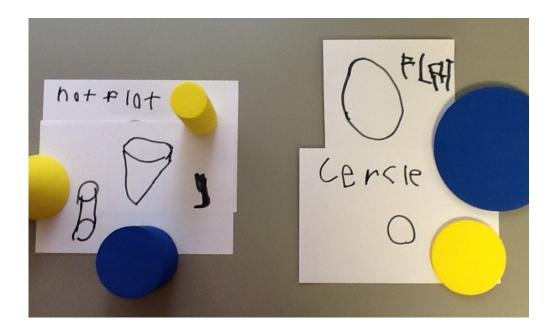
Understanding
Geometry and
Measurement
Pre-K – 2nd
Grade:





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

PreKindergarten

- Foundational Concepts: Identify measureable attributes; focus on vocabulary to describe comparison
- <u>Length</u> direct comparison
- Area direct comparison by one side only
- <u>Capacity</u> direct comparison by pouring
- Routine: Measurement Moves
- Whole Group and Center: I'm Heavy!**
- <u>Circle and Small</u> <u>Group</u>: Parking Cars *
- Circle and Small Group: Race to the Top*
- <u>Center:</u> Exploring Capacity

Kindergarten

- Foundational Concepts: Identify measureable attributes; explore conservation, begin iteration, transitivity
- <u>Length</u> direct comparison; focus on conservation; serial orderer with lengths marked in units
- Area covering shapes with squares and grids
- <u>Capacity</u> direct comparison by pouring
- Routine: How Tall is that Tower?
- Small Group: Rockets
- Whole Group and Partners: Cubits and Rods*
- <u>Center:</u> Heavier, Lighter, About the Same: **
- <u>Center:</u> Measuring Around

First Grade

- Foundational Concepts: iterates with accuracy; explains transitivity
- <u>Length:</u> indirect measurer with samesize length- units
- Area: Begins to count some but not all rows of area; explores by drawing squares and structuring shape.
- Volume: Begins to explore by packing boxes with centimeter or inch cubes: counts
 cube one at a time.

Second Grade

- Foundational Concepts: Inverse relationship between size of the unit used to measure and the number of units.
- Length: Measure
 accurately using a ruler
 and the alignment of
 zero point. Uses
 standard units
- <u>Area:</u> structures space by drawing; conserves and reasons about additive composition
- Volume: uses samesize units to fill and count accurately.

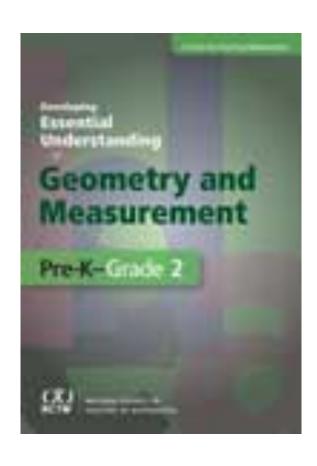


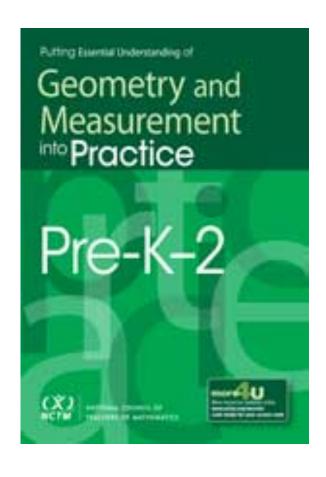
- Whole Group: Exploring Shapes*
- <u>Small Group</u>: Inch Tools
- Whole Group and <u>Center:</u> Measuring Pizza **
- Center: Stick Designs
- Whole Group and Small Group: Robert Wadlow and Feet **

- Routine: Cover It and Fill It!
- Homework Project: Measuring Porsche
- <u>Center:</u> Long, Wide, High and Around
- Whole Class and Centers: Estimation Olympics
- Small Group : Face Measures



NCTM Publications





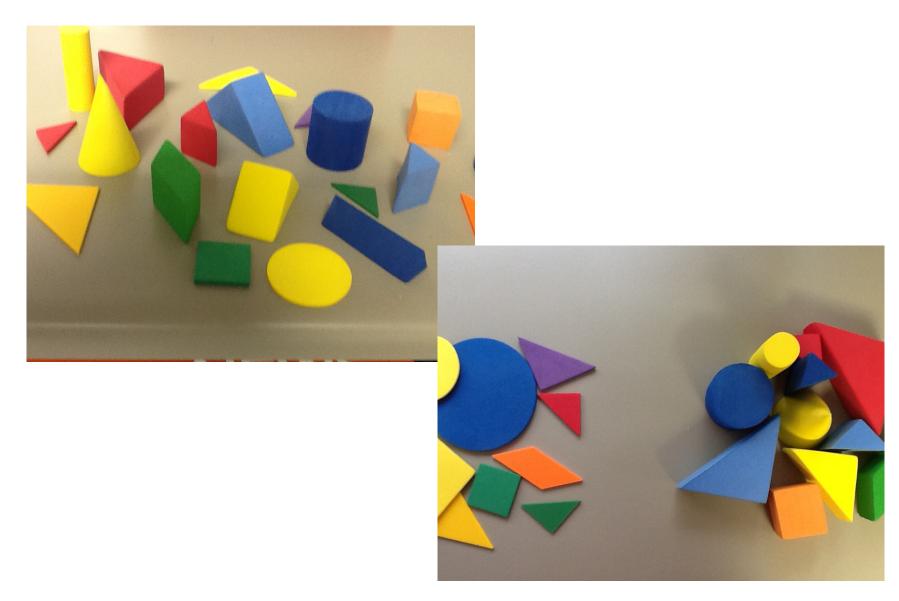
Topics

- Classifying objects —— Big Idea ONE
- Structuring space and identifying locations
 Big Idea TWO
- Decomposing and composing shapes → Big Idea FOUR

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")



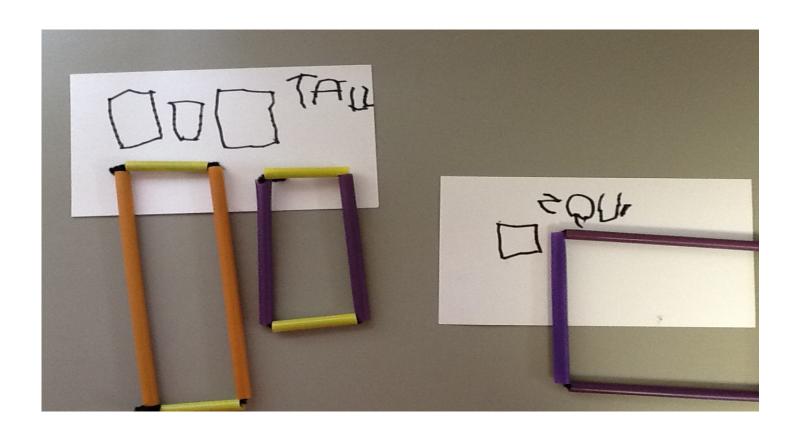
Making Prints with Solids



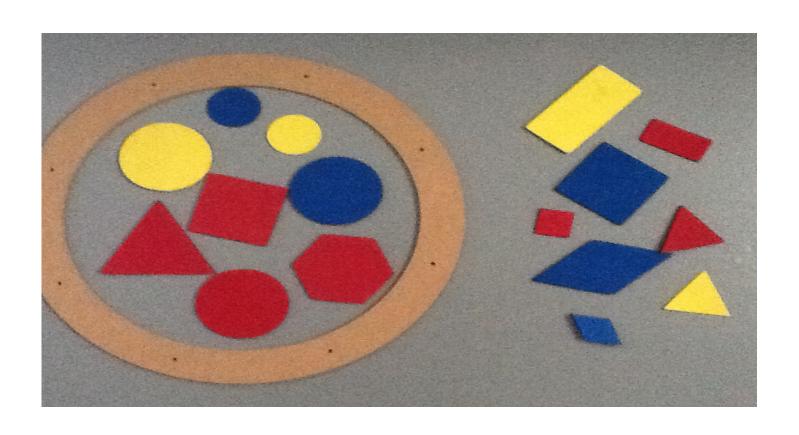
"Stacking" Attributes of Solids



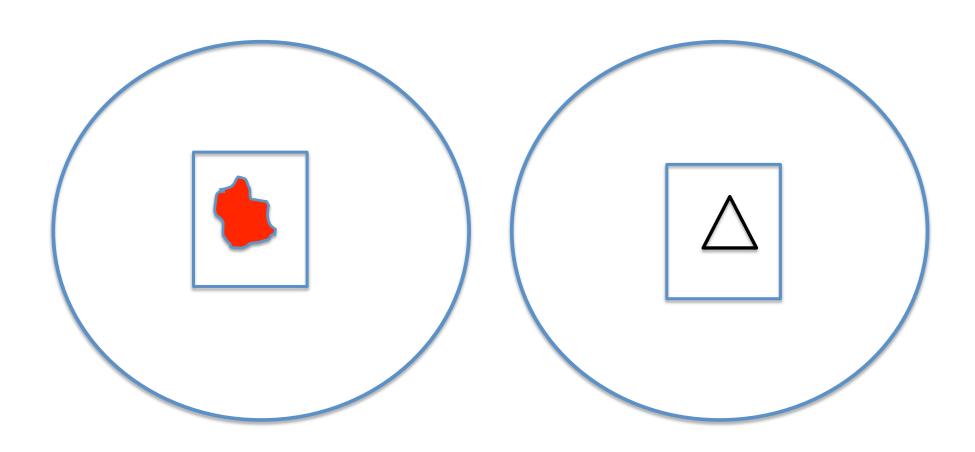
"Tall" and "Squ" Shapes



"I like circles and red big ones!"



2D Loop Games

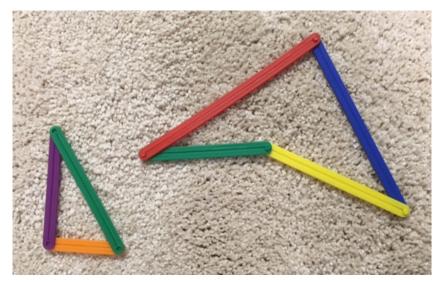


"We gotta'put them together!"



Creating and Labeling 2D Shapes

Anglegs



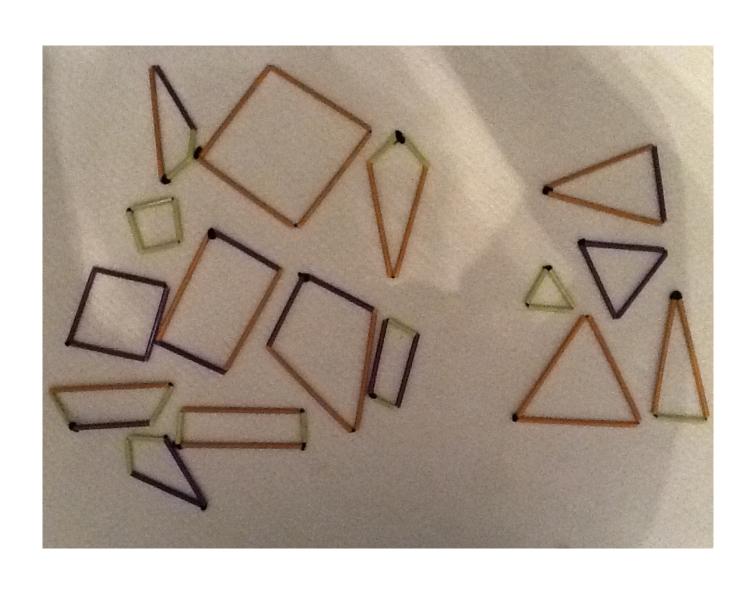
Straws with threaded pipe cleaners

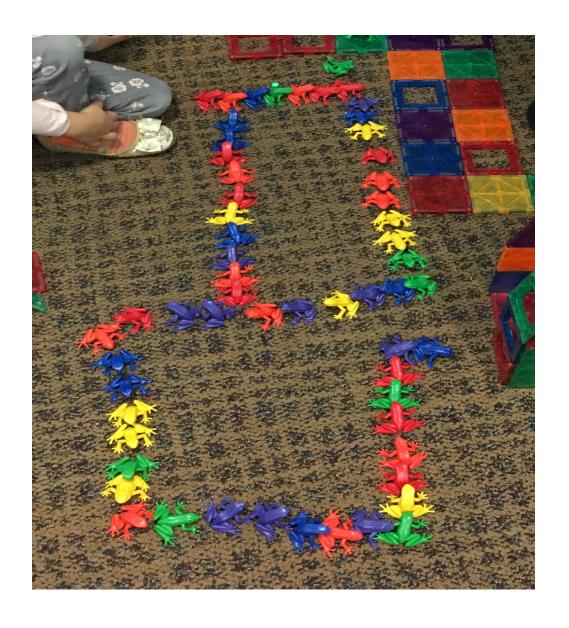


Sticks and Playdoh



Triangles and Quadrilaterals





"My frogs jump in rectangles!"

Finding Square Corners



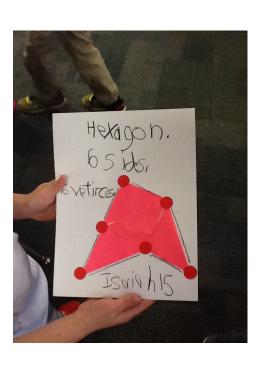
"When you find 1 square corner, you find 3 more.... sometimes!"





First Grade Created Shapes





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he Xpgob



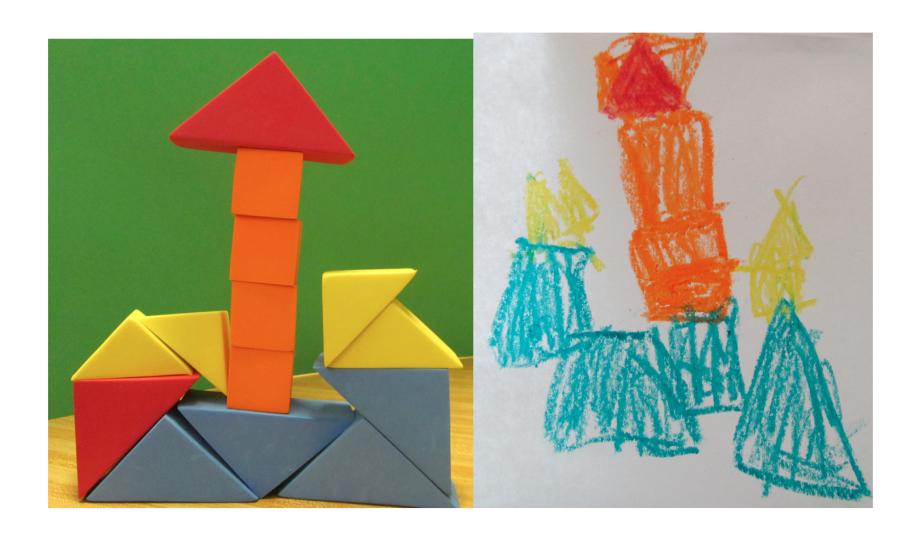
Structuring Space and Identifying Locations 1

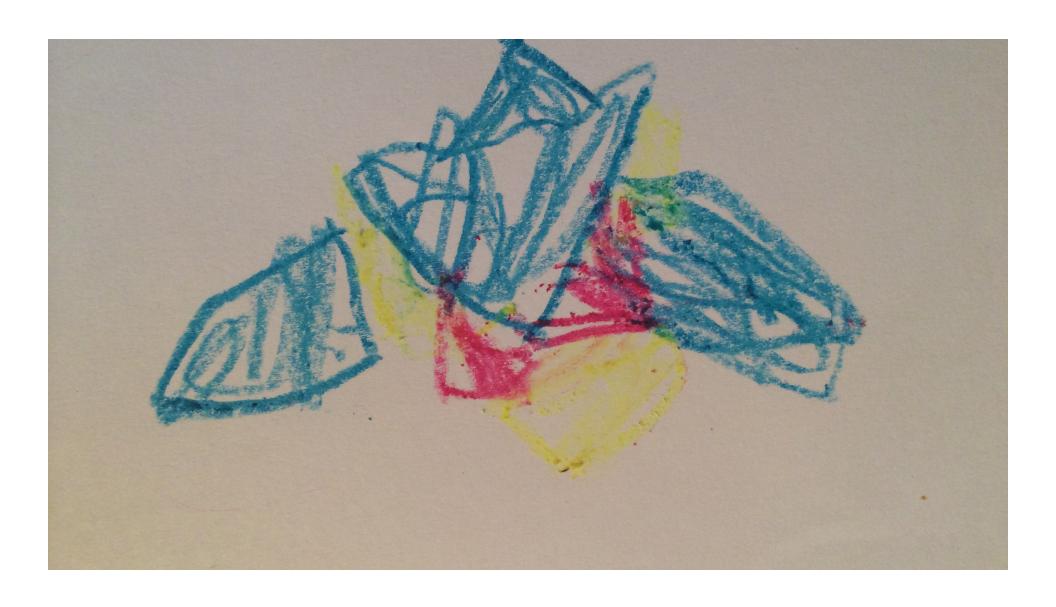
Big Idea TWO

- Geometry allows us to structures 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 -







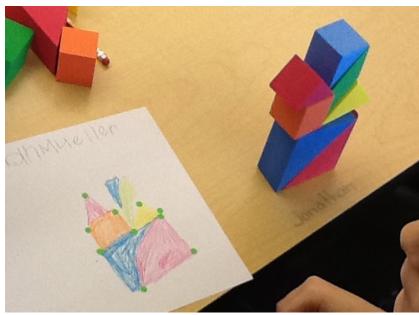
Tangram
Blocks Provide
Good 3D
Building
Explorations



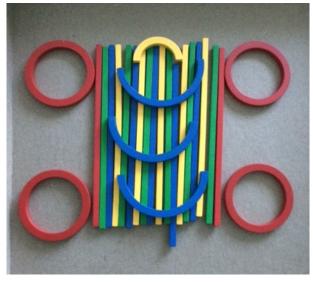


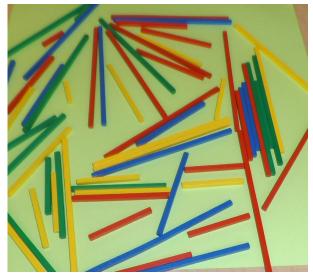
Drawing 3D Structures: Kindergarten



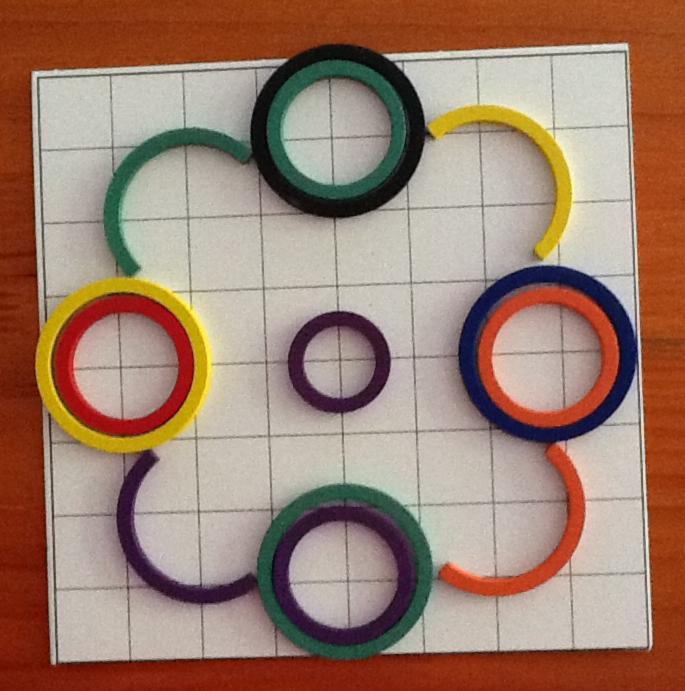


Exploring with Froebel's Gifts

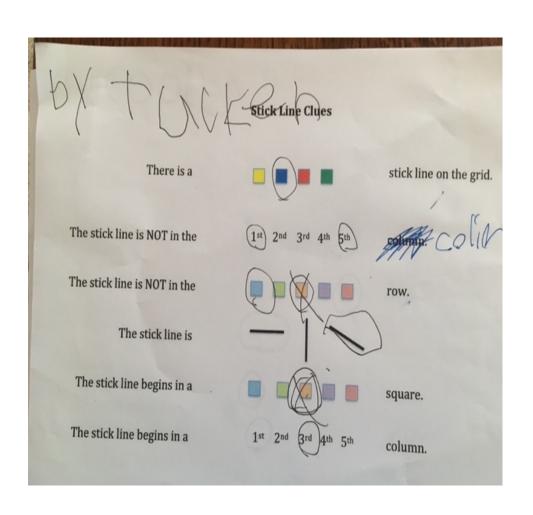


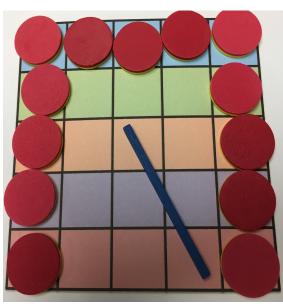






Where's the Stick?





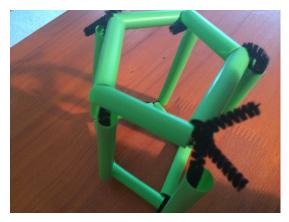
Red circles are placed in the NOT squares.

- 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





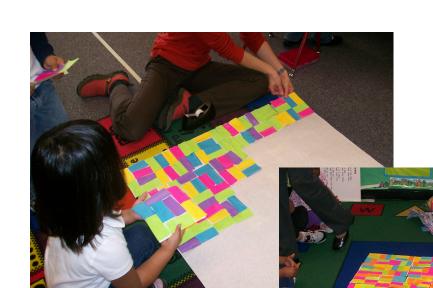
Hexagonal Prism



Triangular Pyramid

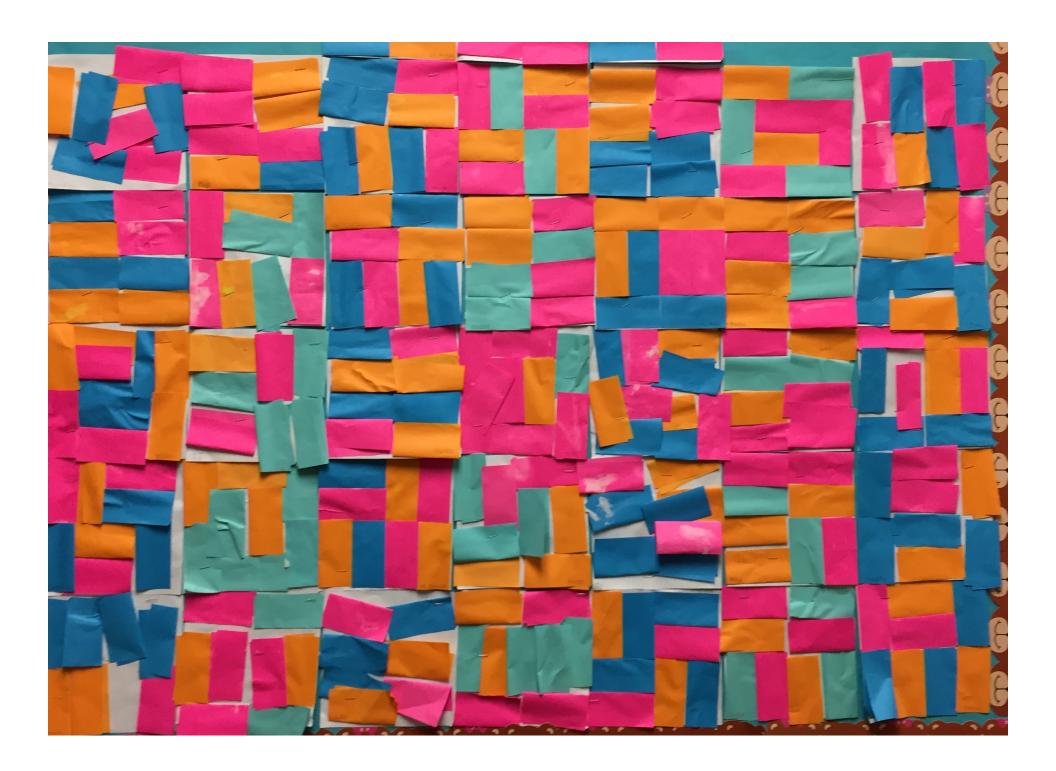
A Home Built for Twins



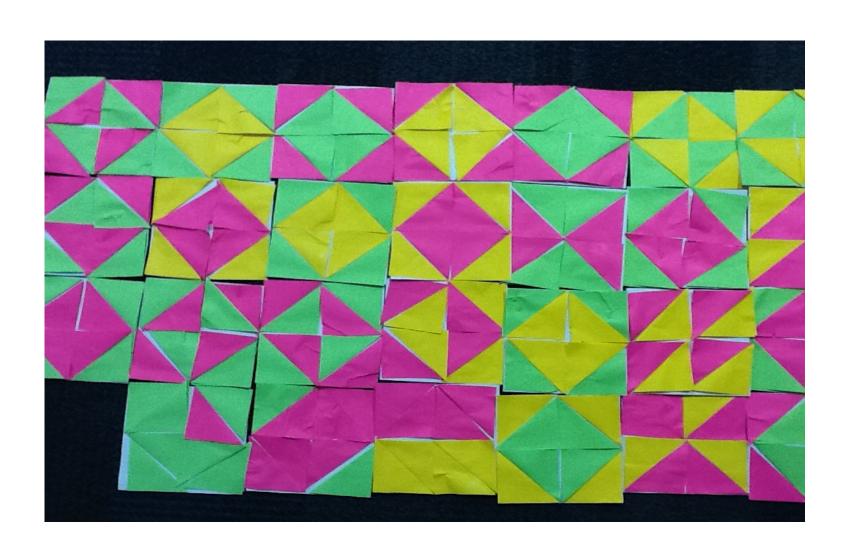


Making Rectangular Quilts

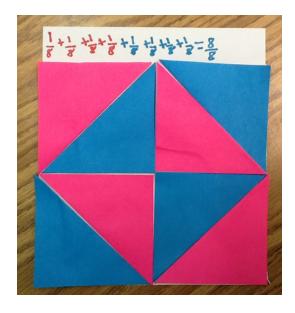
PreKindergarten Students



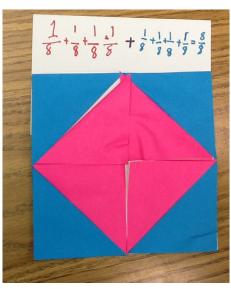
Triangular Quilt by First Graders

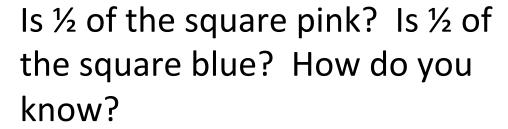


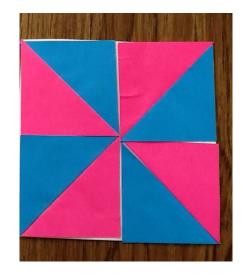
Triangular Quilts with 8 Triangles and Labeled with Unit Fractions: 2nd Grade











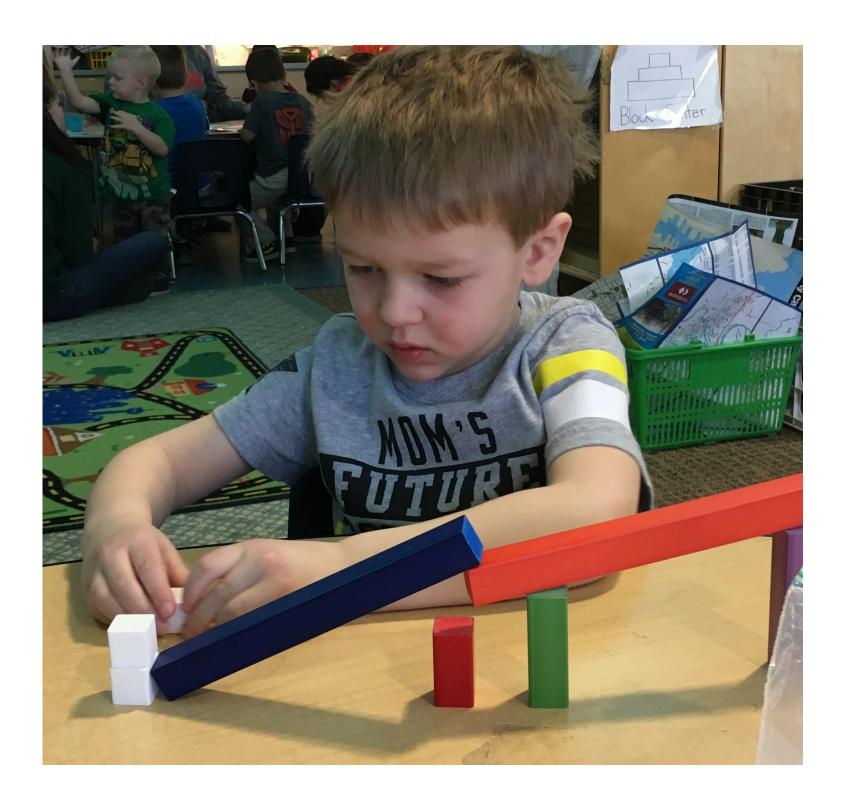
Measuring Geometric Attributes

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.

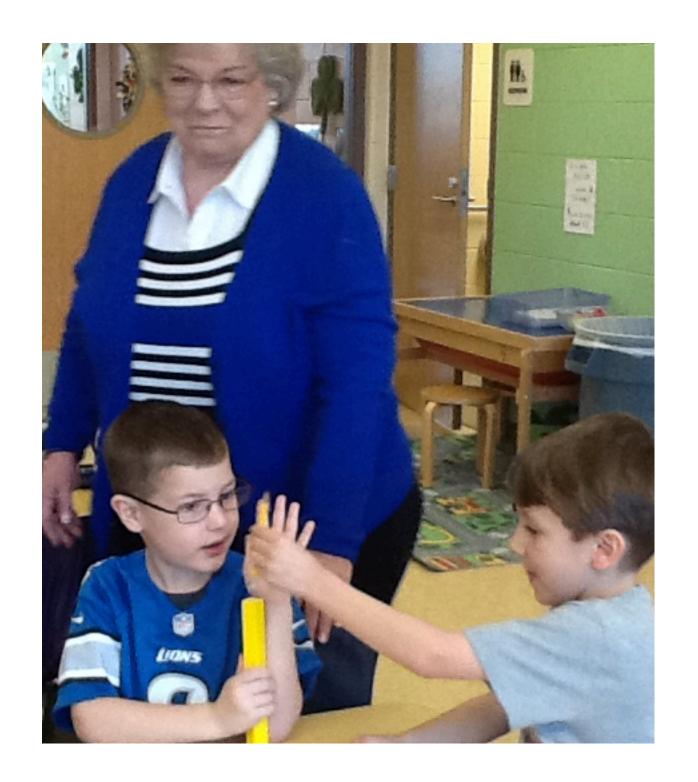
Race to the Top



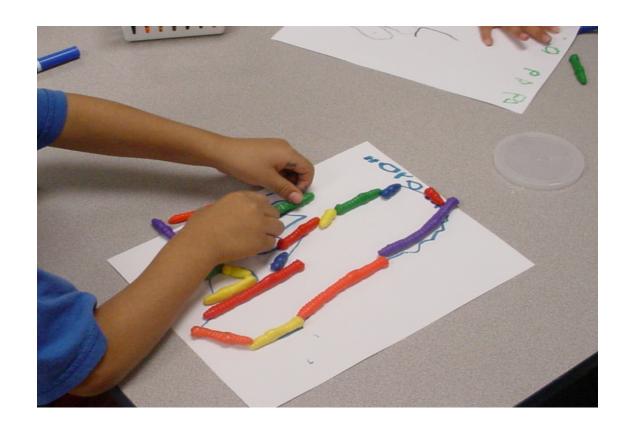


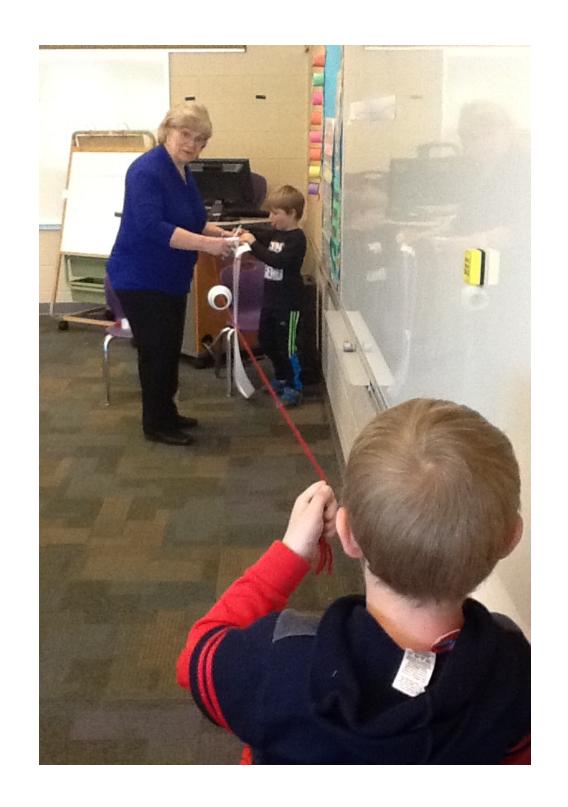




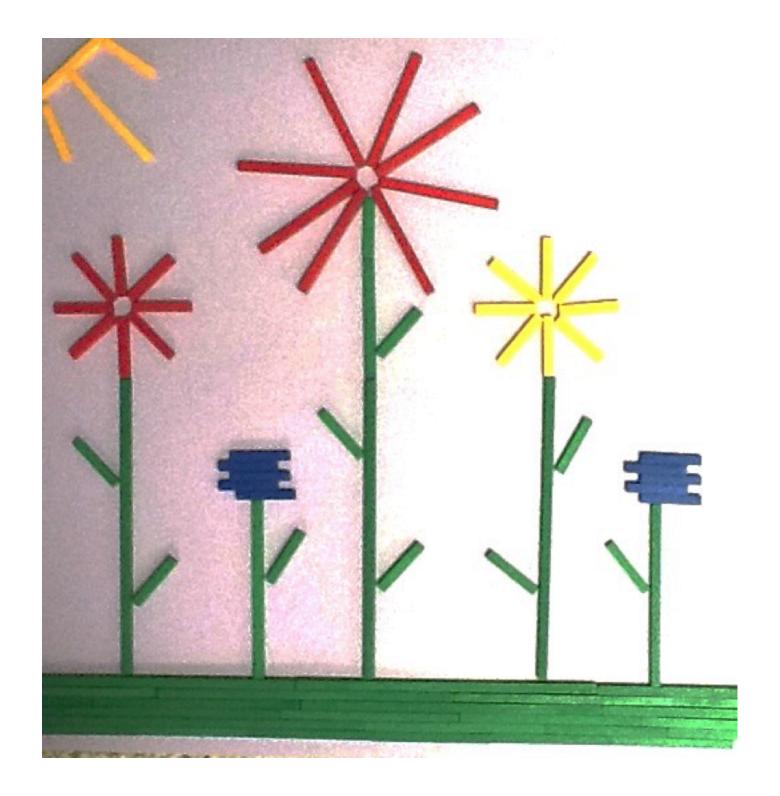








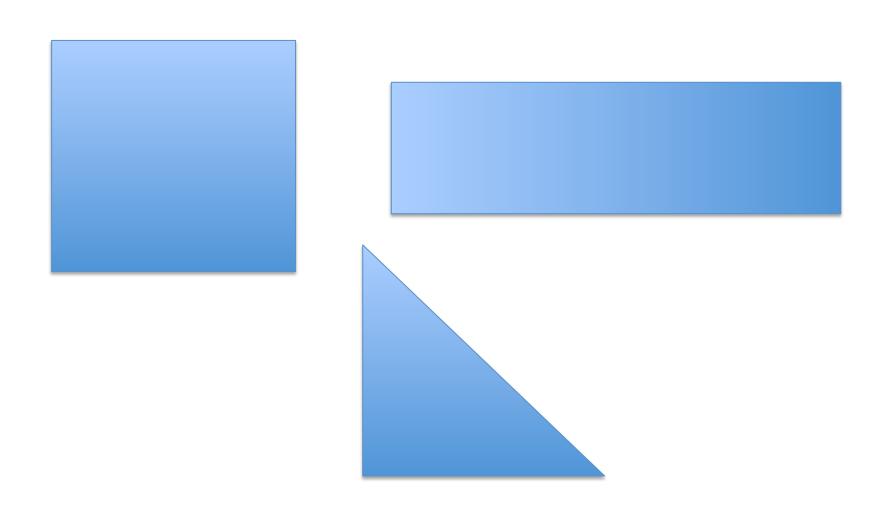


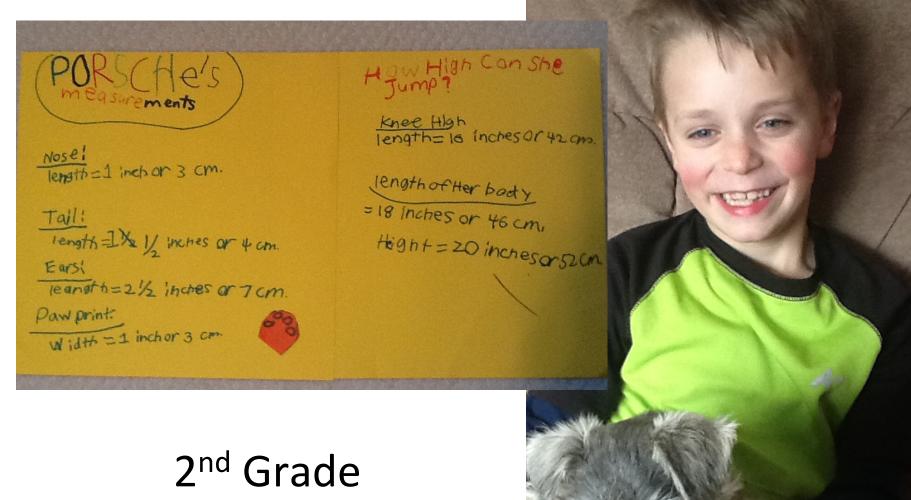






Which Pizza Would you Like?

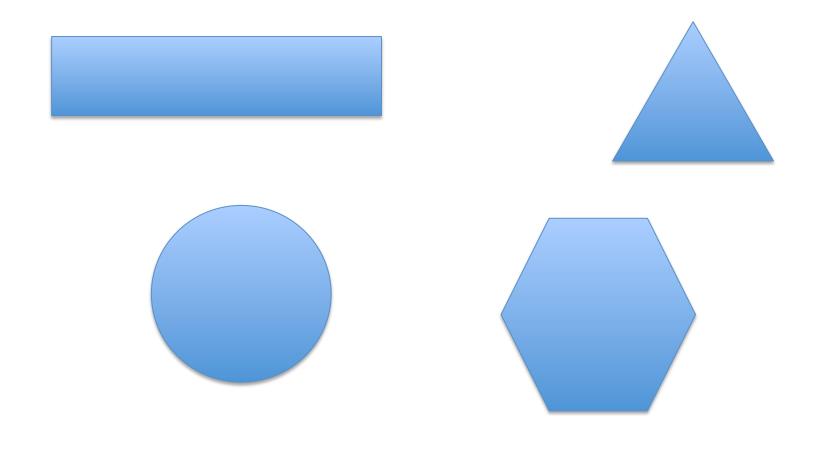




2nd Grade Measuring Project: My New Puppy

 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?



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

After this presentation, I will...

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

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 Special thanks to 31 teachers, students, and supervisors, PreK – 2nd grade in Michigan and Texas.