



## ANGELA RUSS-AYON

### **MATH, MOTION AND CONNECTING THE THOUGHTS**

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- ⇒ Count in a song
- ⇒ Count stairs
- ⇒ Count to a drum beat
- ⇒ Count objects in a book

When the opportunity presents itself... GET UP and physically interpret math concepts. "I see you've built a rocket. Where will your rocket go 1st, 2nd, 3rd...?"

Encourage children to think and make connections between the objects, movement, and abstract mathematical ideas across the curriculum.

### LEARNING EARLY MATH

Math is a multi-faceted subject, with some math skills and operations calling upon "non-math" skills like reading text, memory, and focus to understand. Math is a subject in which many English language learners accelerate because they can manipulate materials, as well as their bodies and hands, to practice math skills. Math is a language of its own.

### NATIONAL MATH STANDARDS

Enhance a child's natural interest in math and their disposition to use math to make sense of their physical and social world.

The (4) central ideas promoted in the national algebra standards for young children are understanding...

- (1) patterns
- (2) mathematical situations & structures: understanding equal, not equal, more, less, same, smaller, larger...
- (3) models of quantitative relationships
- (4) and analyzing change



### EARLY MATH DEVELOPMENT INCLUDES LEARNING THAT NUMBERS...

- ...have a corresponding WORD
- ...refer to a particular QUANTITY
- ...can be represented in DIFFERENT WAYS
- ...are used to COUNT
- ...help us COMPARE and ORDER QUANTITIES.
- ...are a MEANS for SOLVING PROBLEMS

Children are naturally curious & observant. They develop their own understanding of math over time based on their life experiences. They build upon concepts that they already know and have been exposed to, practicing early math skills every day.

Playing games and singing songs helps them learn about counting, addition, subtraction, estimation, speed, and much more, while developing motor skills.

Success comes from children having a rich environment and being in the center of a math experience that makes connections across disciplines and allows them to investigate in a variety of settings, in different contexts.

Maximize each day and introduce math in every part of it. Here's an example using counting:

- ⇒ Count on a math worksheet
- ⇒ Count objects outside
- ⇒ Count jumps, steps, leaps
- ⇒ Count ball tosses & kicks
- ⇒ Count snacks
- ⇒ Count objects cut and glued / colored



### MEMORY & RETENTION

We increase the strength of long-term memories when we assign visual cues and memorable episodes. Use what you know, but BE NOVEL, REVISE and RENEW!

### RAS-A-MA-TAZ THEM!

In our brain, the Reticular Activating System (RAS) grants attention and admission to changes in our environment. Absent of a threat, the RAS focuses on changes that provoke curiosity, or that please us.

So ask yourself... How comfortable are the children in their learning environment? Are there established rules and routines throughout the day? Are you responding to cues given out by the children and, as a result, addressing their concerns and fears?

### RAS ATTENTION GRABBERS

- Dress up: Wear a mask / prop / costume
- Advertise:
  - Ask for predictions.
  - Give thought provoking clues.
  - Wear a prop or costume
- Behave contrary to the norm.
- Stop in the middle of doing something.
- Riddle me this:
  - Put an item out-of-place.
  - Draw a clues in the air or on board.
  - Play charades!
- Play "What's there?"
  - What's in the bag / box / drawer
- Storyboard! Begin a story, song or chant that the kids add - to such as "5 Little Numbers"

### USE MATH LANGUAGE & CONCEPTS THROUGHOUT THE DAY

When you use math language, children learn about shapes, symmetry, time and motion, and understand positions, direction, distance, and location.

*"Please put your hands **down on top of the desk in front of you.**"*  
*"Roll your **sphere** toward the box that looks like a **rectangle.**"*

Encourage exploration of different lines and pathways, sort and graph, measure using different objects, resize and reshape, discover math in the stories you read, find creative ways to write numbers and draw shapes.

When children understand positions, locations, and pathways we have nurtured and refined their ability to read & write.

## Positional and Descriptive words help children learn the language of MATH

### Positional Words:

Front/back/behind  
Top/bottom  
Center  
Next to/Beside  
Between/Through  
Before/After  
Over/Under  
On/Off  
Above/Below  
Inside/Outside  
Left/Right  
Up/Down



### Measurement Words:

Taller/Shorter  
Smaller/Bigger  
Thinner/Narrower/Wider

### Distance Words:

Close to/Far from  
Near/Far  
Shortest/Longest

### Math Terms:

First/Second/Third..  
Next/Then/Last  
Different  
Same/Alike/Similar  
Zero/None/Nothing  
Every/All  
Few/Some  
More/Less  
Add/Subtract  
More than/Less than  
How many  
Together/Pair  
Full/Empty/None  
Half/Medium  
Single/Piece  
Even/Odd  
Horizontal/Vertical  
Parallel

### Movement Words:

Forward/Backward  
Toward/Away from  
Straight/Curved path  
Zigzag/Wavy path

## STEAM: SCIENCE, TECHNOLOGY, ENGINEERING, ART, MATH



We depend upon the rest of the world for oil, cars, clothing and computers. It's essential to produce innovative thinkers who will grow our economy and continue to develop new products and solutions. We do this by encouraging them to think for themselves.

The most powerful mathematics for a preschooler is brought forth by the teacher from the child's own self-directed, intrinsically motivated activity. Ask questions that encourage children to analyze and reason. Offer feedback that acknowledges their attempts and motivates continued efforts. Allow children to discover and problem solve. Observe play and step in only when discovery is stalled. Remember, young children need time to process, and formulate a response.

### FOR EXAMPLE:

You observe a child jumping from one colored plate to another, and then he stops. You might ask him...

- How did you decide to move that way?
- What if you added another color?
- What if you turned sideways?
- What will happen if you move the plates farther apart?
- How else could you get over there?
- What if you couldn't jump or leap?
- What if you held hands with a friend?

## BENEFITS OF TAKING LEARNING OUTSIDE

- Lower rate of nearsightedness
- Room to master motor skill development faster
- Exposes children to the sun
- Raises capacity to focus

## THE CLASS: CLASSROOM ASSESSMENT SCORING SYSTEM

Head Start has adopted this tool for measuring & improving teacher interaction with young children. It provides a reliable and valid assessment of effective interactions in optimal learning conditions.

We touched on the 3 broad domains: emotional support, classroom organization, and instructional support.

**Emotional support from the teacher or caregiver:** Mutual warmth & respect between the adult and child. A comfortable in environment. Adult is seen as resource for information. High level of responsiveness from adult. Understanding of child's academic and emotional functioning.

**Classroom organization:** How organized are activities, attention, and time? Are there interesting activities, instruction, centers, and materials conducive to math exploration:

**Instructional Support:** How are you fostering cognitive development, stimulating language, and encouraging independent thinking? Use language stimulation and language modeling. Open-ended questions promote high thinking skills, and generally begin like so...

*"How did you decide to...?"*  
*"How else could you...?"*  
*"Why do you think...?"*  
*"What is another way you can...?"*  
*"How can you...?"*  
*"What will happen if...?"*  
*"What if you...?"*

## TAKE LEARNING OUTSIDE

- Estimate/Predict distance "How high?" "How far?" – STEP, JUMP, LEAP, HOP, TOSS, ROLL, BAT!
- Compare speed/velocity (on slide) using the body and equipment – MOTOR SKILLS
- Observe/Measure shadows and patterns as the sun and body MOVE, and plants as they grow (over time)
- Use the sun to make and PLAY OUT shadow stories
- Share finds. Keep adding until each child has one – Take away—Divide and re-count
- Estimate quantities. Train eye to recognize a number of things. (grains of dirt vs. rocks)
- Predict what will be found that can fit on/in a plate, penny, cup – GO test your theory!
- Introduce math terms and descriptive language: high, low, large, small, wide, thin, thinner, thinnest – SHOW ME!
- Compare / Contrast / Sort finds by size, weight, shape, color, and other characteristics – MOTOR TO FIND
- RETRIEVE stones and items to build & construct
- Compare and contrast differences in how things move. (water, rock, leaf, bug, bird) – DROP / TOSS / MIMIC
- Compare and contrast characteristics: Tree: trunk, stem, leaf. Compare to our bodies and other things.
- Describe/Count quantity of parts of plants, body parts on insects – SQUAT / CRAWL / REACH
- Use tools to pick up, distribute, move and measure objects. BEND, STRETCH
- Use things found outside to make artwork
- Create and extend patterns with objects found in nature

## WHY INCORPORATE MUSIC?

*Music prompts greater connectivity between the brain's left and right hemisphere and between the areas responsible for emotion and memory, than does almost any other stimulus.*

- Dartmouth, Petr Janata, *Science* 2002

When children sing nursery rhymes, they learn the math skill of natural comparisons, such as distinguishing between a variety of instrumentation, high and low pitches, and fast and slow beats.

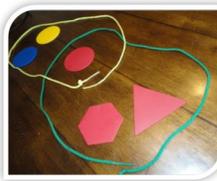
## BENEFITS OF INTRODUCING PROPS

Manipulative movement enhances hand-eye coordination & motor skills. We viewed slides with a variety of activities.

- Promotes tactile discovery
- Integrates school-readiness skills (shapes, colors, matching, sorting, patterns)
- Varies activities to enrich learning

With a simple rope or lace ...

- Make a number, letter
- Clap and move to match a number
- Say the sound the letter makes
- Make site words
- Make objects: body, home, car
- Measure: Distance, length, or width



Make shapes with chalk, laces, or foam...

- Trace
- Describe characteristics of...
- Touch body parts
- Stand in/out
- Crowd in & count
- Motor around / between
- Interpret with movement / body
- Extend patterns
- Sort and graph
- Combine to make things
- Resize to make it longer, wider, shorter, thicker
- Do the Hokie Pokie

Make lines and pathways

- Walk the pathway
- Jump / Hop / Step over, around, between
- Roll a ball down
- Toss a bean bag or throw a paper plane over

## BEYOND ROTE COUNTING

- Count together while marching, stepping, jumping, etc.
- Step or jump onto the numbers while counting
- Clap or pat, dance freeze ("1, 2, 3, freeze"), and play "follow the leader"
- "Rocket Ship Count Down" blast off from a squat or sitting position
- Draw a number & move that many times
- Each grab a number and line up in order
- Beat the COUNTDOWN clock at clean-up time
- Count going up and down the STAIRS
- TOSS a BEACH BALL– Count the catches/throws –

- or - identify the numbers fingers touch on the ball
- Move & ESTIMATE how far
- MIMIC ANIMAL moves while counting
- Flap, stomp, bear walk, step sideways (crab), etc.

## OTHER FUN ACTIVITIES

- **Streamers: Tape on walls or tables and limbo**, build an obstacle course, or play volleyball
- **Chalk:** Letter/numbers/shapes/pathways
  - Draw animal paws, motor to them.
  - Draw faces and use items from nature to make the facial features. Describe the features.
  - Draw large dice and roll a big foam dice, then move to the number that was rolled
  - Draw a huge fish bowl with children adding and subtracting handmade fish
  - Draw shapes and color them in—move to the color called
  - Draw a number or letter, then trace it with a toy (car, horse, Barbie)
  - Draw a huge road to nowhere (children move along the road as directed, using different motor skills)
  - Write numbers, letters and shapes in different sizes for target practice.
  - Draw a number line or large ruler for measuring distances thrown or motor skills.
- **Noodles:**
  - Bat different colors of balloons into baskets.
  - Make into big rings and toss or jump over/ into
  - Slice them into small rings and use for target practice.
- **Seek and Find:**
  - Find the same number outside that is in your hand.
  - Find the hidden numbered sticks and then put them in order.

## PATTERNS & SEQUENCING

Skip counting, addition, and times tables, all require an understanding of and proficiency in patterning. Many songs, chants, finger plays, and clapping games help children practice repeating lyrical patterns. Try combining **real-life experiences** and **sequences** with moves and simple melodies.

## MUSIC REFERENCE LIST:

- "Down and Up I Go": Math, Music & Motion CD
- "Counting 1 to 100" Cultural songs: Math, Music & Motion CD
- "Two Clapping Hands": Math, Music & Motion CD
- "Shake Mix Pound Roll" CD: "Smart & Tasty 1"
- "High, Low, Piccolo" CD: Clapping Games & Chants"
- "Number Chant" - "Smart Songs 1"
- "Bugster's Tunes & Tales" CD Compliments STEM
- "Animal Romp & Stomp" CD Compliments STEM
- "When You Find Colors & Shapes" Picture Book
- "Cuando Encuentres Los Colores y Las Formas" Picture Book



**Thank you for listening, and  
WELCOME TO THE CLUB!**