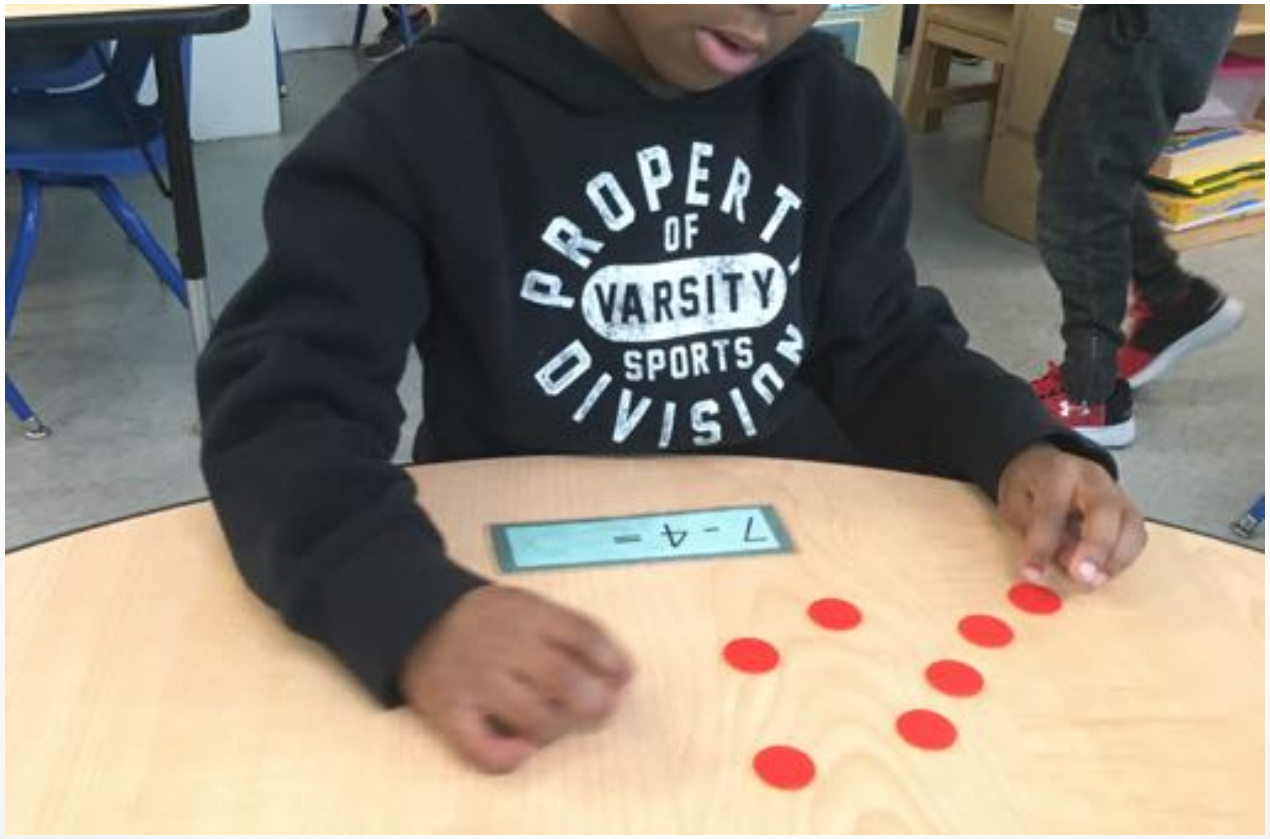

2+2=

Addition & Subtraction

- Start with manipulative toys: something to see and to hold.
- Start with very small numbers: numbers children can subitize.
- Give children freedom to make choices

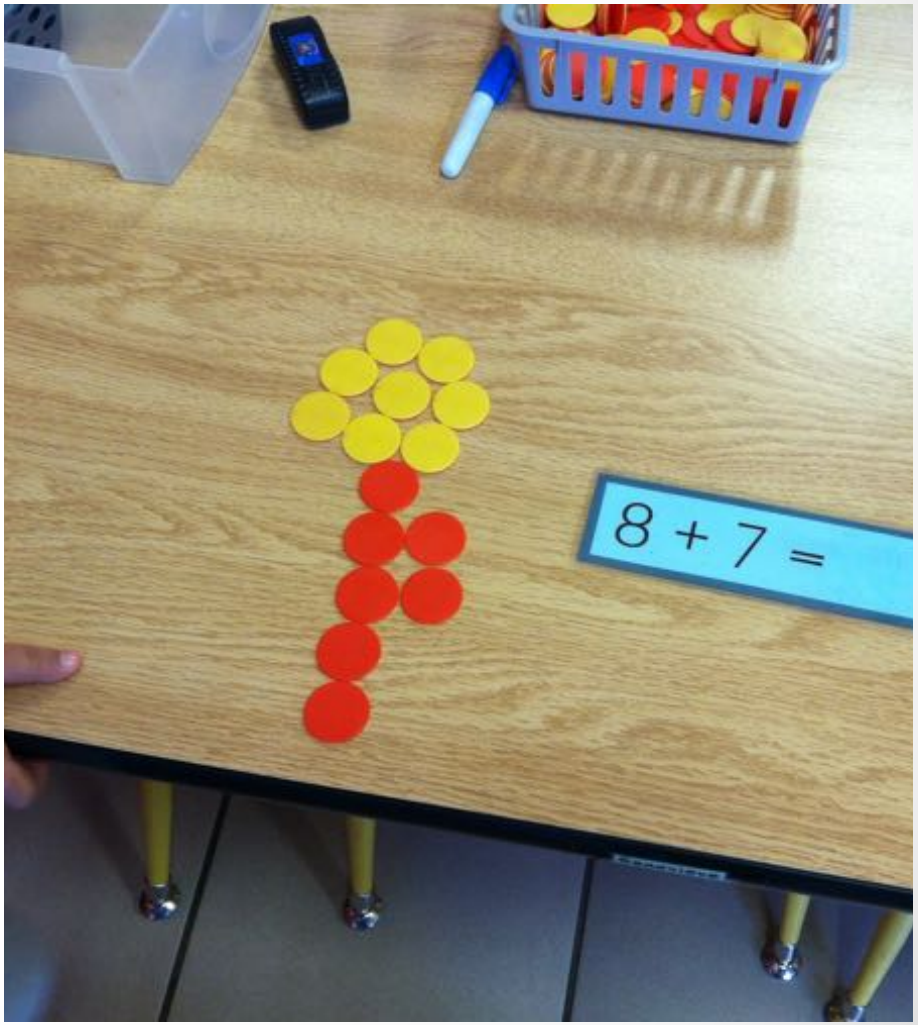
Addition & Subtraction

- I teach both pretty early in the school year.
- Addition: **"More"** or **"Put Together"**
- Subtraction: **"Less"** or **"Take Away"**



Addition & Subtraction

- We are practicing basic skills.
- Many young children can follow these steps, even though they struggle to count items accurately.



Add With Fingers

- More abstract
- Often, we solve it with manipulatives after we use our fingers.

One More, Two More…

- "Counting on" from a number
- Requires quick subitizing
- Demonstrate w/ manipulatives, too
- **Sports scores**: a fun way to practice.

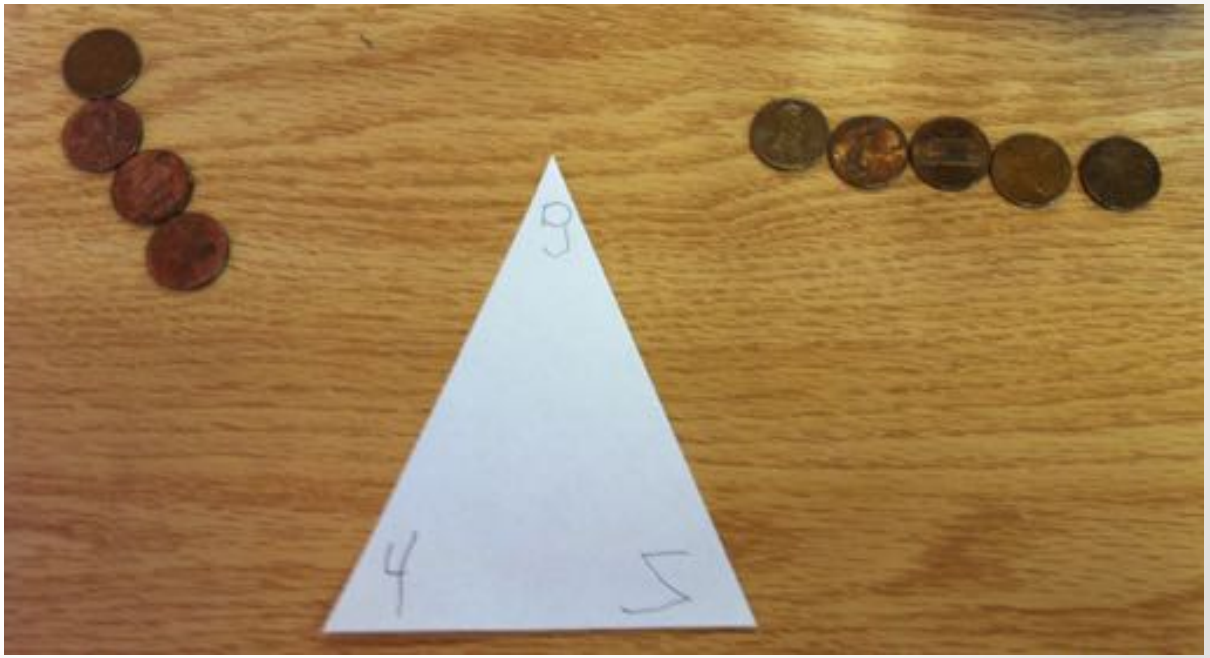
Number Lines

- Explain numbers line arrangement.
- Which way are the numbers more/bigger?
- Again, demonstrate with manipulative toys, too.

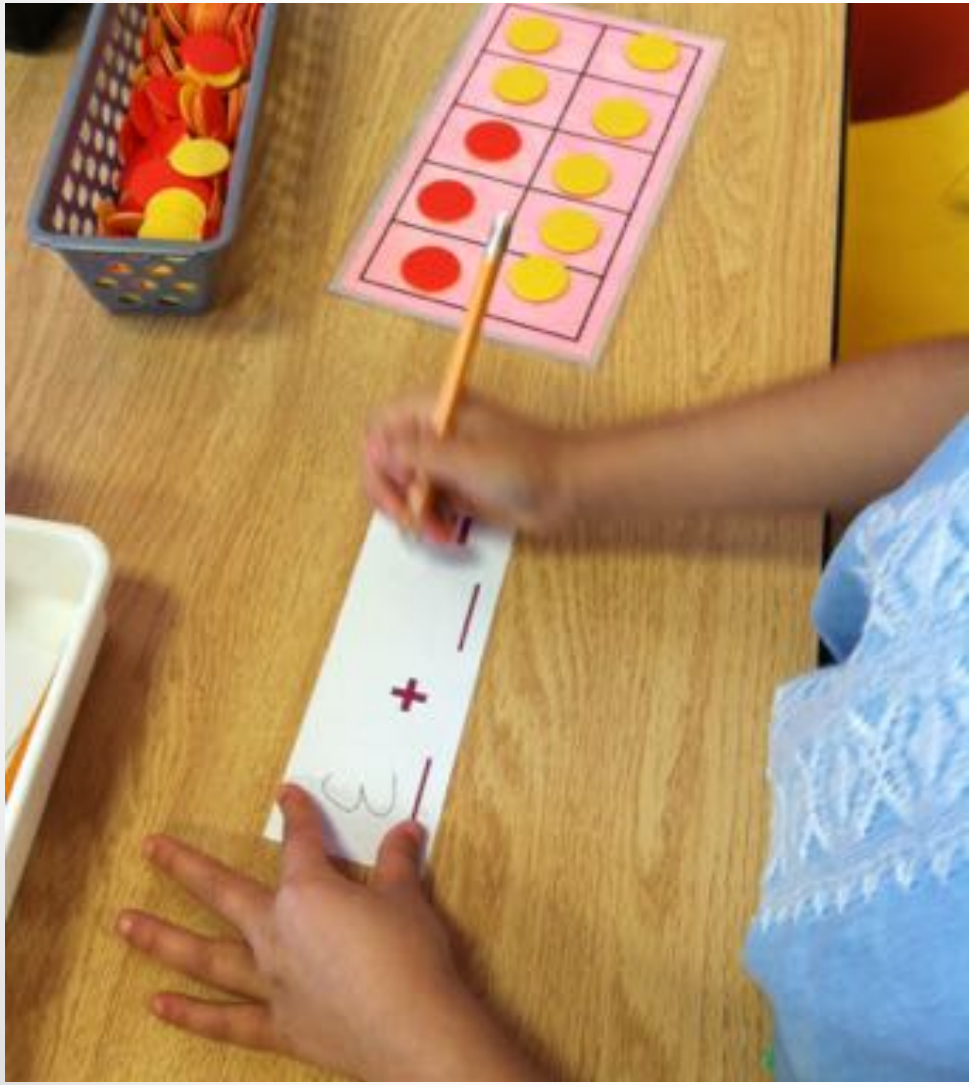

4+9=

Part-Part-Whole

- Break Numbers Apart,
- Put them back together
- Start with small numbers that children can subitize.



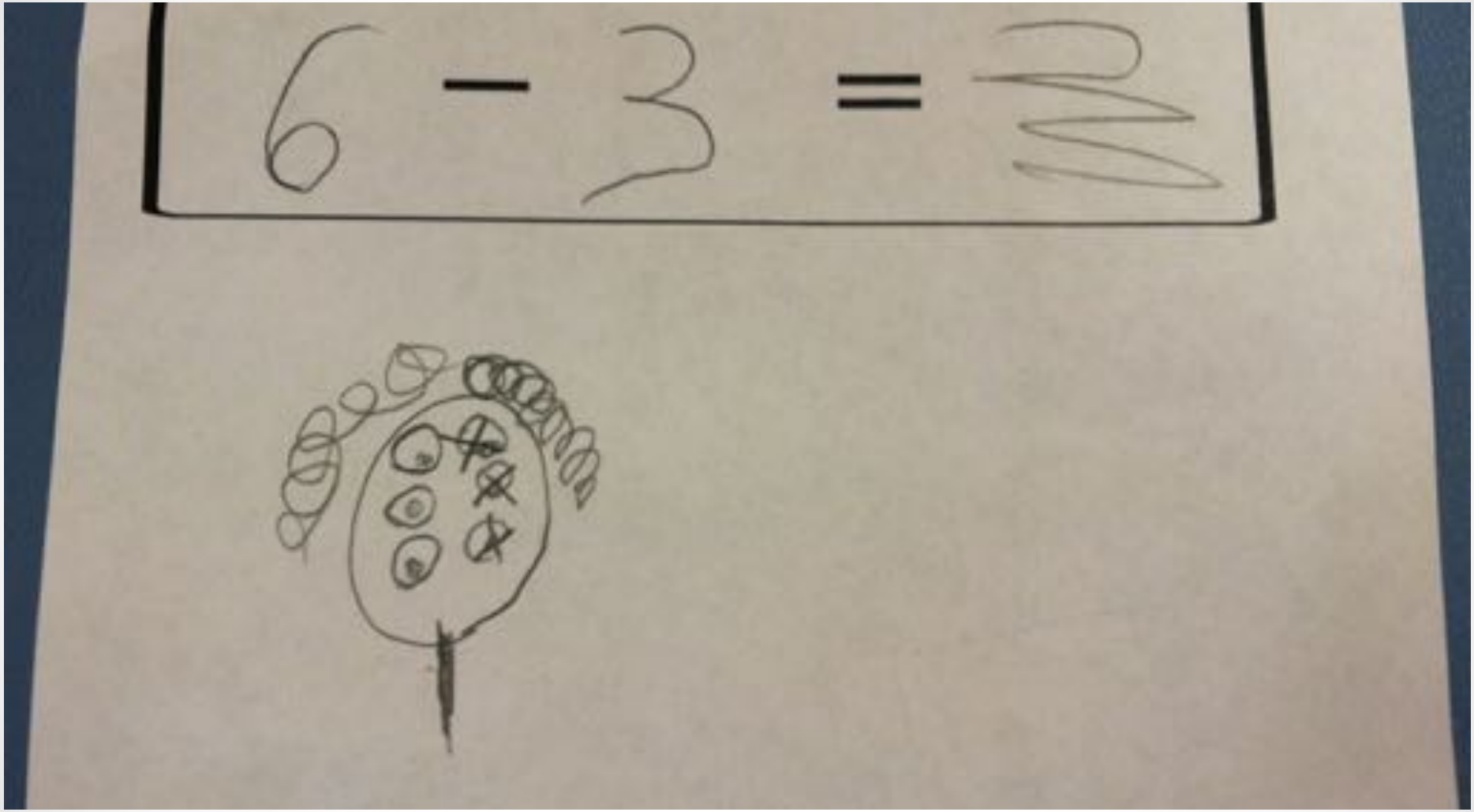
Tens & Fives Frames



- Part-Part-Whole With 5 and 10
- More subitizing practice

Number Stories

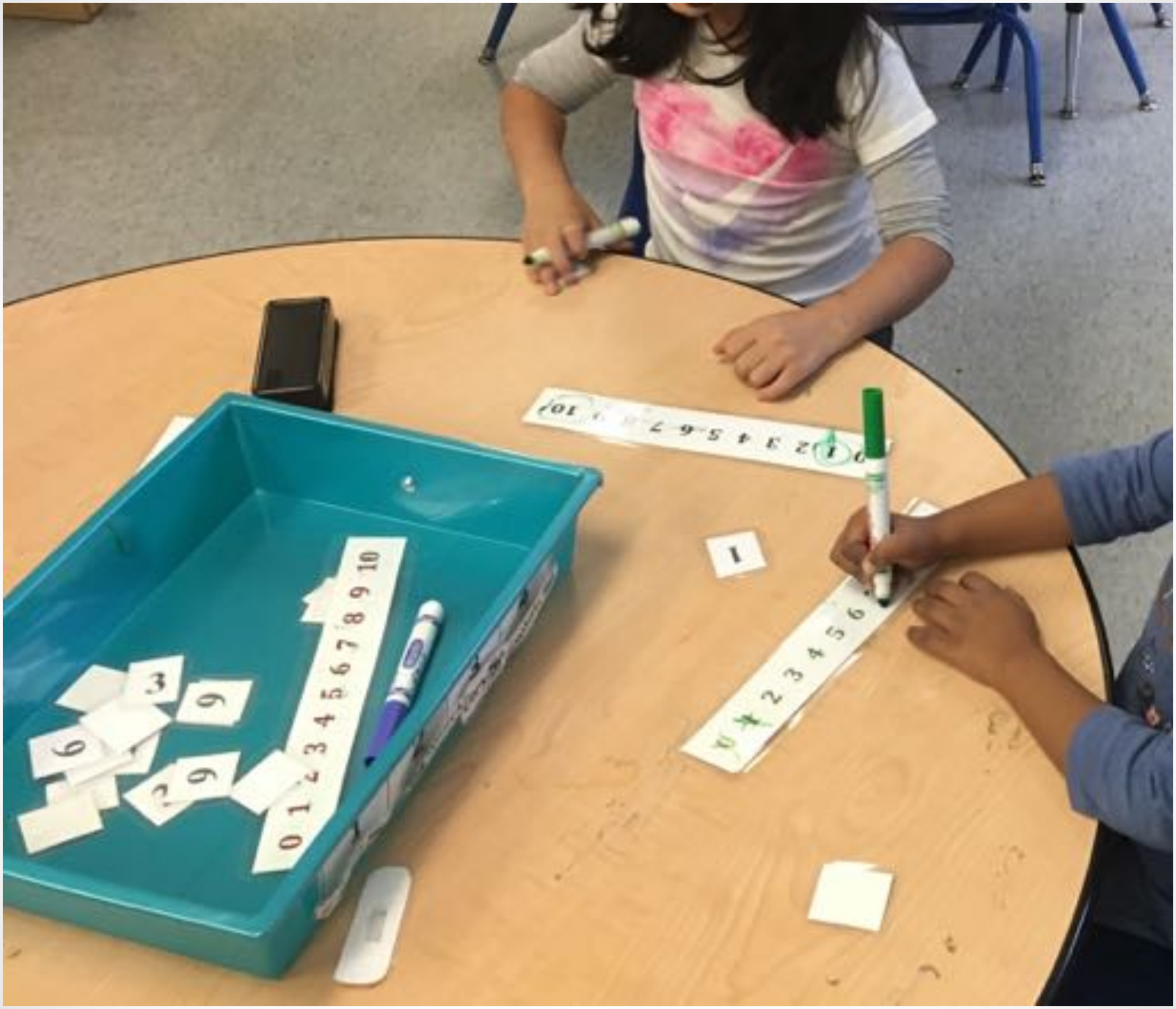
- Full group or small groups many times.
- Then have students try it.
- What is your story about?
- How many are there?
- Then were there more or less?
- Why? What happened?


6 - 3 = 2

10 − 2 = 8

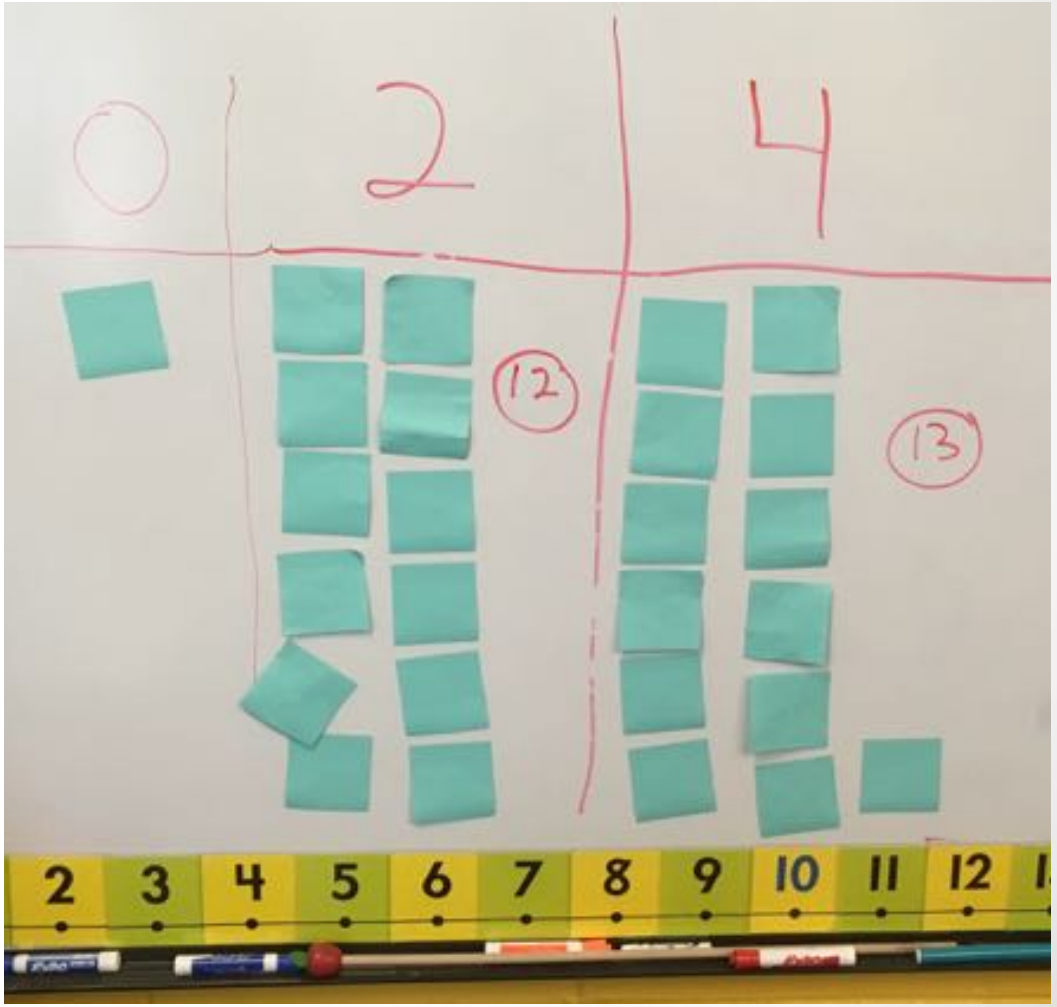
Number & Quantity Comparisons

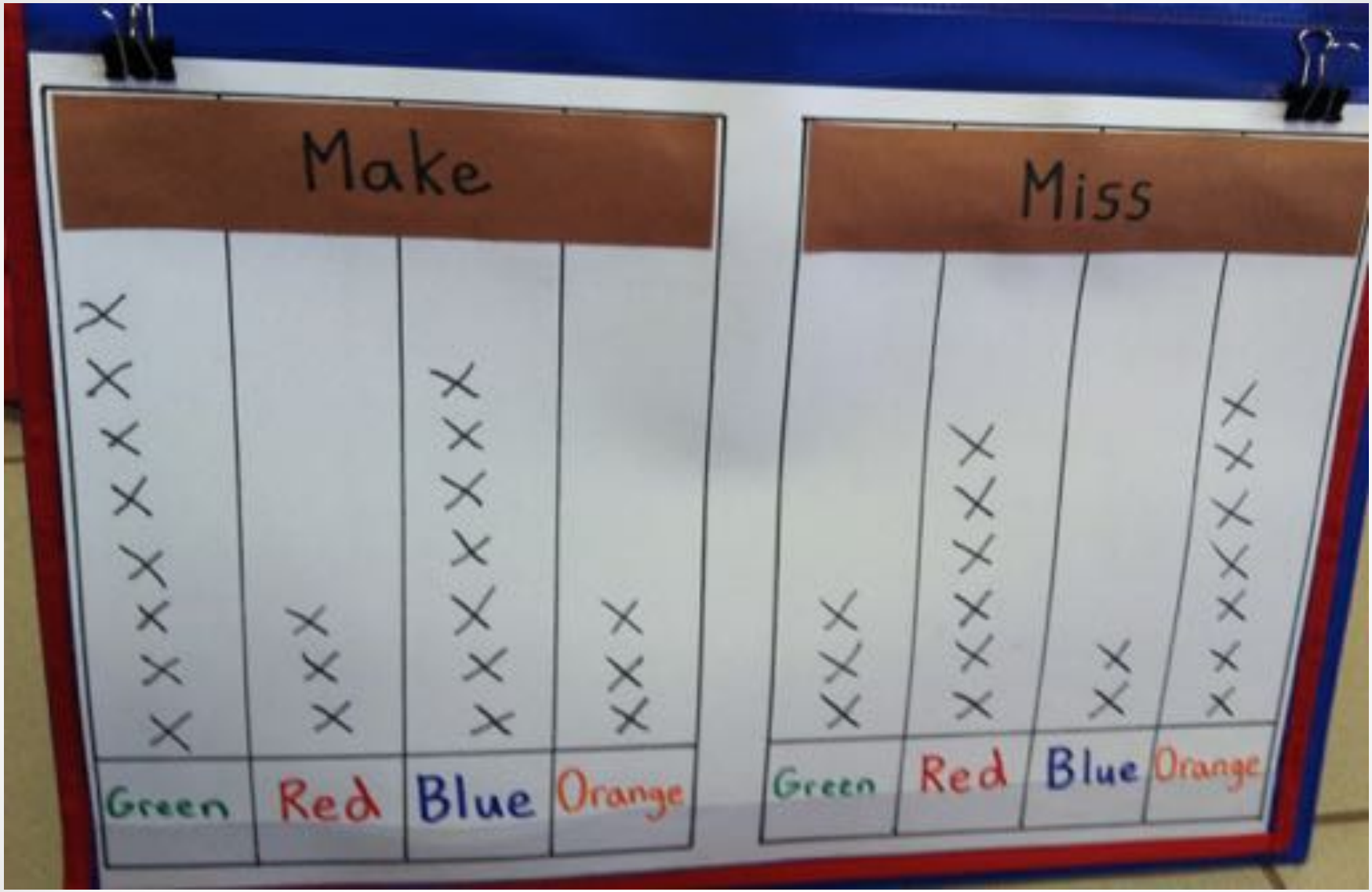
- Make it fun and meaningful
  - Two cookie jars.
  - Bugs bites
  - Candies
- Negotiating Prices
  - I use a number line for reference when I do this.
- Number guessing game.
  - Tell whether it's bigger/more or smaller/less
  - Again, I use a number line.


0 1 2 3 4 5 6 7 8 9 10
1

Data and Graphing

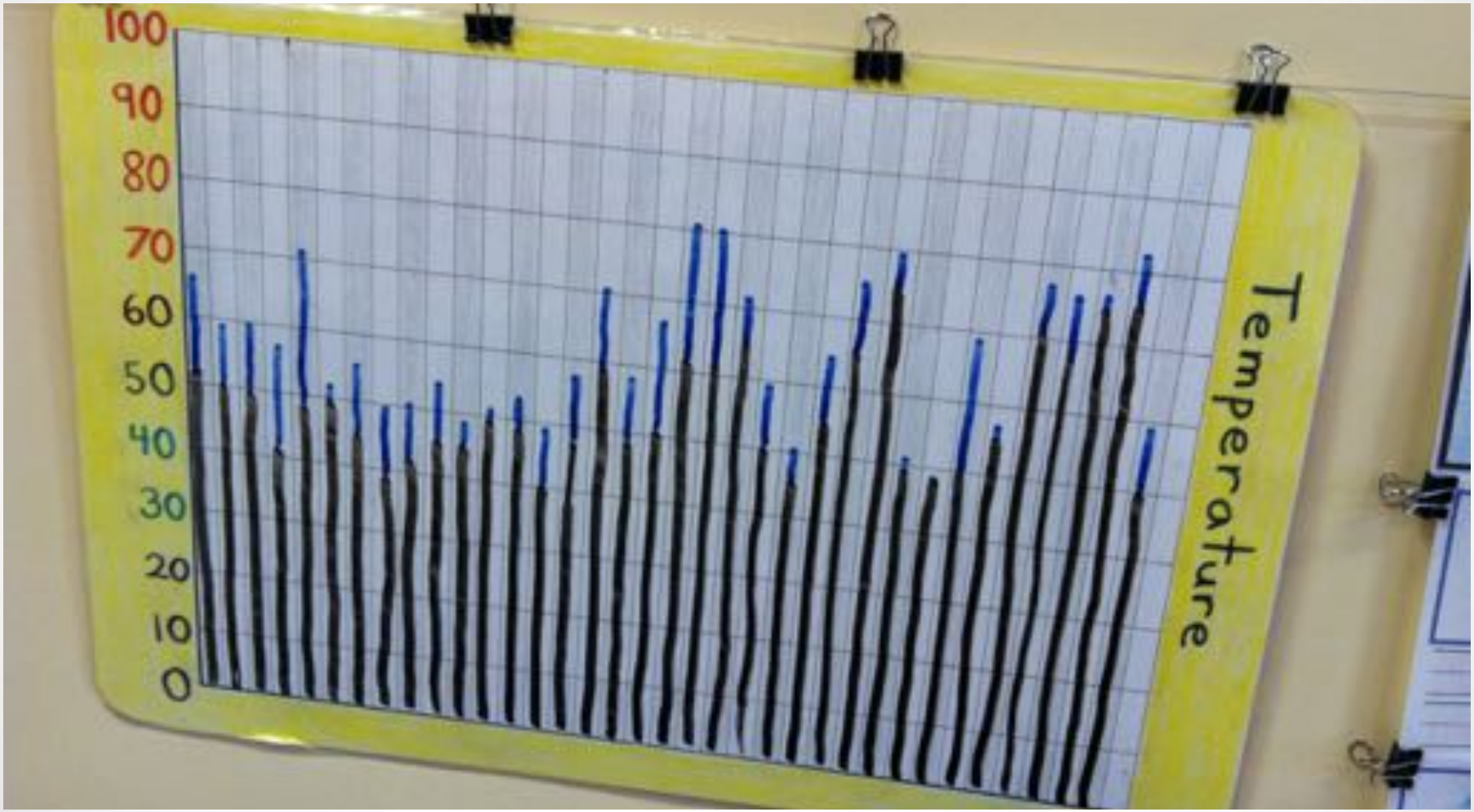
- Pre-K students do quite well understanding simple comparison graphs.

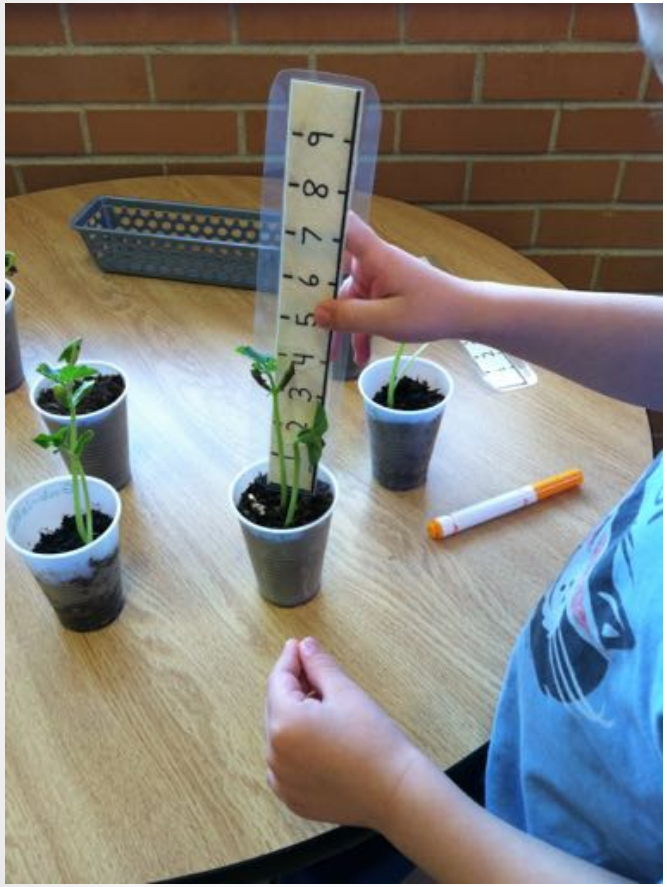



Make
Green
Red
Blue
Orange
Miss
Green
Red
Blue
Orange

Surveying Each Other

Data Across Time

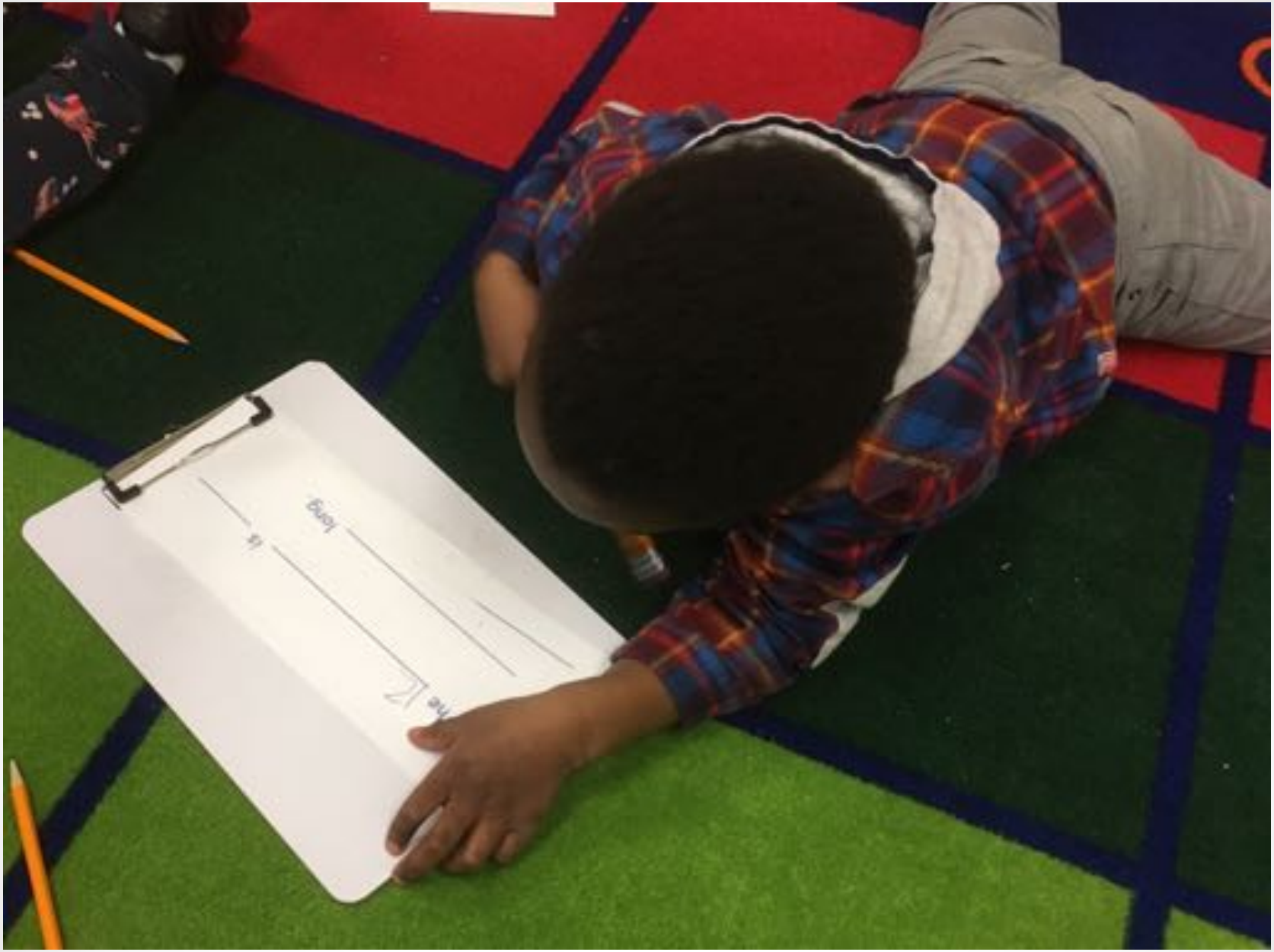


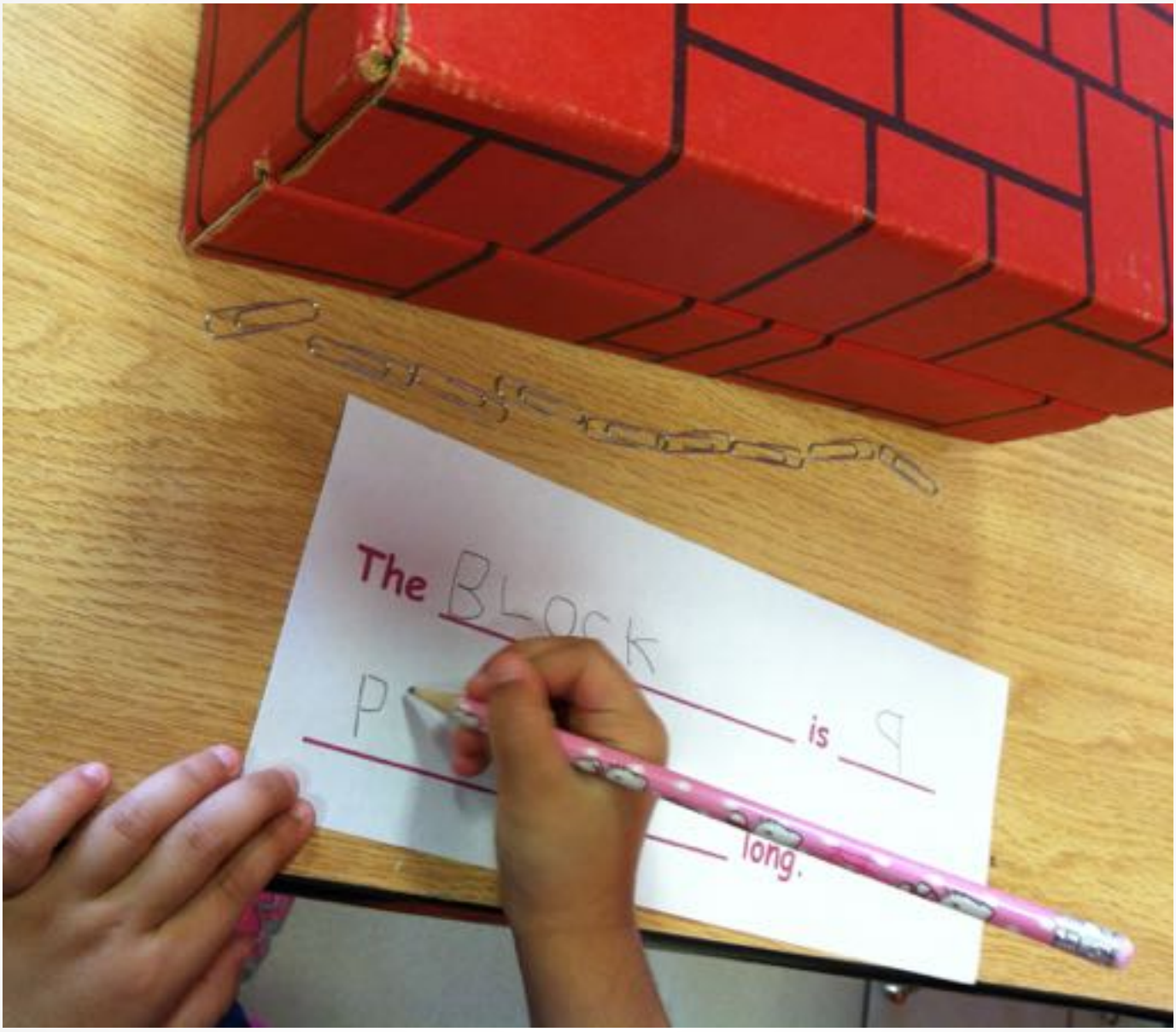



Bean Plant Graph

Measurment

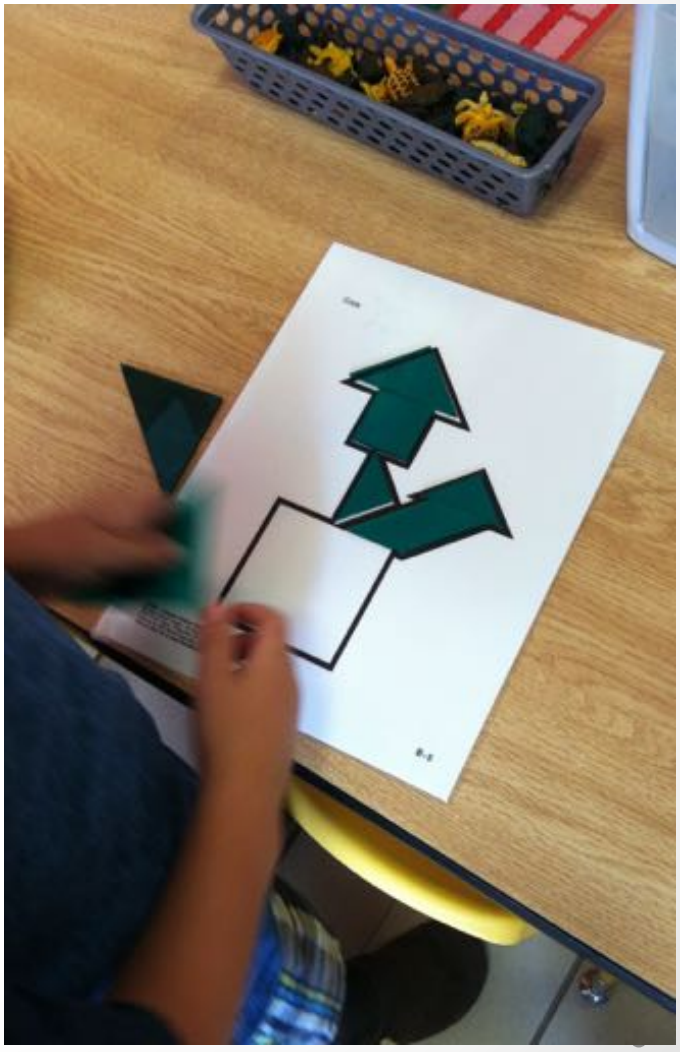
- Introduce the concept of units in measurement.
- Pennies, paper clips, cups, beads, etc.


long


The BLOCK
is 9
long.

Place Value

Spatial Reasoning



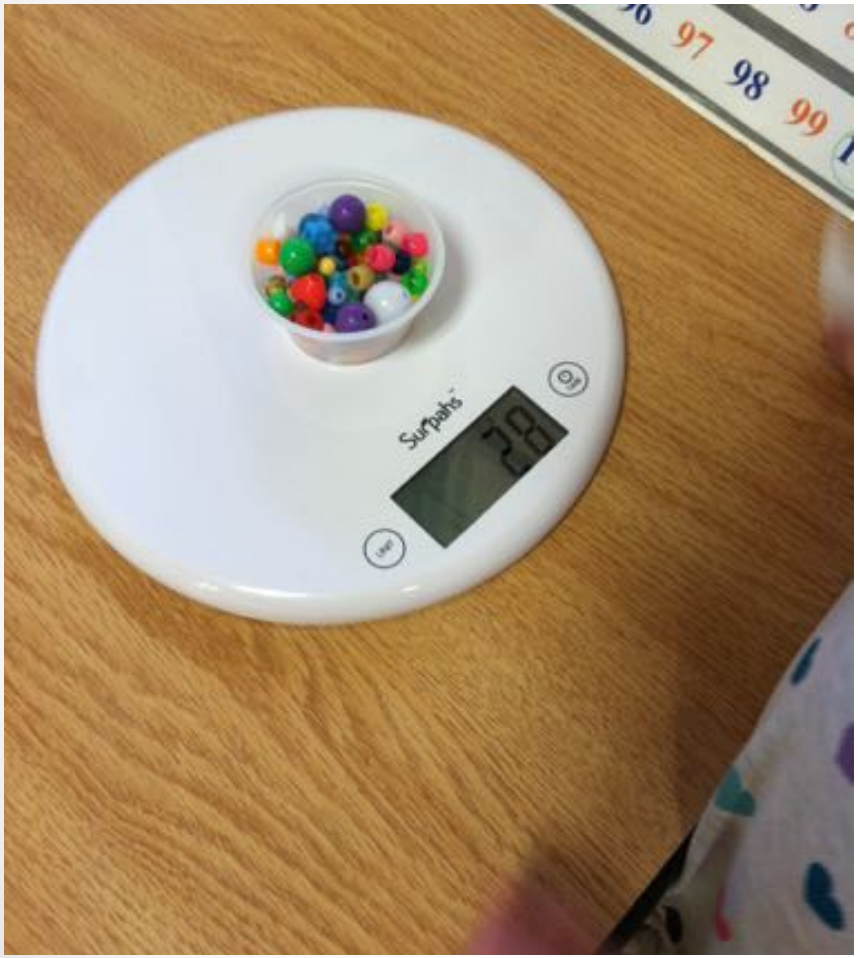
Multiplication

Probability

Math and Science: A Perfect Match

- Inquiry-based
  - Avoid one-off demos
  - Stretch explorations over the course of weeks or months
  - Allow children to make decisions.
  - Adapt to children's interests

Tools To Have: Scales



Tools to Have: Timers


Pink
Purple
Red
Blue
ellow
reen
efoam
Pong
od
PRESTO

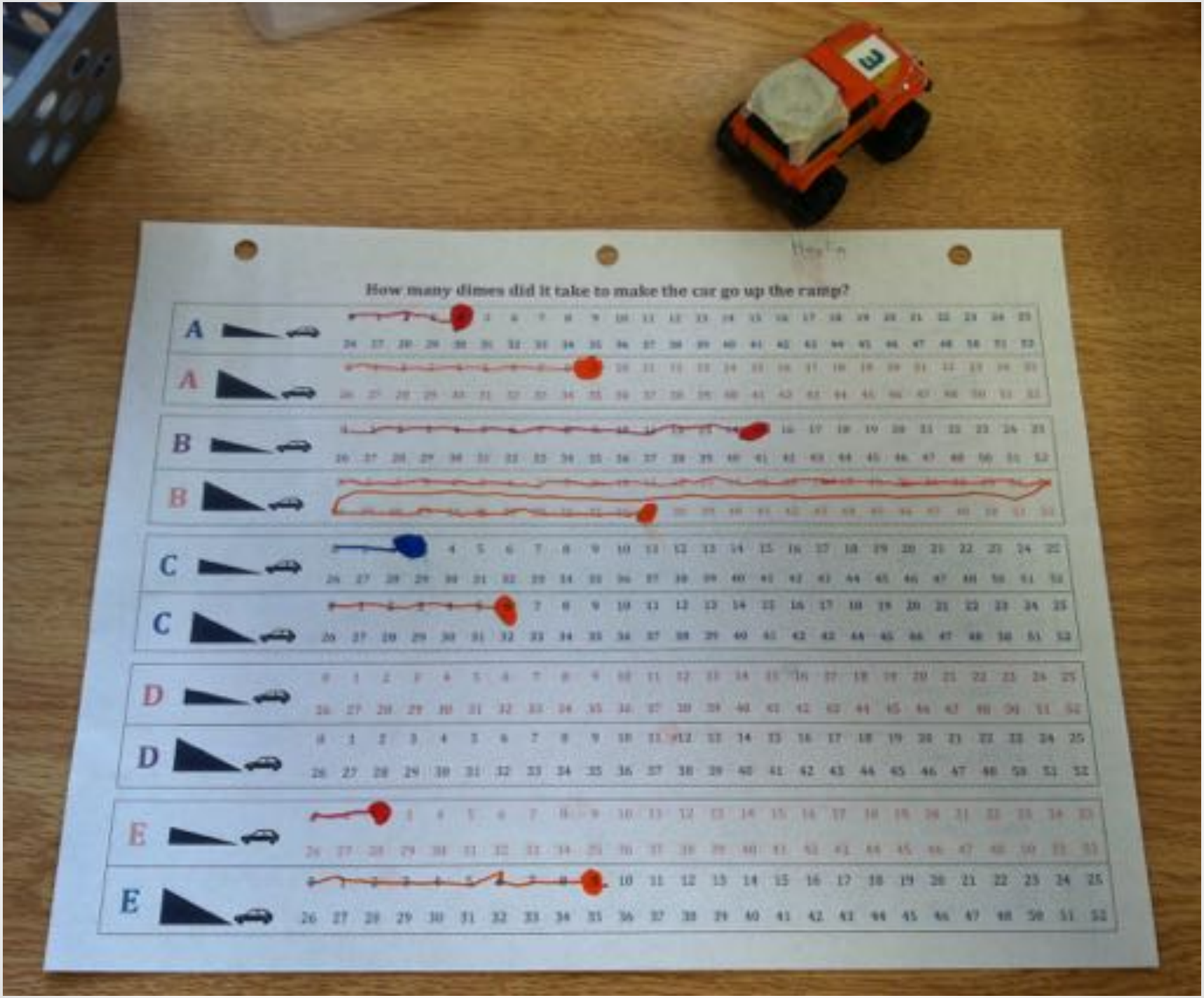
Sorting, Categorizing

- Clouds
- Rocks
- Seashells
- Animals

- Begin to understand that categorizing is an active process; it's not handed down from on high.

Physics: Cars & Ramps

- How many dimes do we have to put in the cup to make the car go up the ramp?


How many dimes did it take to make the car go up the ramp?
A
A
B
B
C
C
D
D
E
E

Questions?

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