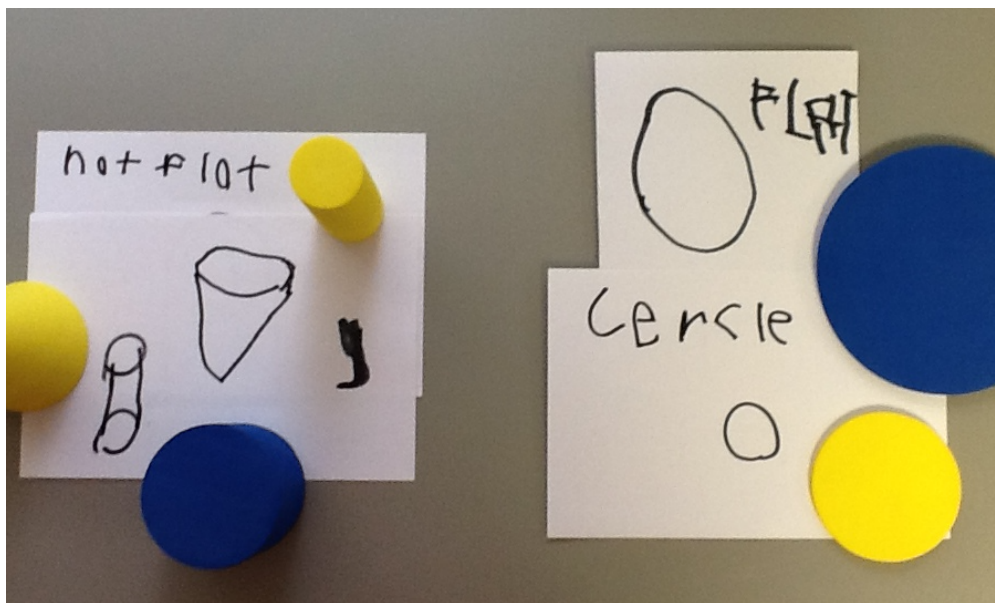


Understanding Geometry and Measurement Pre-K – 2nd Grade:



Facilitating
Coherence and
Connections

Conceptual Understanding – Coherence and Connections

- Carefully connect the learning within and across grades so that students can build new understanding on foundations built in previous years.
- Begin to count on solid conceptual understanding of core content and build on it. Each standard is not a new event, but an extension of previous learning.
(www.achievethecore.com)

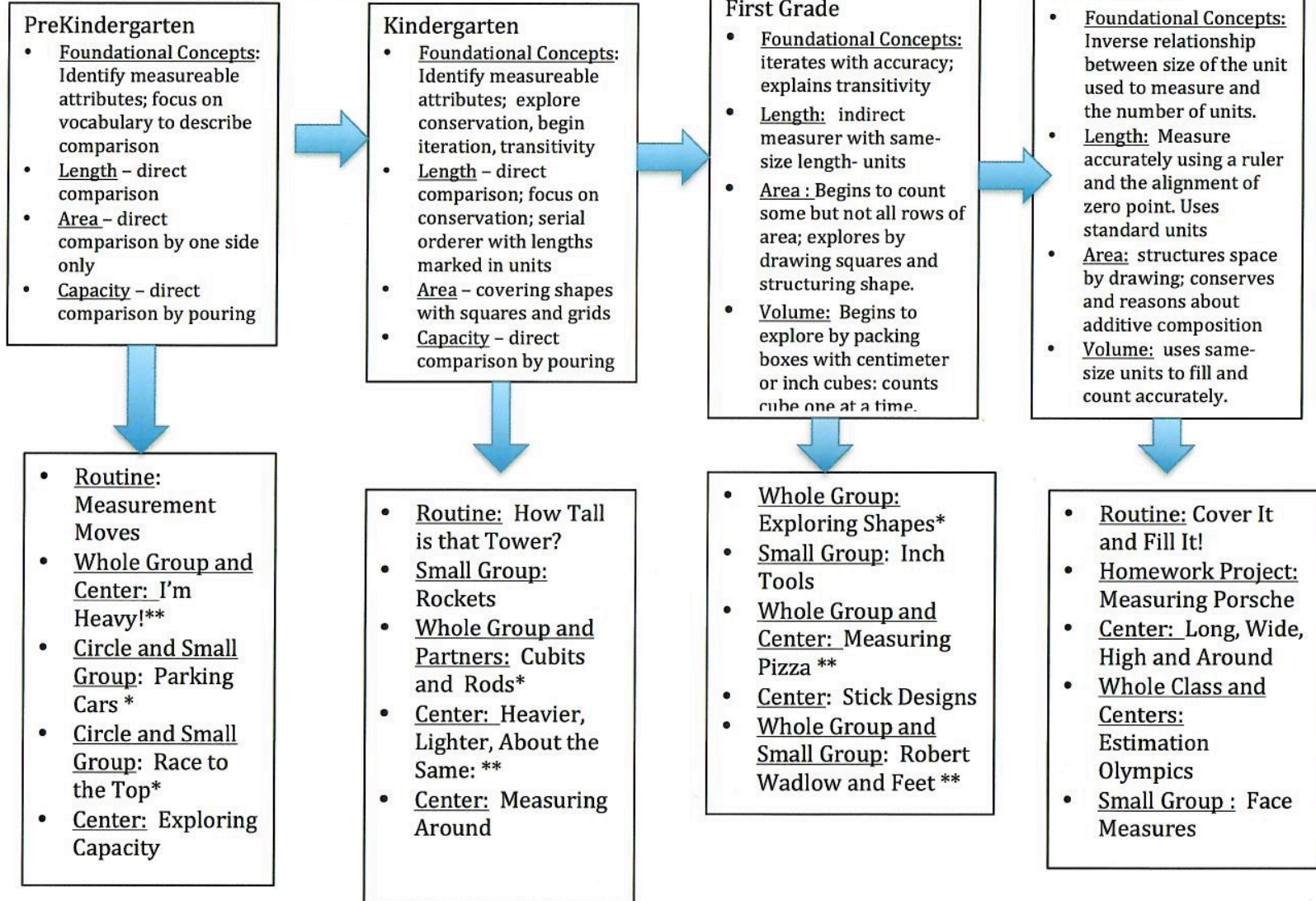
Boats, Shapes,Weights and Counting



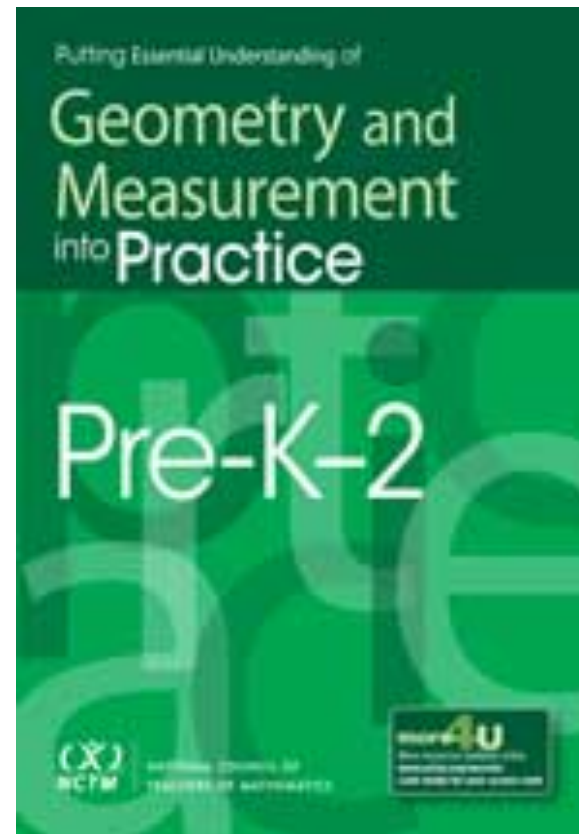
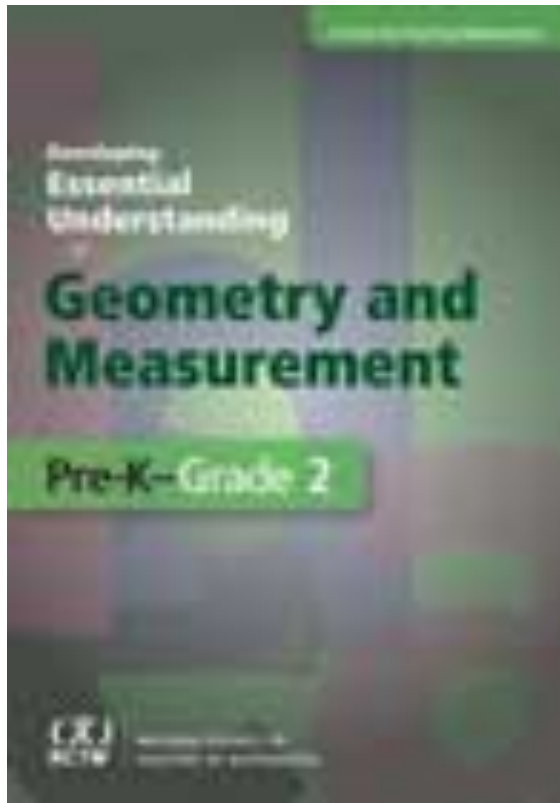
Coherence and Connections?








Understanding Measurement



NCTM Publications



Topics

- Classifying objects  Big Idea ONE
- Structuring space and identifying locations 
Big Idea TWO
- Decomposing and composing shapes  Big Idea FOUR
- Measuring geometric attributes  Big Idea FOUR
- Transforming shapes and objects  Big Idea THREE

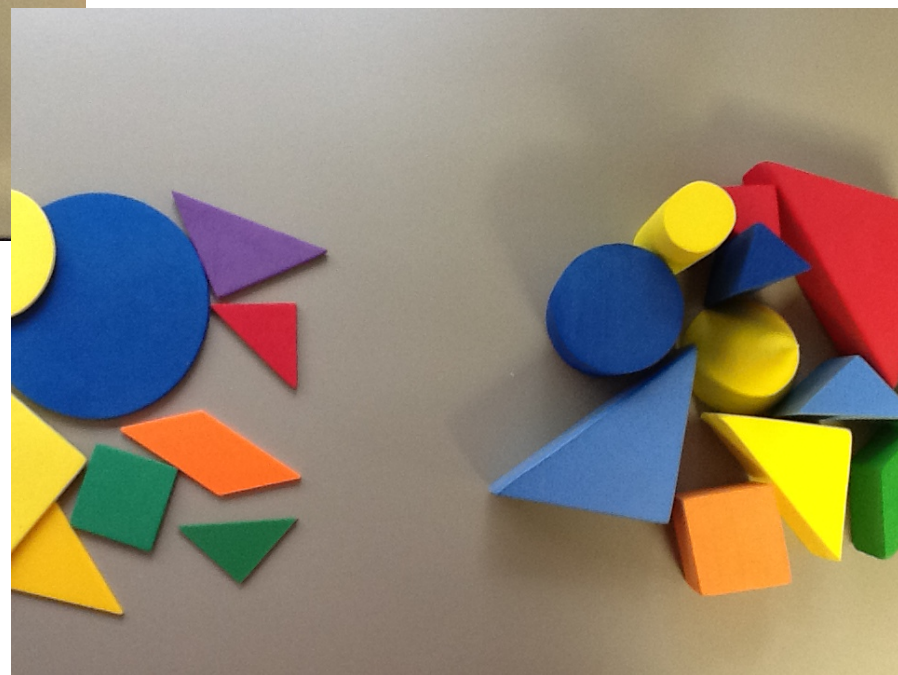
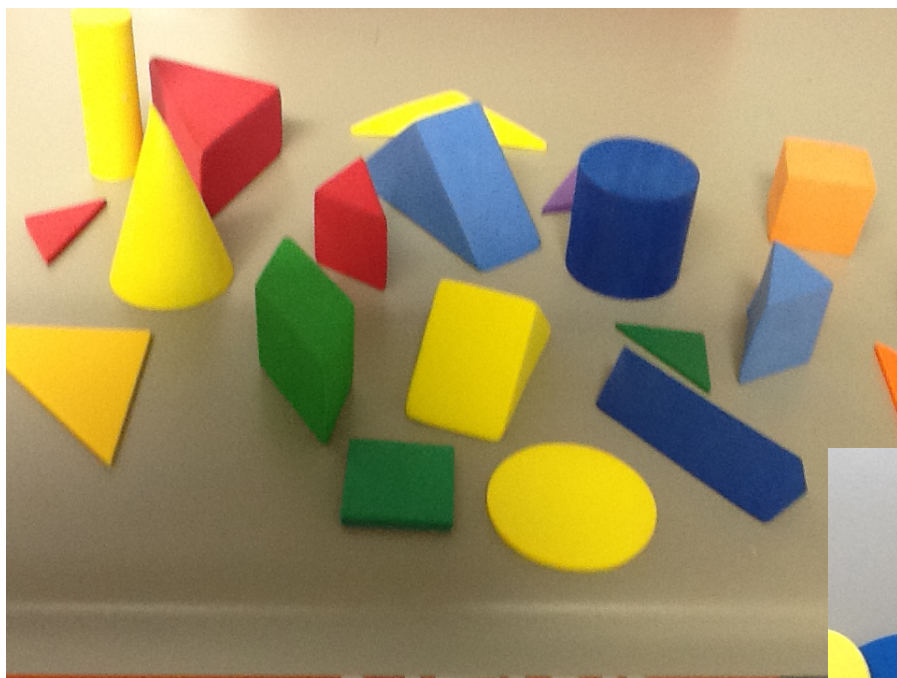
Classifying Objects



Big Idea ONE

- A classification scheme specifies for a space or the objects within it the properties that are relevant to particular goals and intentions.
 - Refine and extend categorizations by more precise language
 - Same collection of objects may be categorized in different ways

Sorting: Flats and Solids (“Fats”)



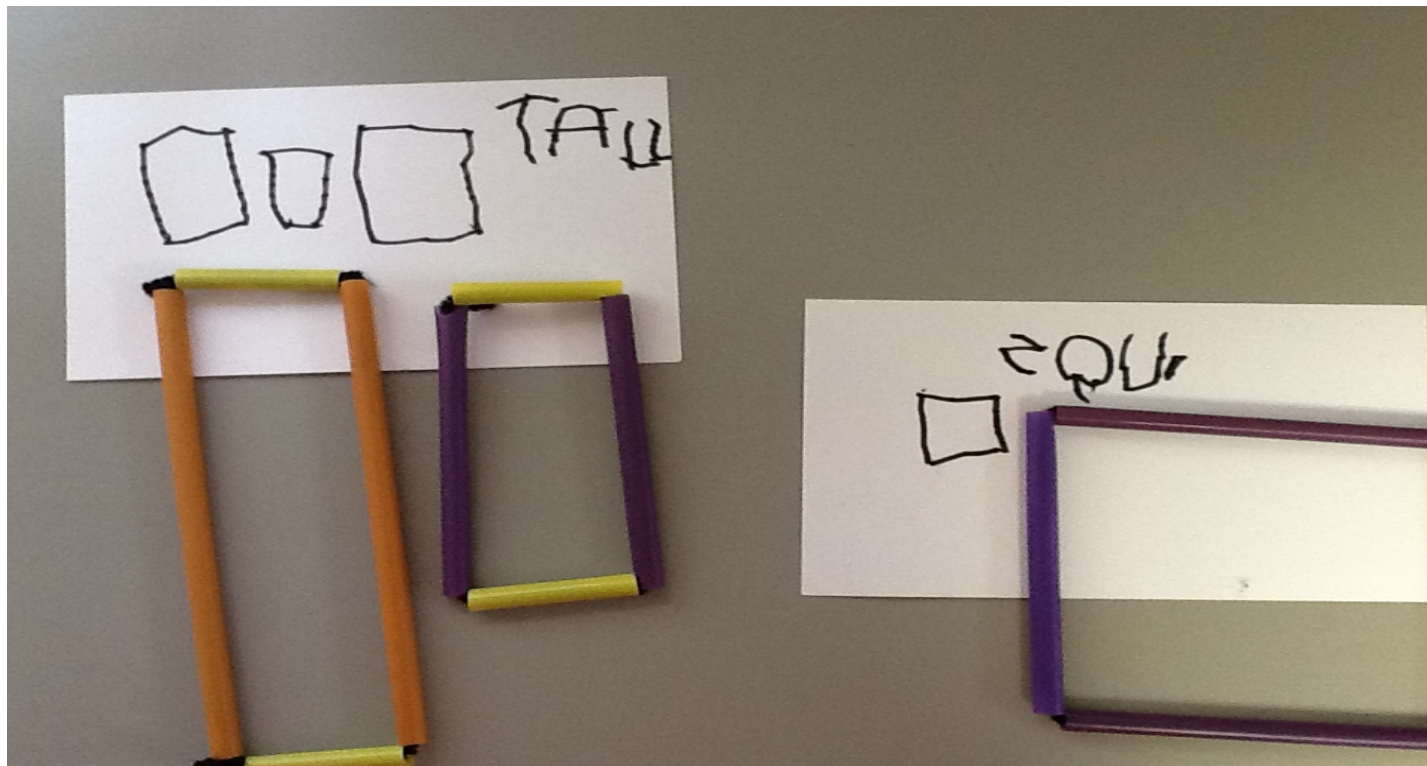
Making Prints with Solids



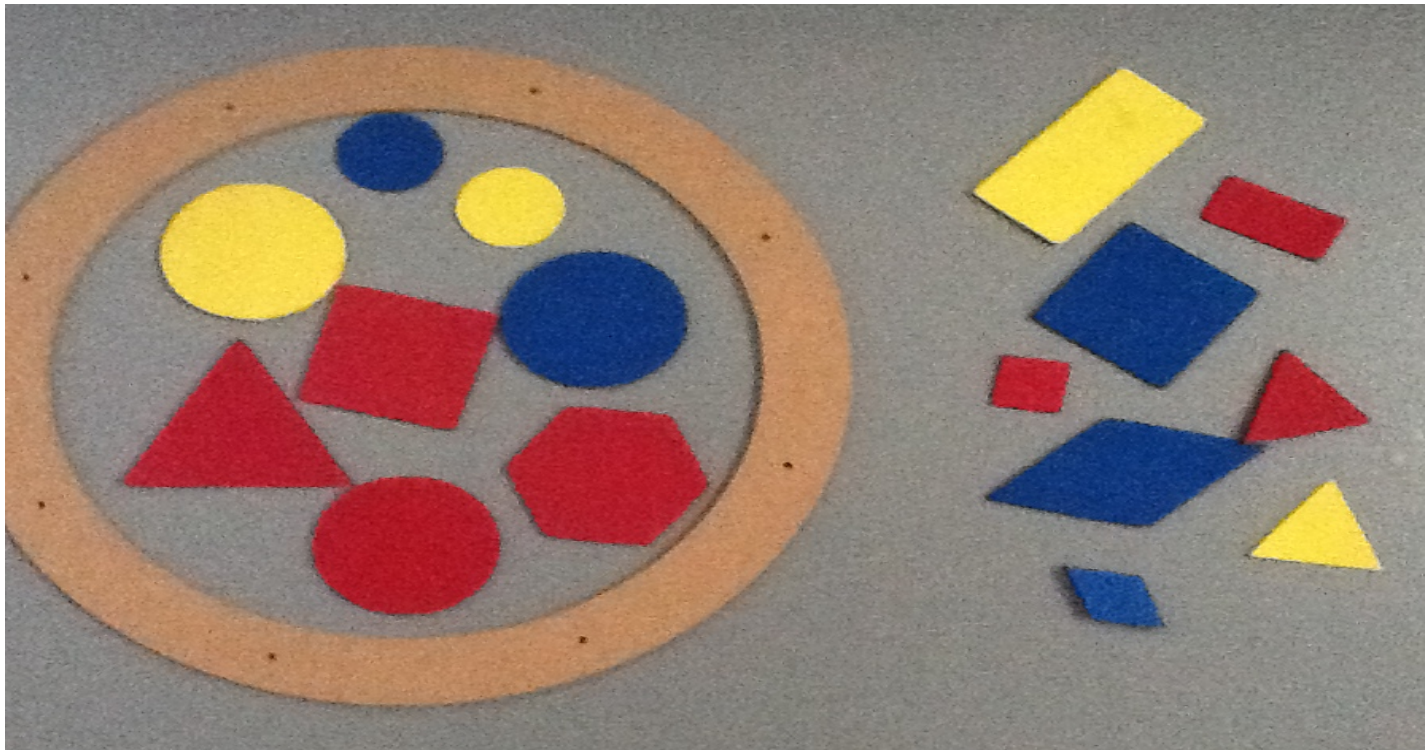
“Stacking” Attributes of Solids



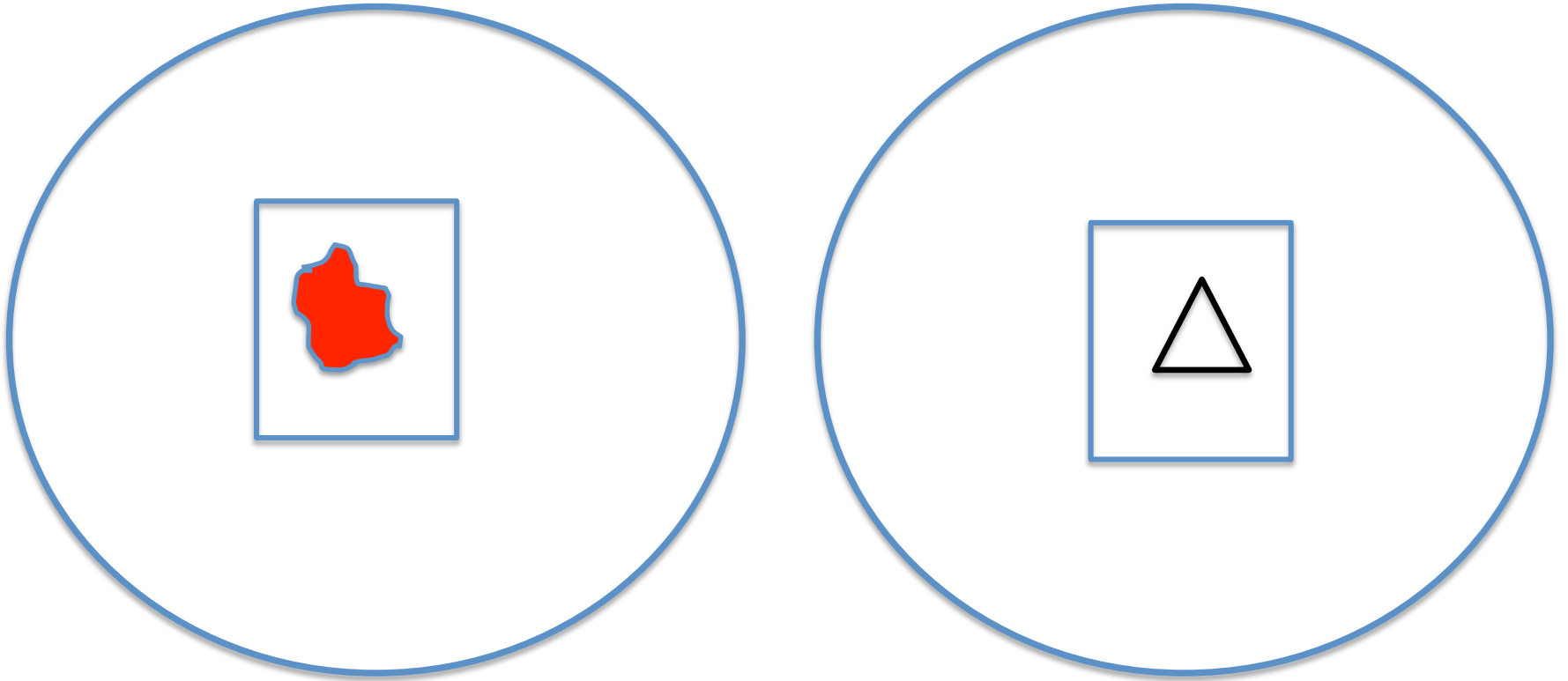
“Tall” and “Squ” Shapes



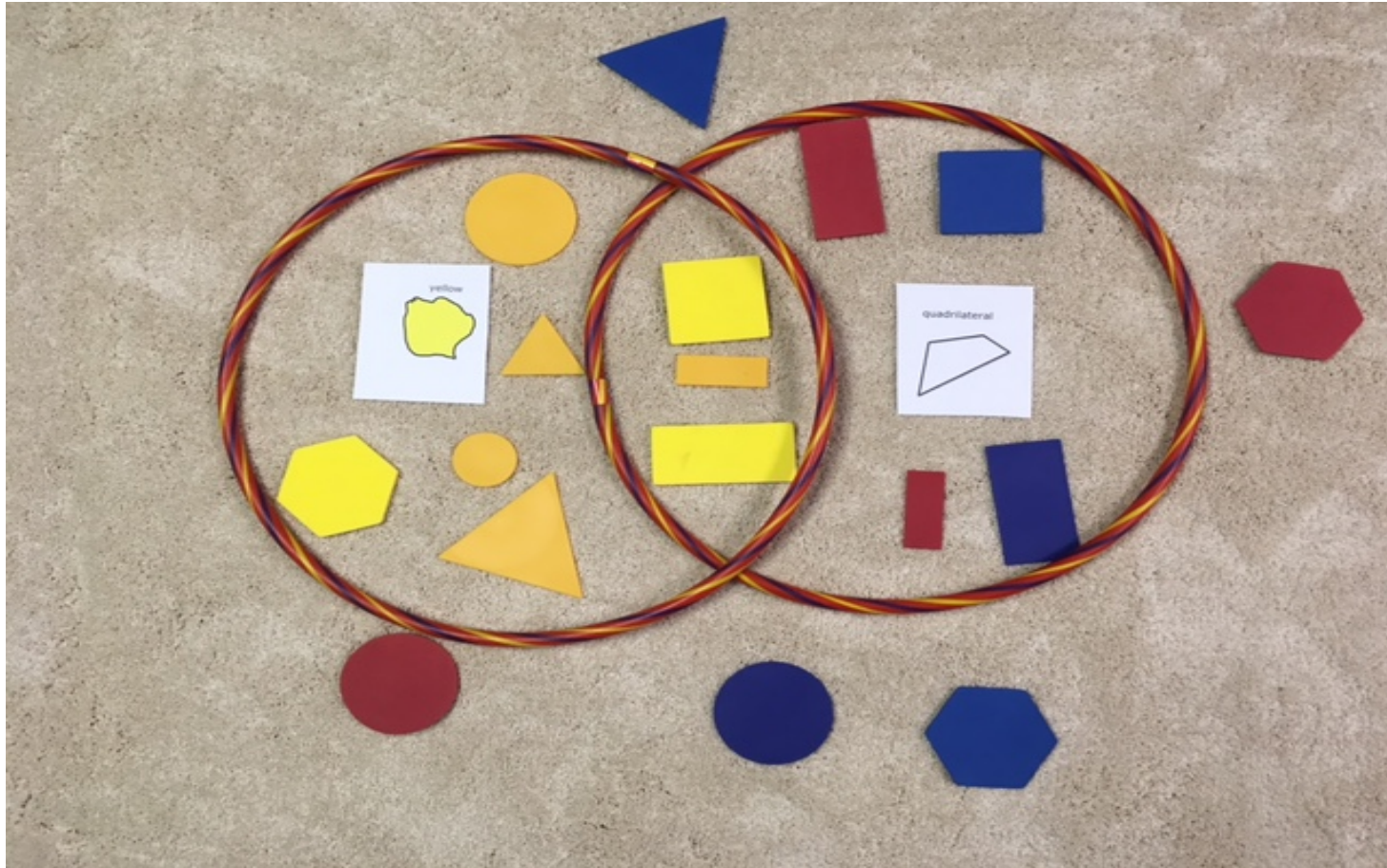
“I like circles and red big ones!”



2D Loop Games

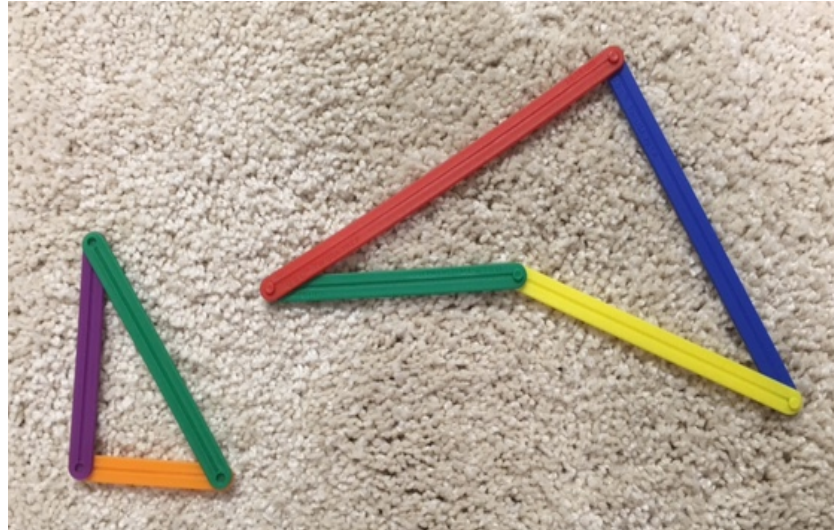


“We gotta’ put them together!”



Creating and Labeling 2D Shapes

Anglegs



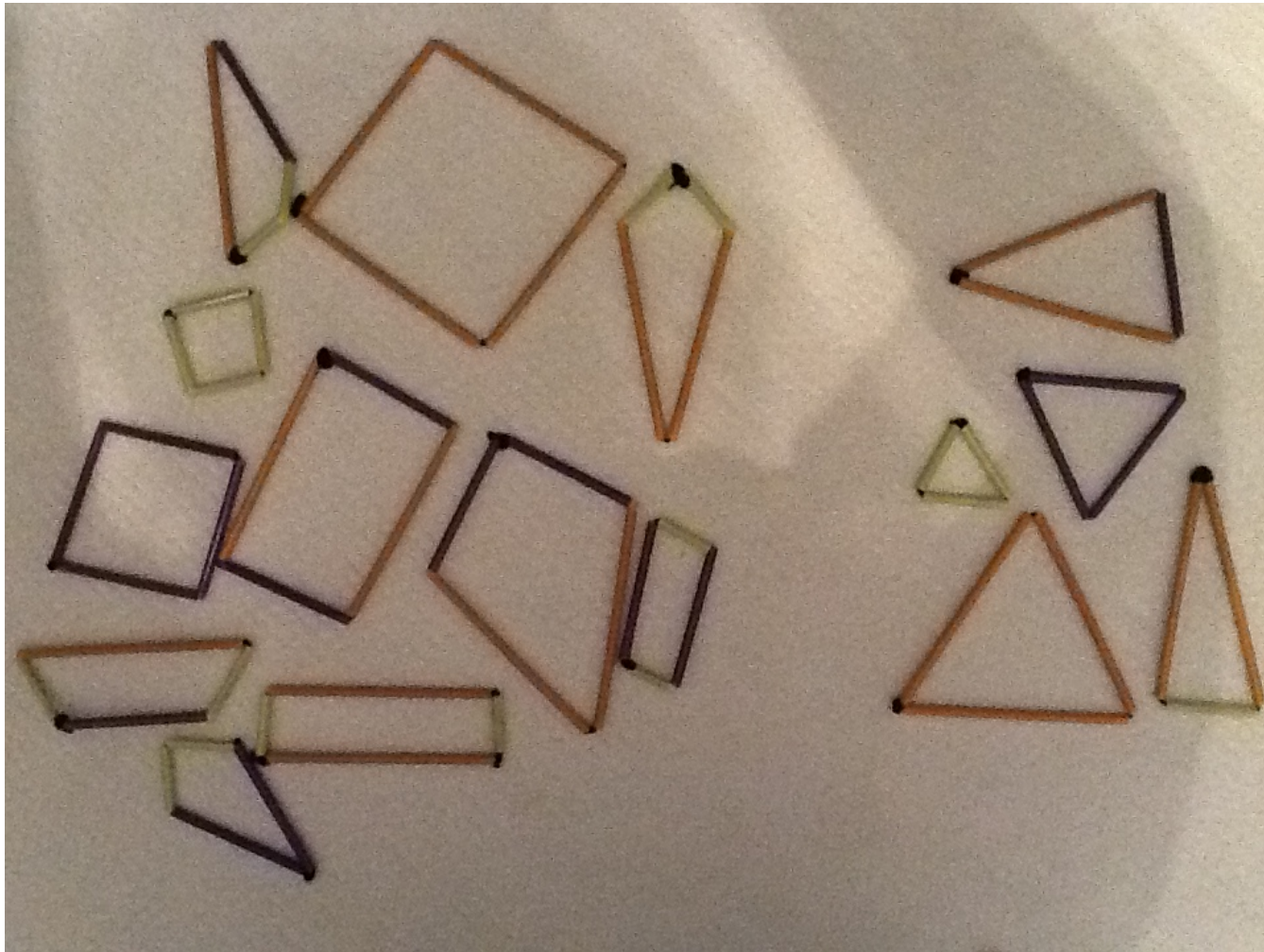
Straws with
threaded
pipe
cleaners



Sticks and
Playdoh



Triangles and Quadrilaterals



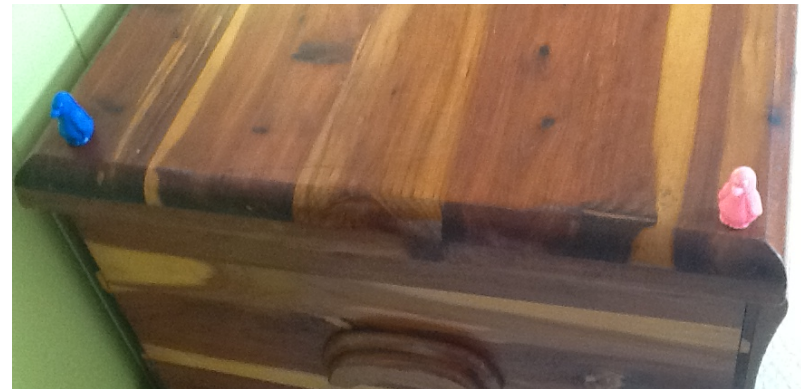
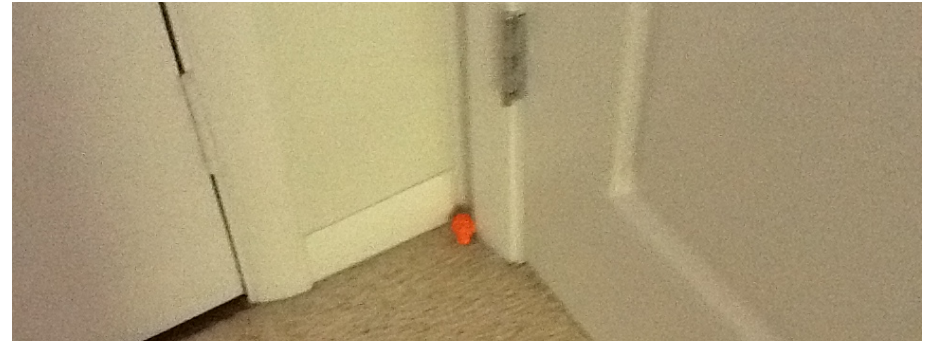


“My frogs
jump in
rectangles!”

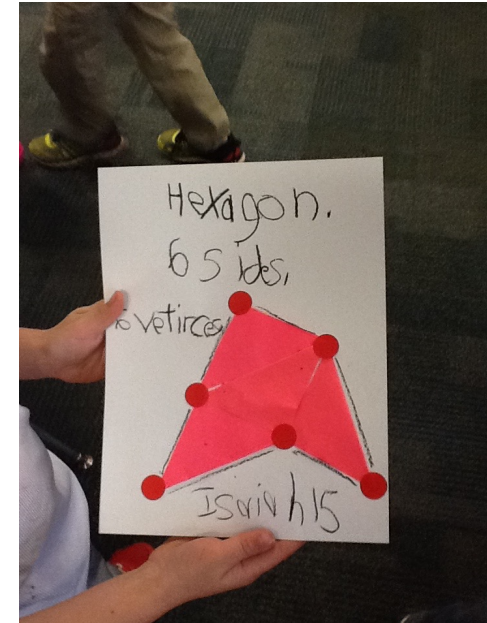
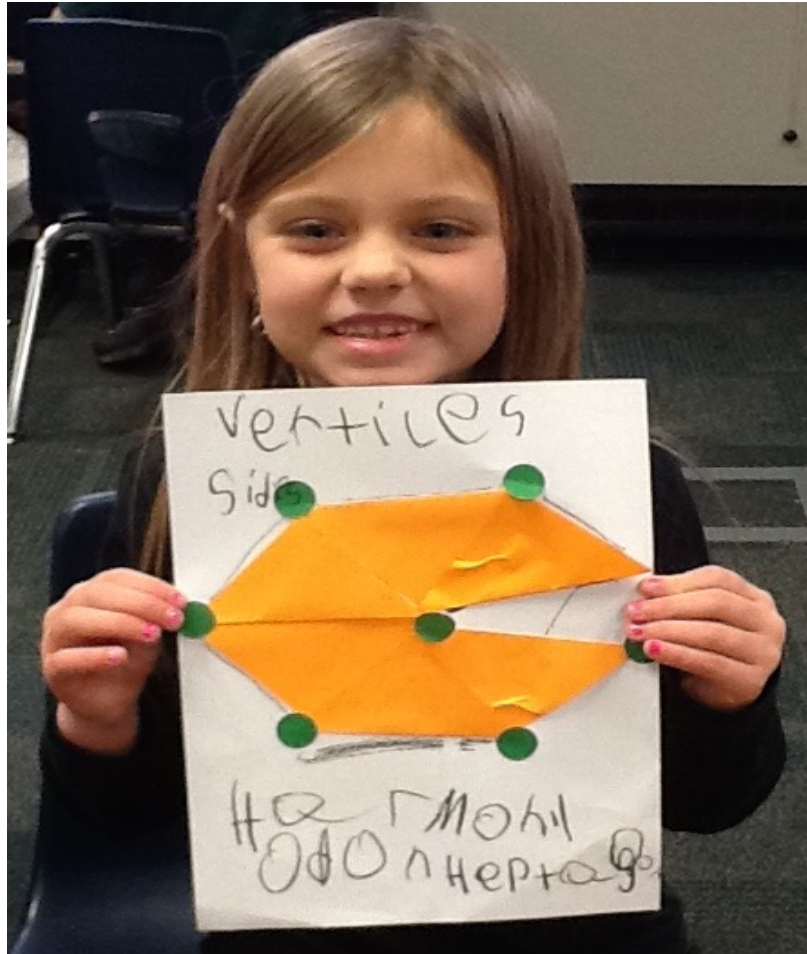
Finding Square Corners



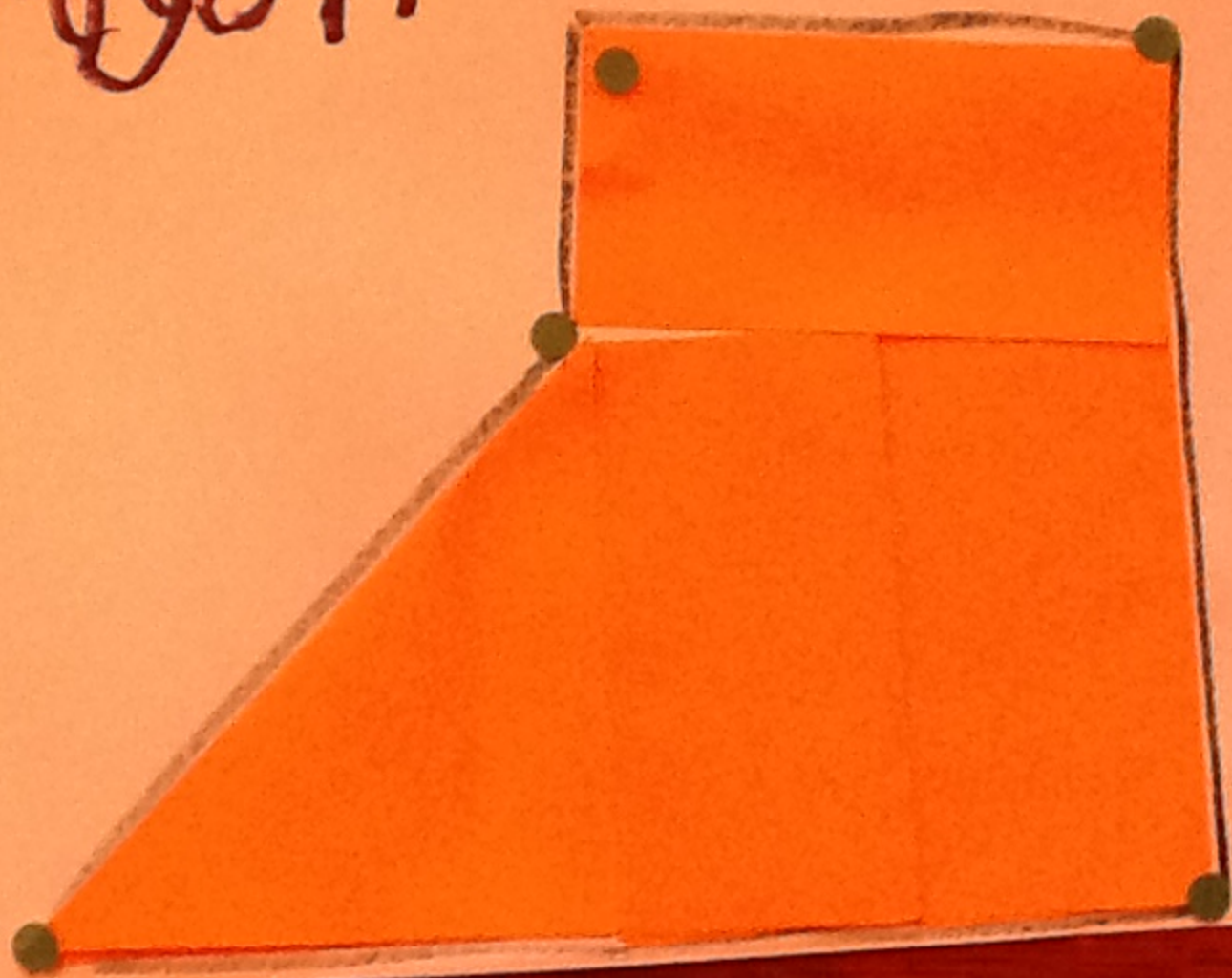
“When you find 1 square corner, you find 3 more.... sometimes!”



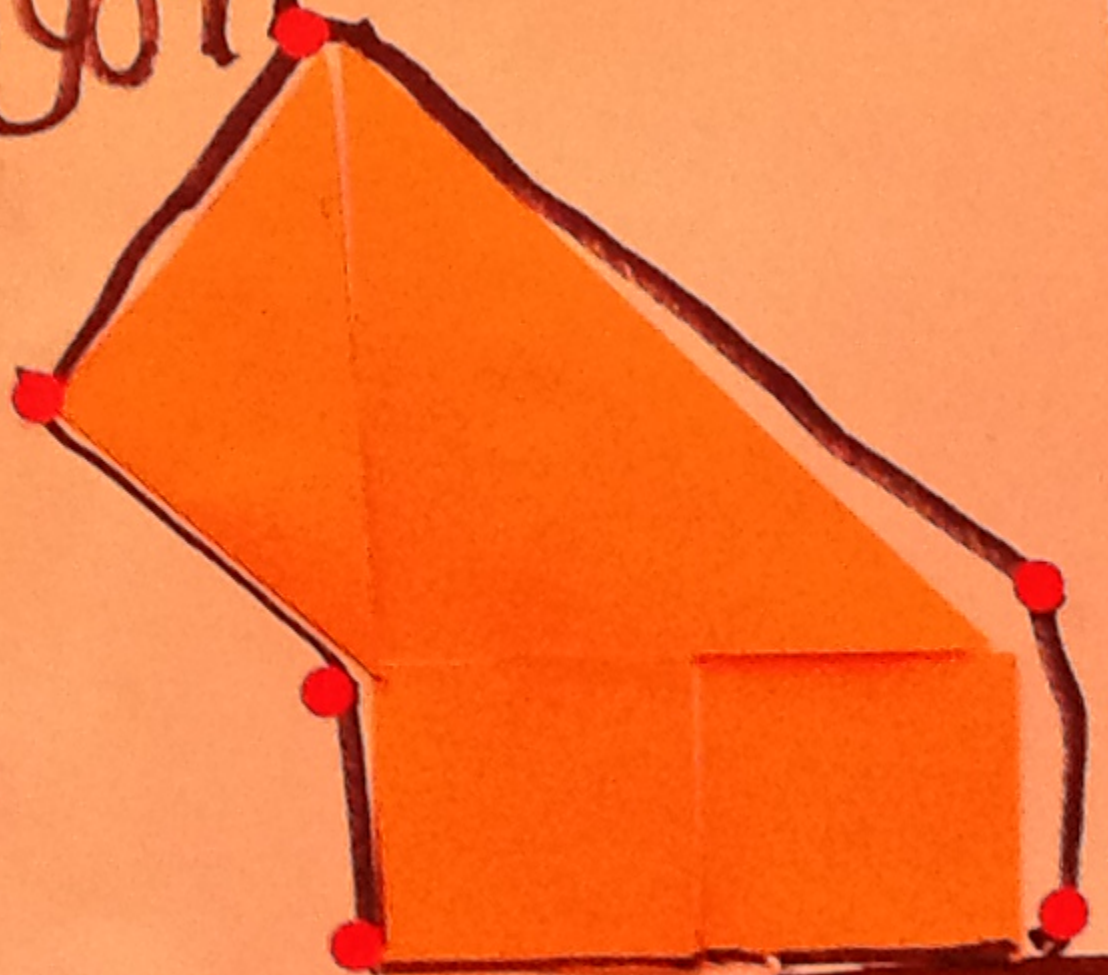
First Grade Created Shapes



pentagon



hexagon





Structuring Space and Identifying Locations



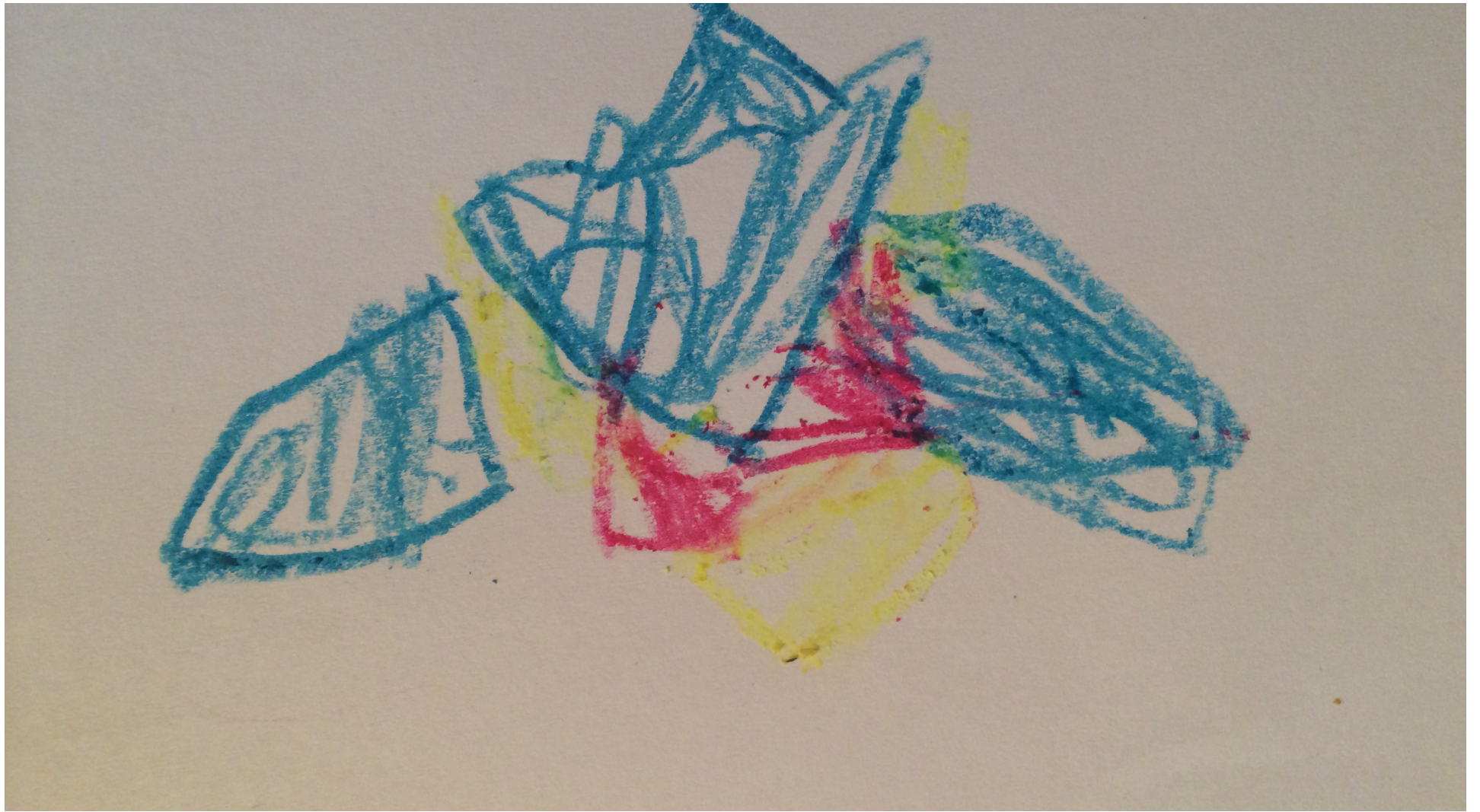
Big Idea TWO

- Geometry allows us to structure spaces and specify locations within them.
 - Describe locations with reference point and distance and direction from point.
 - Position in space can be labeled with numbers.

Organized Using Subitizing, Colors and Grids -



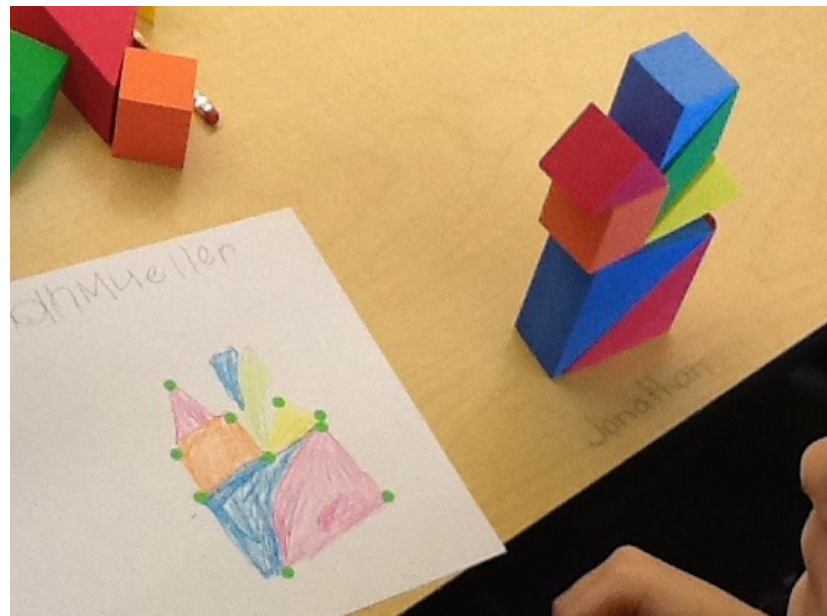




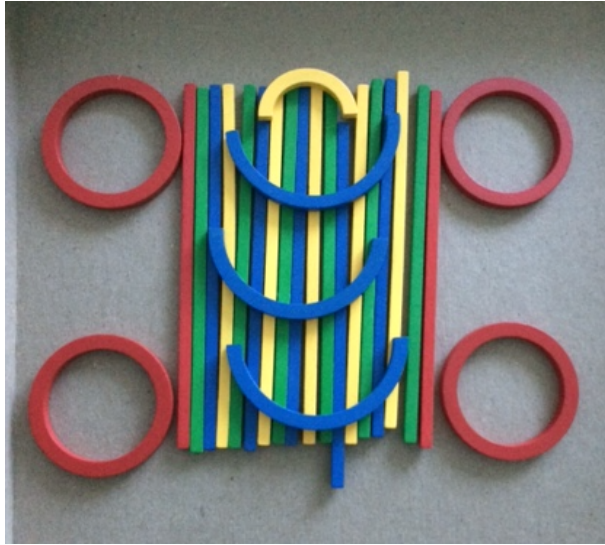
Tangram
Blocks Provide
Good 3D
Building
Explorations

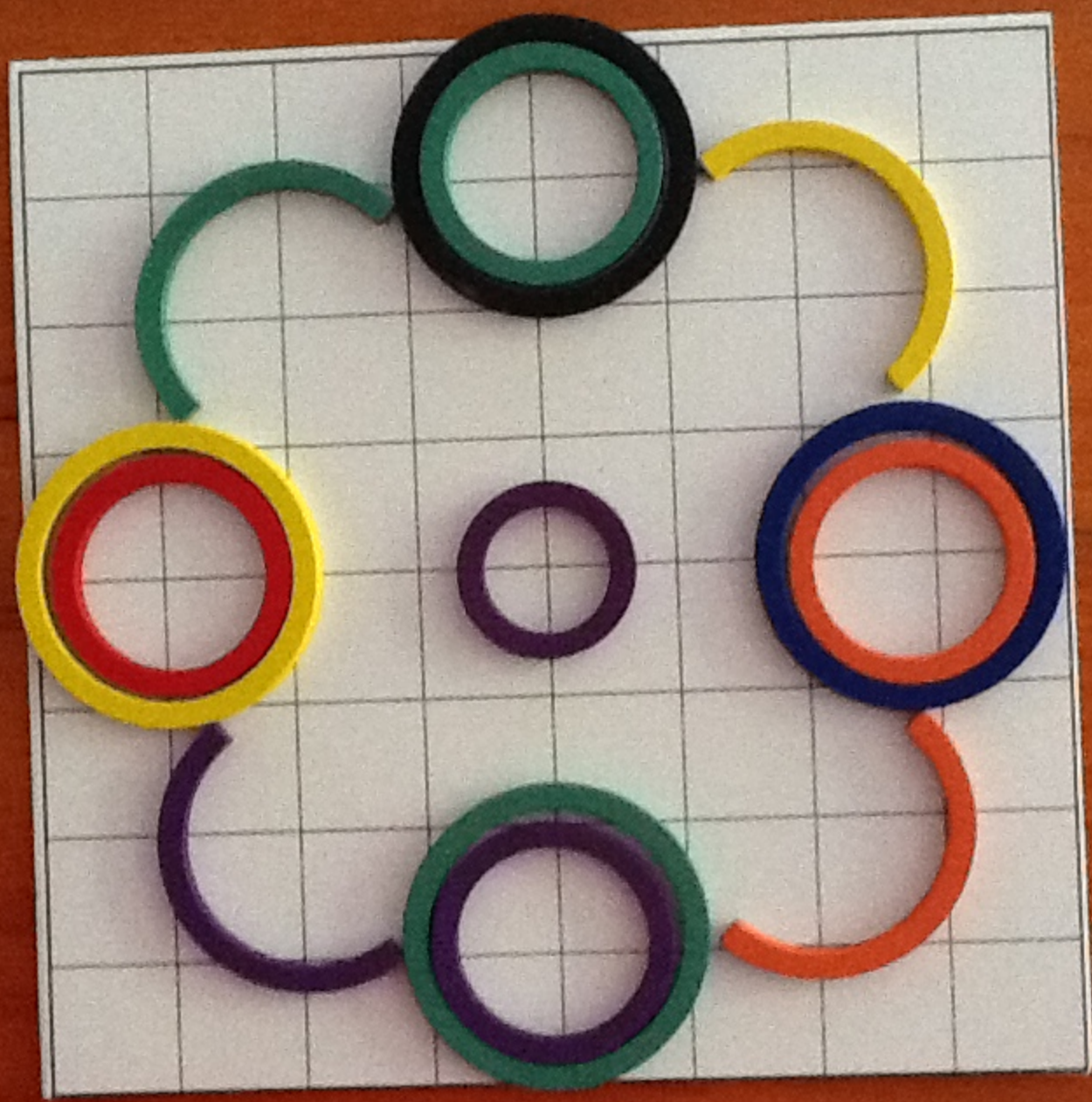


Drawing 3D Structures: Kindergarten



Exploring with Froebel's Gifts






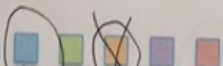


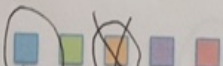
Where's the Stick?

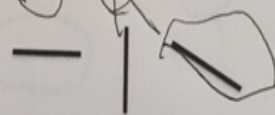
by Tucker

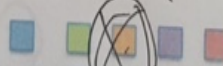
Stick Line Clues

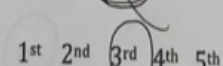
There is a  stick line on the grid.

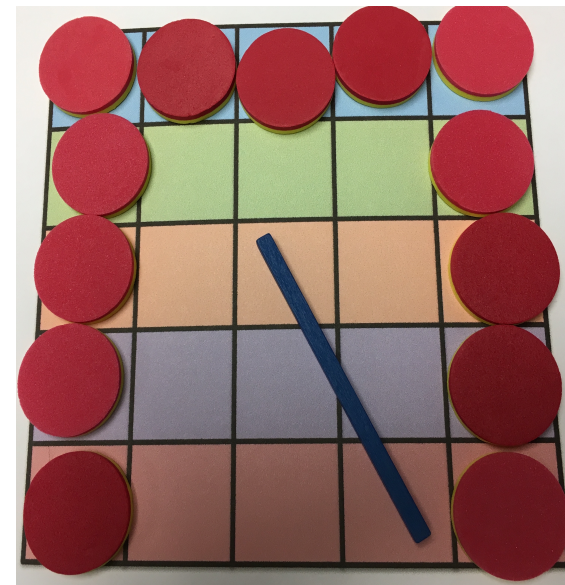
The stick line is NOT in the  ~~column.~~ color.

The stick line is NOT in the  row.

The stick line is 

The stick line begins in a  square.

The stick line begins in a  column.



Red circles are placed in the NOT squares.

Decomposing and Composing Shapes

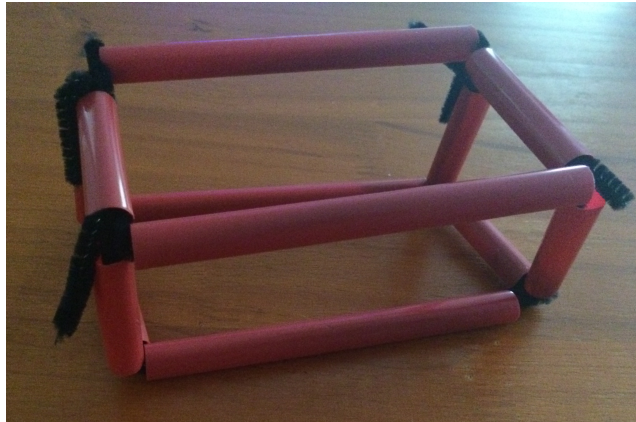


Big Idea FOUR

- One way to analyze and describe geometric objects, relationships among them, or the spaces that they occupy is to quantify – measure or count – one or more of their attributes.
 - Objects can be decomposed and composed to facilitate their measurement.

3D Shapes Made with Straws and Pipe Cleaners Make Excellent Bubble Tools.

Rectangular
Prism

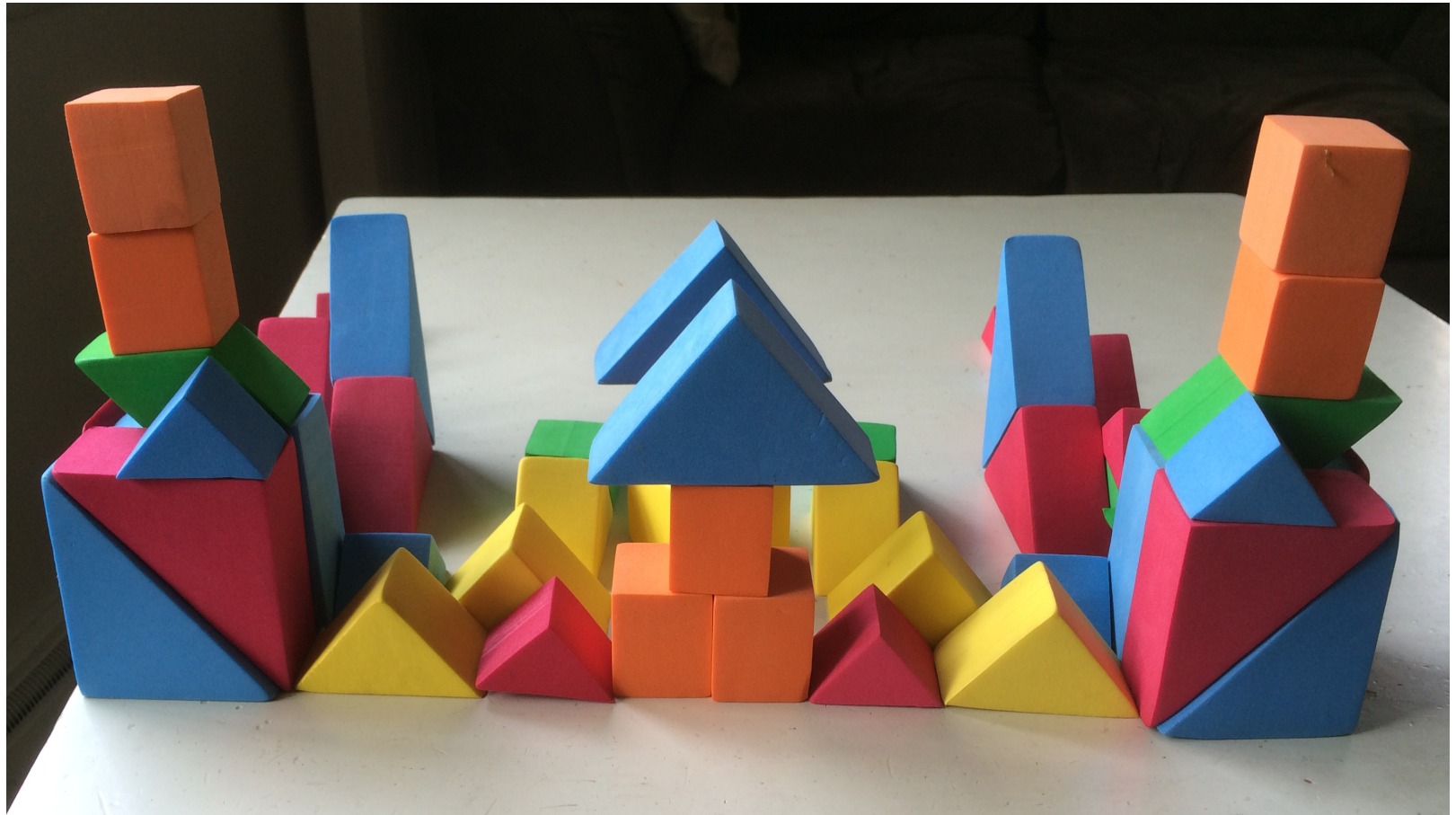


Hexagonal
Prism

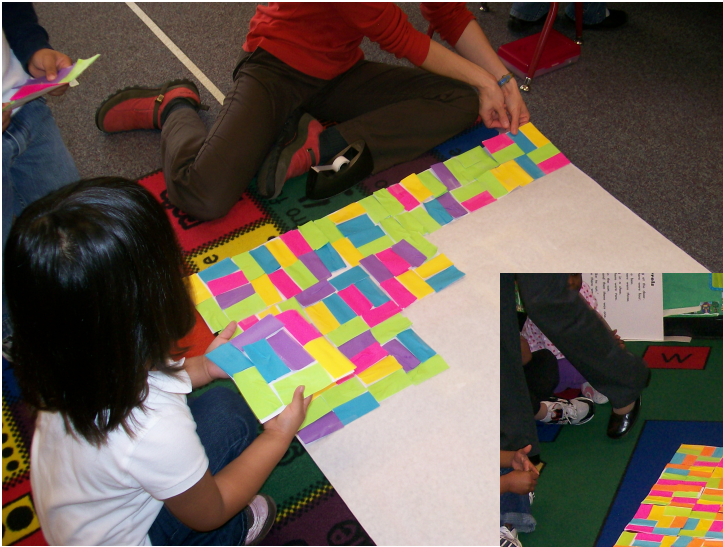


Triangular Pyramid

A Home Built for Twins



Making Rectangular Quilts



PreKindergarten
Students

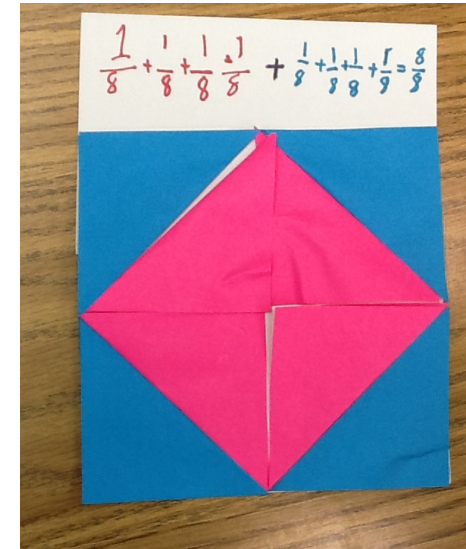
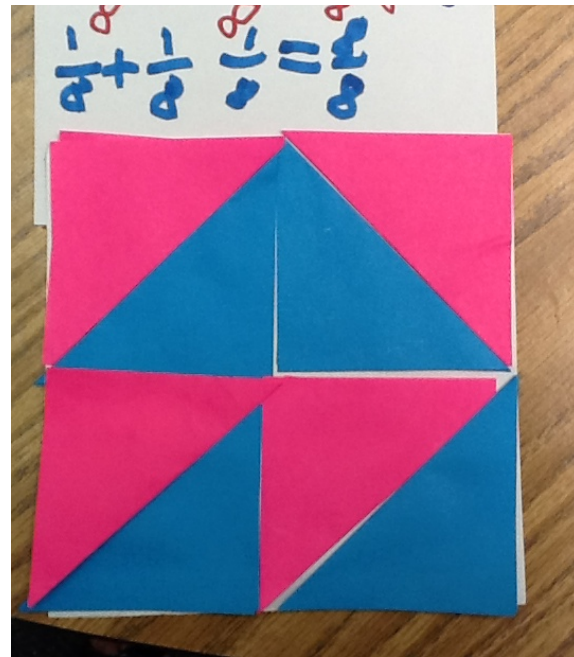
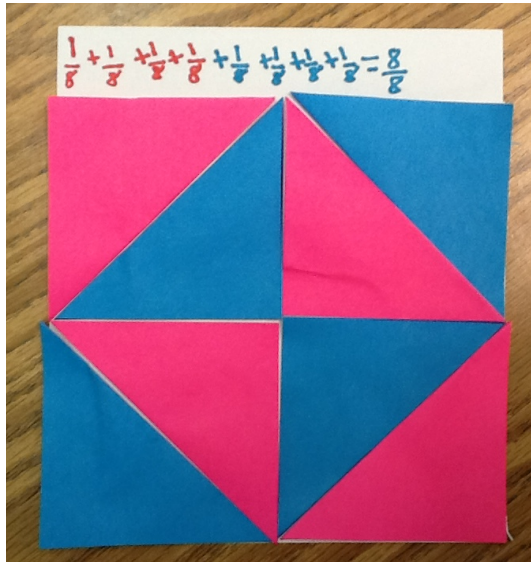




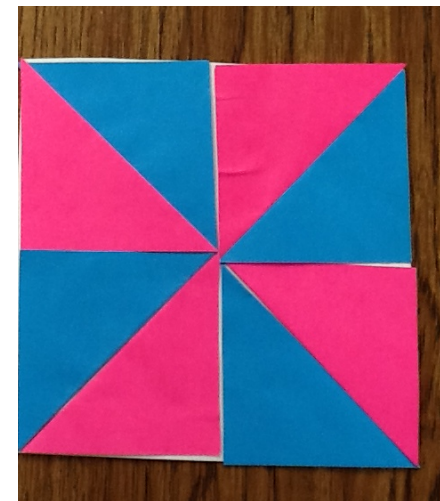
Triangular Quilt by First Graders



Triangular Quilts with 8 Triangles and Labeled with Unit Fractions: 2nd Grade



Is $\frac{1}{2}$ of the square pink? Is $\frac{1}{2}$ of the square blue? How do you know?



Measuring Geometric Attributes



Big Idea FOUR

- One way to analyze and describe geometric objects, relationships among them, or the spaces that they occupy is to quantify – measure or count – one or more of their attributes.
 - Measurement can specify “how much” by assigning a number to attributes (length, area, volume, and angle).
 - Quantities can be compared or measured directly, indirectly or computed for other measurements.
 - Size of the unit and the number are inversely related to each other.

Race to the Top



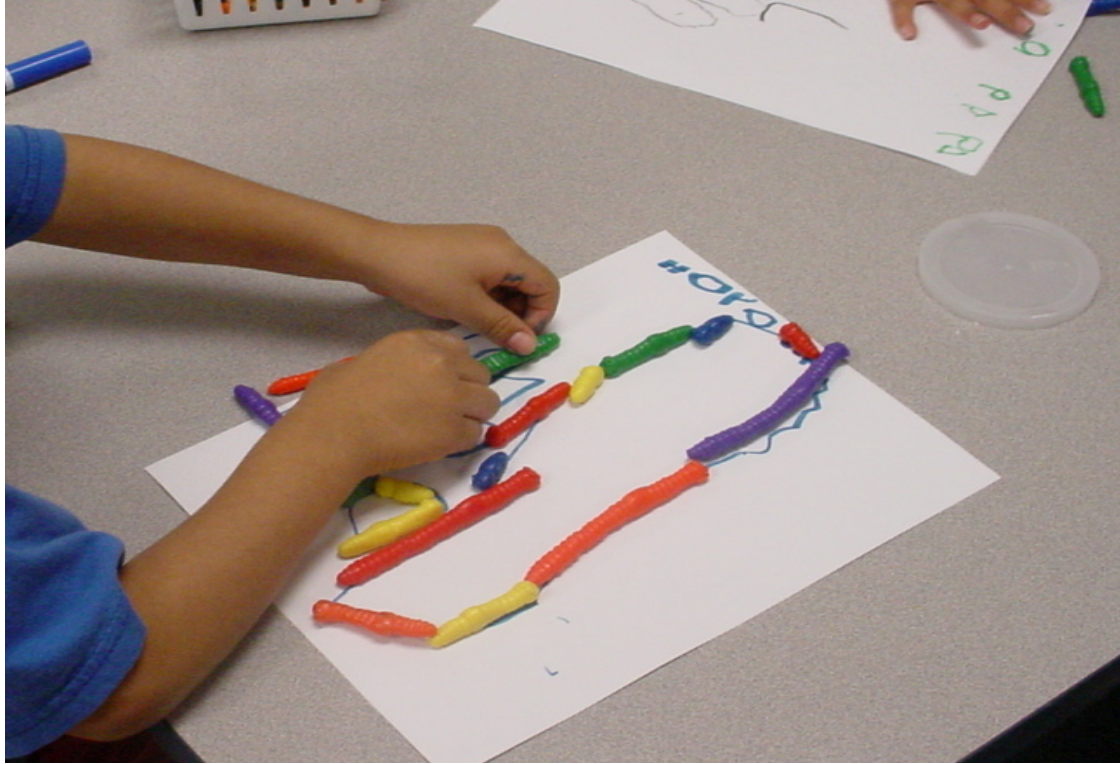


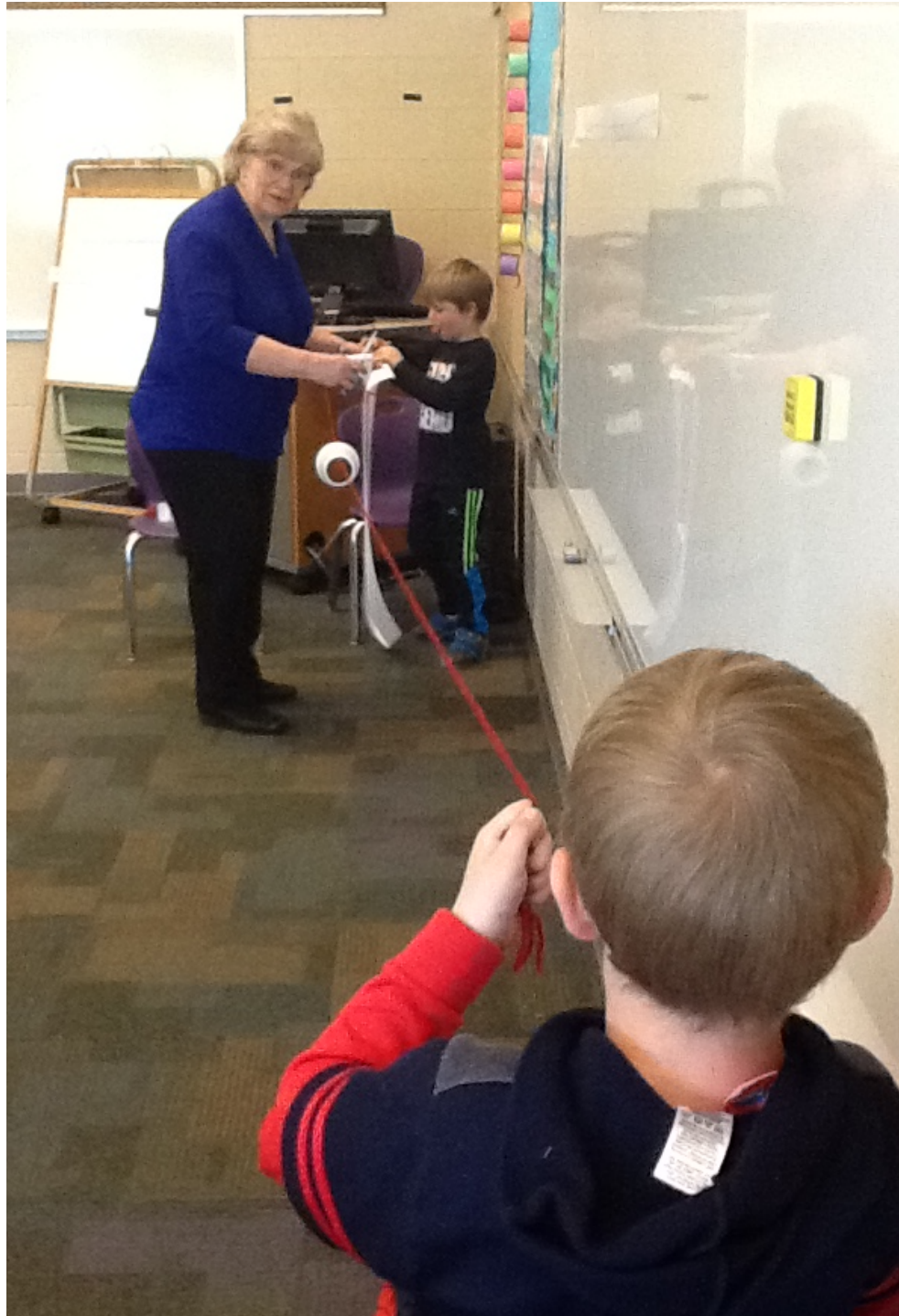


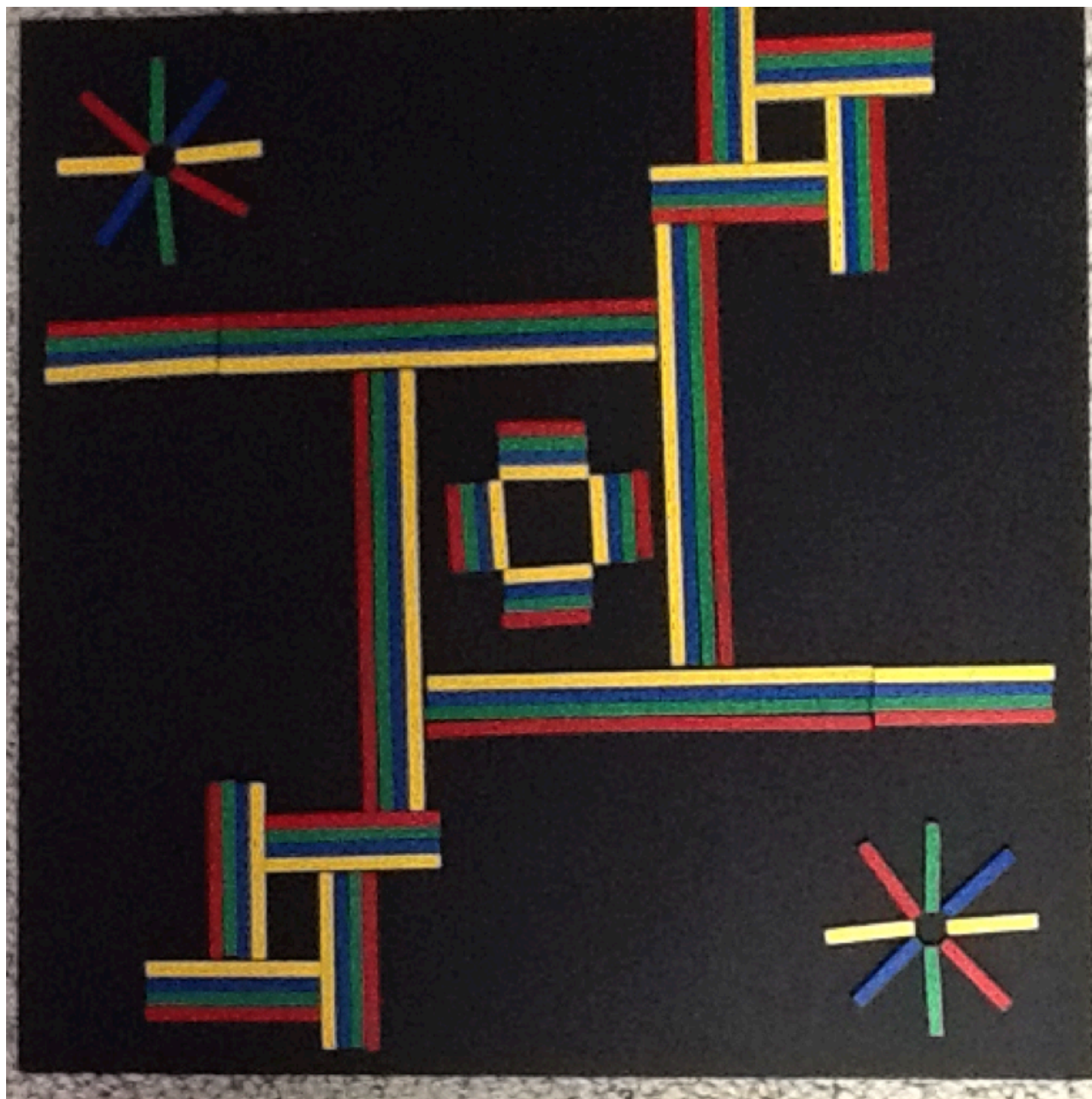


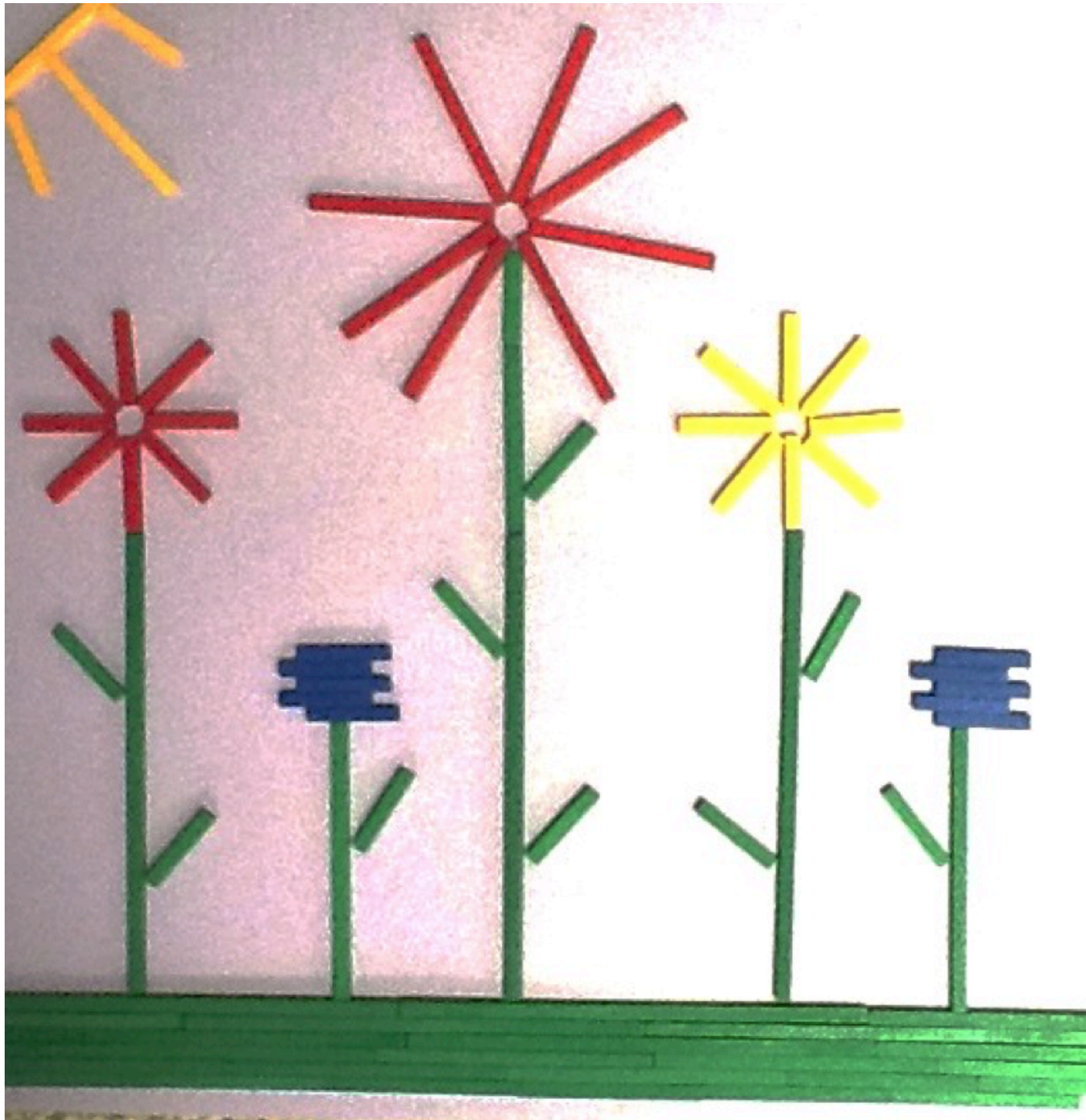








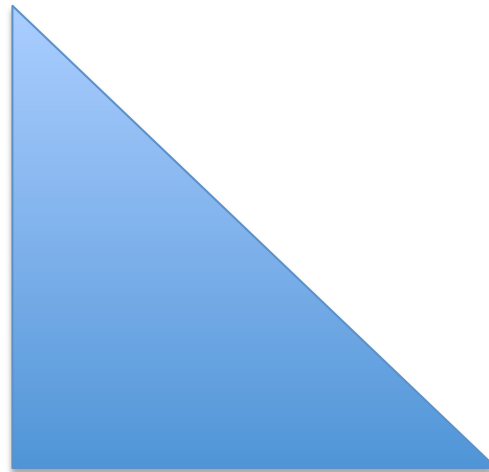
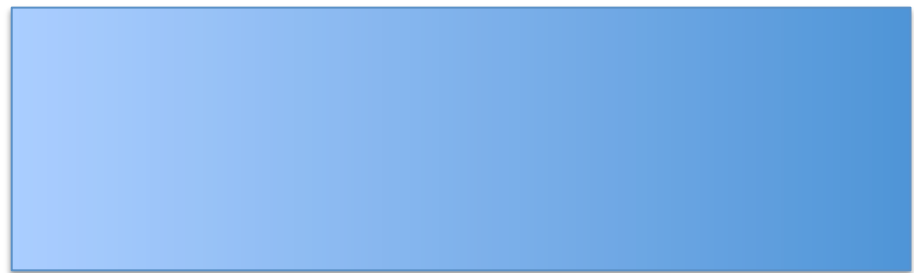


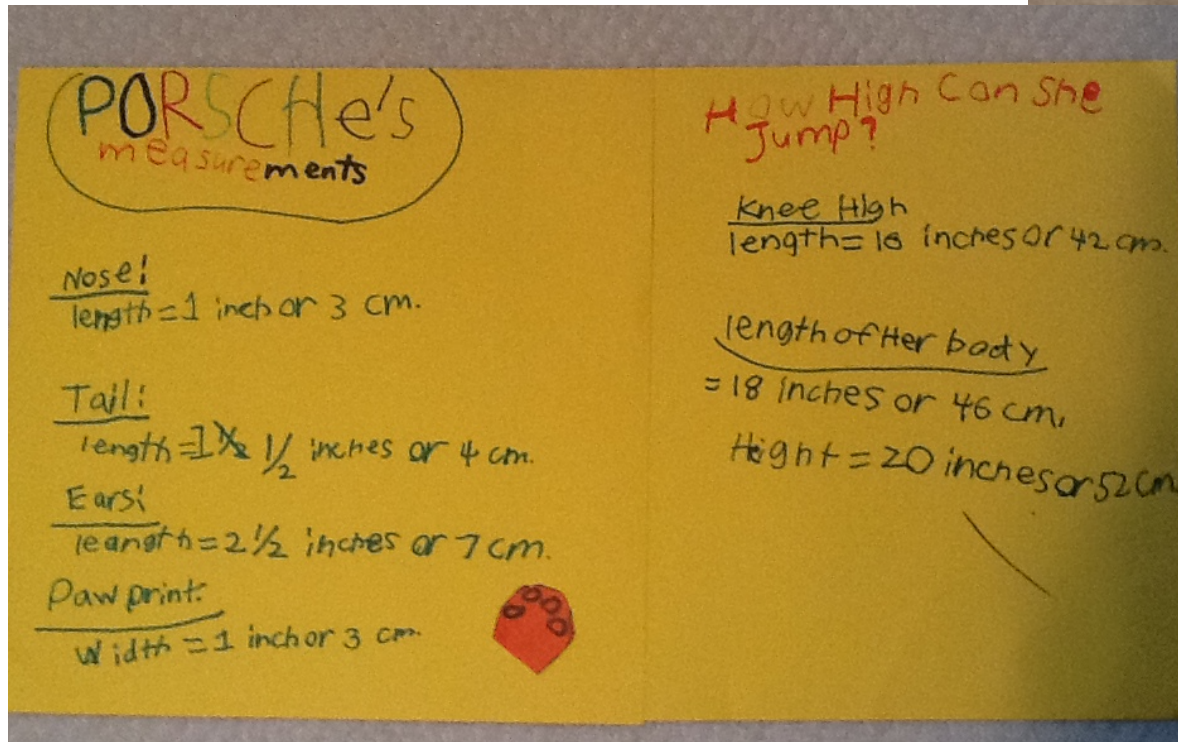






Which Pizza Would you Like?





2nd Grade Measuring Project: My New Puppy



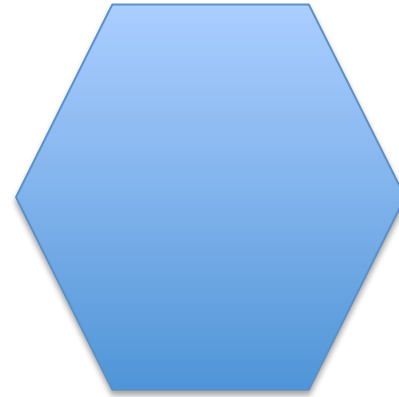
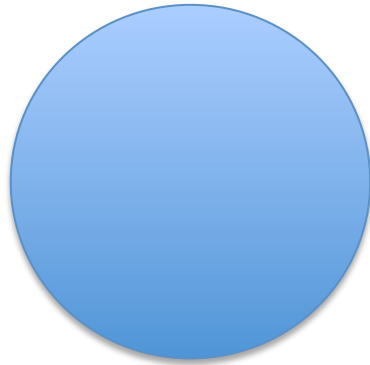
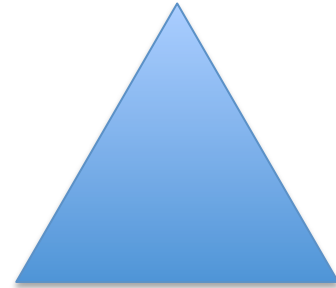
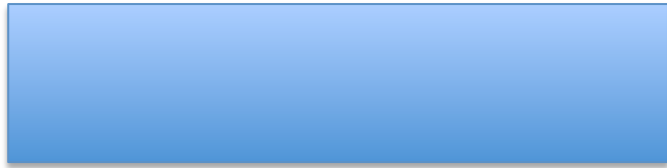
Transforming Shapes and Objects








Big Idea THREE

- We gain insight and understanding of spaces and the objects within them by noting what does and does not change as we transform these spaces and objects in various ways.

What Shapes Can You Make Using a Mirror?



	<p>"Same shape again . . . I can put the mirror one way or the other, and I still get the same thing!"</p>
	<p>"I just made a little diamond . . . Or a crooked square!"</p>
	<p>"I made a bow tie! What's it called?" "Count the sides." "Six sides! That's an octagon, I think!"</p>
	<p>"Looks kinda like a football!" "Yeah, the circle is boring!" "Let's stick with the other ones . . ."</p>
	<p>"If you put the mirror on opposite corners, you always get the same shape again no matter what way the mirror is facing!" <i>[From a second grader]</i></p>

After this presentation, I will...

- Start doing...
- Keep doing...
- Stop doing...

- Juanita Copley, Professor Emerita, University of Houston, copvar65@gmail.com OR ncopley@aol.com.
- Special thanks to 31 teachers, students, and supervisors, PreK – 2nd grade in Michigan and Texas.