Arithmetic, Algebra, Geometry, Measurement & Statistics, Oh My!

How can we foster positive attitudes and build conceptual foundations about mathematics while children are in preschool and kindergarten?

Please join us for an exploration of math opportunities at school, at home, and in the community!

**Family Math**  
CMU Children’s School  
Staff / Parent Discussion

Friday, September 24, 2010  
10:00 – 11:30 AM, Margaret Morrison Building – Room 227

Preschool 4’s and Kindergarten Children will be in school. Child Care will be provided for children 3 and under in the Red Room.

*We’ll share ideas from teachers of 3’s, 4’s, and Kindergartners. We’ll offer suggestions for supporting math learning through cooking, household chores, book reading, game playing, etc.*

Please RSVP to this email, indicating how many adults will attend and the ages of children needing child care.

We look forward to exploring Math with you!!

Dr. Carver
Family Math
CMU Children's School
Staff / Parent Discussion 9/24/10

5 Processes of Math

- Problem solving
- Reasoning
- Communicating
- Connecting
- Representing

5 Concept Areas of Math for Emphasis in Early Childhood

1) **Number & Operations (Arithmetic)**

Includes:
- Counting
- Comparing & Ordering Numbers
- Recognizing Number & Subitizing (visually perceiving the quantity)
- Composing and Decomposing Numbers
- Adding & Subtracting
- Multiplying & Dividing

2) **Patterns, Functions & Algebra**

Includes Identifying Patterns and Describing Change

3) **Geometry & Spatial Sense**

Includes:
- Recognizing & Forming Shapes (individually and in combination)
- Describing Locations, Directions, and Coordinates
- Transforming & Creating Symmetry
- Visualizing & Reasoning Spatially

4) **Measurement**

Includes both Comparing Attributes Using Units and Specific Techniques & Tools

5) **Data Analysis & Probability (Statistics)**

Includes Classifying & Organizing Data Using Varied Representations, then Using the Information to Make Decisions
CMU Children’s School
Integration of Math Concept Areas

1) **Number & Operations** (*Arithmetic*)

3’s  Identifying numbers at centers, on the calendar, on the timer, etc.
     Counting friends, items at snack, steps, etc.
     Doing number puzzles
     Partitioning items for equal sharing

4’s  Counting days of school, up to 100, by 10’s, etc.
     Table setting practices one-to-one correspondence
     Guessing jar emphasizes estimation
     Recognizing and writing printed numbers for signs, labels, etc.

K   Being the Number Helper (Math Spinner)
     Experimenting with Bean Counters (different colors on each side,
       shake to see how many of each color you get, then write the
       equation 3 B plus 2 W = 5 beans)
     Exploring money and the relationships between coins

Book Samples:

   Who’s Counting
   Feast for 10
   Two Ways to Count to Ten
   One Hundred Hungry Ants
   How Many is a Million?
   How Many Legs in All
   The Doorbell Rang
   Two Greedy Bears

Game Samples:

   Snail’s Pace Race
   Number Bingo
   Uno
   Tip Top Tally
2) **Patterns, Functions & Algebra**

3’s  Noticing patterns on clothing, in the weather for the week, in stories or songs, in the routine of the day, etc.
     Predicting what will happen in a story, song, routine, etc. based on the pattern so far

4’s  Recognizing and extending simple patterns of objects, on the calendar, when stringing beads, etc.
     Noticing naturally occurring patterns on clothing, buildings, objects, but also in nature
     Playing games with patterns of children (e.g., sitting, standing, kneeling, sitting, standing ...) and with patterns of actions (head, shoulders, knees & toes)

K   Extending patterns to materials including classmates faces, theme-related materials, etc. with longer and more complex combinations of elements
     Using computer art programs, such as KidPix, to explore and create graphic patterns

**Book Samples:**
     What is the Pattern?
     Posy’s Patterns
     The Hungry Caterpillar
     One, Two, Skip a Few

**Game Samples:**
     Lacing Patterns
     Memory Game Sets can be used for patterns (parent-child, front-back)
     What’s Next? Puzzles emphasize patterns of change
     Rivers, Roads & Rails
3) **Geometry & Spatial Sense**

3’s  Cutting playdough shapes  
     Drawing or painting shapes  
     Making tracks with tape  
     Noticing shapes while building with blocks, magnet tiles, etc.  
     Emphasizing behind & in front of when lining up  

4’s  Putting puzzled together using visual strategies  
     Using clipboard with paper to draw constructions  
     Making designs with tangrams and other manipulatives  
     Mapping the classroom  

K  Emphasizing combining shapes to draw common objects  
   Creating symmetry in art (e.g., bilateral in totem pole, radial in “surround patterns”)  

**Book Samples:**  
Bear in a Square  
Right Down the Middle  

**Game Samples:**  
Shapes Up  
Castle Logic  
Blokus  

4) **Measurement**

3’s  Comparing people and objects by size  
     Noticing cups that are full, half full, empty  

4’s  Using measurement tools at the woodworking center  
     Creating equal weight on a balance scale  

K  Comparing distances by counting steps to get there  
   Using unifix cubes to measure objects using standard units  
   Beginning to emphasize time and timing  

**Book Samples:**  
My First Look at Sizes  
How Do We Measure?  
Inch by Inch  

**Game Samples:**  
Tall Bird, Short Bird  
Measure for Treasures
5) **Data Analysis & Probability (Statistics)**

3's  Sorting toys for storage (blocks vs. play food, different types & shapes of blocks)
     Learning who’s a 3’s friend vs. 4’s friend, blue vs. red room, etc.

4’s  Using graphing strategies to organize birthday, name length, family size, and other data about the friends in each class

K    Playing “How many in a Handful”
     Answering the Question of the Day, then comparing responses
     Being the Clipboard Helper – Take a Survey
     Graphing the weather each month and then keeping a record to compare months

Book Samples:
     Just Enough Carrots
     Is It Likely to Happen?

Game Samples:
     Color & Shape Bingo
     Pet Hunt
     Guess Who
Home Activity Ideas

Card Playing: Concentration & Kings Corner Emphasize Multiple Skills
1) Learn the sequence of numbers & face cards, count cards or matches, etc. (Play Who has More?).
2) Alternate suits or colors.
3) Recognize spades, hearts, clubs & diamonds.
4) Arrange items by value, compare different decks by size, etc.
5) Consider chances of getting a certain card (vs. rolling a certain number on a die for example).

Household Help

Table Setting:
1) Count the correct number of plates, utensils, etc.
2) Find patterns in napkins, tablecloths, baskets, etc.
3) Use spatial arrangement terms - above, next to, on top of, to the right of, etc.
4) Notice size relations between multiple plates, forks, etc.
5) After washing the dishes, sort everything and put it away!

Laundry:
1) Count the items.
2) Notice patterns in the fabric, match the pairs, etc.
3) Identify shapes in the designs.
4) Arrange items by size (also identifies whose they are).
5) Sort items by type (also determines where they are stored).

Recycling:
1) Count the items of paper, plastic, metal, etc.
2) Notice patterns in the materials, consider changes in the materials when prepared for recycling, etc.
3) Find the 3-dimensional shapes vs. 2-dimensional.
4) Arrange items by size, weight, or weigh the recycling vs. the trash each week.
5) Graph the weight of the recycled materials vs. the trash to find the patterns over time.

Cooking:
1) Count helpers, aprons, cups of ingredients, etc.
2) Do operations with how much more do I need, multiplying a recipe, dividing equal shares, etc.
3) Emphasize patterns in recipe steps (add, stir, add, stir) or in layering (such as with lasagna).
4) Notice shapes and symmetry of utensils (e.g., apple cutter, funnel).
5) Cut biscuits, make pancakes, etc. into shapes.
6) Combine shapes to make a larger object (e.g., pineapple turkey).
4) Use measuring spoons & cups, emphasizing the relative size.
4) Compare the size of bowls, utensils, etc.
4) Use a scale to weigh food & compare (e.g., weight of a lemon before & after squeezing).
4) Use the oven timer according to the recipe.
5) Sort ingredients by food groups.
5) Do taste tests and compare preferences, etc.

**Neighborhood Activity Ideas**

Start a Collection:

1) Count the items in your collection.
2) Arrange the items to make patterns that repeat or grow.
3) Identify the shapes in your collection.
4) Arrange the items in order of size, thickness, weight, etc.
5) Sort the items in many different ways and record which groups have more, fewer, or the same number.

Play I Spy Math when Walking or Driving:

1) Find singles, pairs, triples, etc., as well as finding numerals on signs, license plate with 2’s in them, etc.
2) Look for patterns on buildings (e.g., window, door, window, door or pillar, space, bench, space, pillar, space …). Also consider “growing or shrinking patterns”, such as 2 steps then 4 steps then 6 steps or 5 bricks then 4 bricks then 3 bricks, etc.
3) Locate the shapes and symmetries in both natural and artificial objects
4) Notice objects that are big & small, moving fast or slowly, that appear heavy or light, etc. and then estimate height, speed, weight, etc.
5) Using a clipboard, keep a tally of the number of different color, type or size of vehicles, or any other items that can be categorized, and then make predictions about what you’re most likely to encounter next