Early Childhood Building Blocks
Making Math Meaningful and Enjoyable

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INTRODUCTION

“Evan, would you like to help put the candles on your cake?” asked his teacher as she placed the birthday cake from Evan’s mom on the table.

With a big smile, Evan nodded.

“Well, let’s figure out how many candles we need. When you were one, there was one candle on your cake.”

Evan took the candles from his teacher and placed one candle on the cake. “When I was two, I had two candles,” he said as he placed a second candle on his cake.

“That’s right! How many candles did you have when you were three?”

“Three candles,” Evan said as he put the third candle on the cake.

“Now you are four. You have added another year. How many candles do we need now?”

“One more,” answered Evan. “I need four candles. One for each year.”

As many of us grew up, we developed a dislike for mathematics. When people ask why, we usually say, “It was hard,” “It never made sense,” or “I had to learn it different each year.” Why? Because many of us only learned math by rote memorization rather than also by learning to understand the important fundamental math concepts. There are a number of strategies you can use to help your students develop an understanding and a lifelong “like,” if not love, of math.
RATIONALE

Rote memorization ignores those principles most important to developing an understanding of mathematics concepts: a developmentally based sequence for learning, concrete learning experiences, a meaningful context for the concept, and consistency in teaching (Caine & Caine, 1994; Caine, Caine, McClintic, & Klimek, 2005; Sousa, 1998, 2005).

When children use memorization to demonstrate math skills, they seem to advance through the system flawlessly until they reach about third grade. Then, they suddenly hit a brick wall. For the first time, the adults around them become aware that these children may not have a conceptual understanding of basic math skills (Tileston, 2005).

Memorization is important. It helps us get answers quickly. However, we also need a basic understanding of why the answer is correct. For example, children can memorize that $2 + 2 = 4$, but to demonstrate conceptual understanding of addition, they must understand that two cats when placed with two dogs can form a set of four animals.

BEYOND ROTE

Often children learn to count by using their ability to remember what they heard. A child may be able to count to a hundred but have no idea what a hundred is conceptually. He or she just knows that it is a very big number. This is why children, when asked about their parent’s age, often provide an outrageous answer. Children know we are older than they are, but how much older is beyond their comprehension.

*Five-year-old Audrey asked her mother how much longer until her birthday. Her mother said it was still 30 days away. Audrey thought for a minute and then said, “Is that 5, 10, 15, 20, 25, 30, or is it 1, 2, 3, 4, 5?”*

Try this experiment. Give a child 20 marbles, a shallow bowl, and a tall, skinny glass. Have the child count 10 marbles into the bowl and 10 marbles into the glass. Ask the child if both containers have the same number of marbles. If children have a conceptual understanding of numbers, they will know that although the glass appears to have more marbles, there are the same number of marbles in each container. After all, they counted the marbles themselves (Schiller & Peterson, 1998).

A conceptual understanding of mathematics ensures that children understand that a number remains the same no matter what the configuration of that number may be. For example, 4 is 4 whether it is expressed as $1 + 3$, $2 + 2$, or $4 + 0$. Students will also understand that 10 is twice the amount of 5 and that 20 is twice the amount of 10. Conceptual math evolves. It is not acquired by teaching only for rote memorization.
DEVELOPING CONCEPTUAL UNDERSTANDING

How do children develop mathematics concepts? They learn them in a developmental sequence in which one skill builds on the other (Schiller & Peterson, 1998). They need to build these skills with concrete experiences using materials they can touch, taste, and smell as a meaningful part of their daily activities and with consistency and accuracy in vocabulary.

An Appropriate Developmental Sequence

Mathematics builds on itself. Ideally, children take what they know about one concept and apply it to the next. When children freely explore materials, they can develop a familiarity with and understanding of the materials’ attributes: color, size, shape, texture, and weight. This understanding of the meaning of attributes is a foundation for many math concepts.

The more children know about attributes, the greater their ability to sort and classify. The ability to classify into categories will be necessary before children can begin to create patterns, which is an important foundation for developing future algebraic understanding.

This evolution of understanding and abilities continues. “Old” concepts make new ones easier to understand (Sousa, 2005). New concepts reinforce and extend old ideas. Creating a pattern of square, circle, square, circle is easier for a child who understands the differences between squares and circles.

After children develop an understanding of patterns, they can begin to match items in one-to-one correspondence, which will lead to the understanding of even and uneven sets, which in turn will lead to ordering and sequencing sets and ultimately to the understanding of numbers and numeration.

Concrete Experiences

Young children learn by doing, and they learn by trial and error. When they control, manipulate, and arrange objects, they internalize concepts; they make sense of the world. With concrete materials, children can make mistakes and then easily correct them (Caine et al., 2005).

Many early math concepts can be taught using the children themselves, which is as concrete as it gets. Children can describe themselves by using attributes such as height, eye color, skin color, hair color, and so forth. They can stand on the rug, in front of the rug, behind the rug, and off the rug, with each position serving as a lesson in the understanding of position and direction.
Children can classify themselves and others as boy or girl, tall or short, sitting or standing, and so on. They can make patterns with their bodies—open eyes, shut eyes, open eyes, shut eyes. They can clap, snap, clap, snap. They can practice one-to-one correspondence as they match their fingers to their toes or their fingers to the fingers of their friend. They can count fingers and toes.

Meaningful Context

Think about the last time someone tried to explain something to you when you saw no reason to know that something. How much did you learn? How much do you remember? Just like us, children are more willing to make the effort to learn when they understand the need for the learning. They are certainly more motivated to learn when the material is interesting to them (Sousa, 2005). Take, for example, children’s enthusiasm for birthdays. Remember Evan’s candle scenario at the beginning of this article? He is the perfect example of “motivated to learn.”

Consistency in Teaching

Understanding how the concepts we teach tie into later learning illustrates the importance of consistency and accuracy. Using appropriate terminology with children reduces the possibility of later confusion (Leong & Jarred, 2001). For example, if children learn the appropriate terminology for groups of materials (sets) when they are learning to classify, they are more likely to understand sets when they get to numeration. Consistency ensures that learned concepts and skills hold true from classification to calculus. The meaning of equality is another concept that is so important and can be introduced at a very young age.

When children learn math skills and concepts in an appropriate developmental sequence, using real-life and concrete experiences and a consistent vocabulary, they develop an understanding of mathematics that serves as a springboard to higher-level learning.
AN APPROPRIATE SEQUENCE OF CONCEPTUAL EARLY MATH ACTIVITIES

A logical sequence for presenting and developing math concepts for preschool children appears below. Please bear in mind—and as you know from working with children—children’s learning isn’t linear even though this is a linear list, so a different sequence might “just happen” based on the children’s responses.

<table>
<thead>
<tr>
<th>Activity</th>
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<tr>
<td>Free exploration of materials</td>
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<tr>
<td>Spatial relationships (vocabulary for position and direction)</td>
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<tr>
<td>Classification (sorting items into a specified position or set based on attributes)</td>
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<tr>
<td>Patterning (arranging items in a specific sequence based on attributes)</td>
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<tr>
<td>One-to-one correspondence (matching items from sets into a one-to-one relationship) and set comparison</td>
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<tr>
<td>Ordering (arranging items by an attribute of size)</td>
</tr>
<tr>
<td>Numeration (understanding the concept of number)</td>
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</tbody>
</table>

Presenting concepts in this sequence allows children to build on their current understanding and knowledge of number and be able to apply what they have learned.

Example: Applying new learning to geometric figures

After studying the numbers 1 through 5, the attributes of shapes can be examined. Now when children count sides and corners, they will be applying their conceptual understanding of three sides versus four sides.

The following activities are presented in a developmental sequence that encourages children to use what they know about one skill or concept and apply that knowledge to a new skill or concept.
### Free exploration: Becoming aware of and developing vocabulary for attributes and properties of materials

#### Vocabulary

**Words such as** big, little, fast, slow, hot, cold, rough, smooth, few, many, large, small, thick, thin, hard, soft, liquid, solid, wet, dry

#### Activities

- Create junk boxes, and keep them within easy reach of the children. Collect buttons, jar lids, keys, corks, spools, ribbons, fasteners, and so forth. Encourage children to explore the junk and to think of as many ways to describe each item as possible.
- Place a variety of containers and utensils on the water play table. Use strainers, funnels, scoops, buckets, spoons, bowls, measuring cups, and any interesting containers you can find. Discuss the characteristics and uses of each item.
- Make play dough. Experiment with rolling, squeezing, pounding, and stretching. Try using cookie cutters. Mix two colors of play dough together.
- Play I Spy. Select an item in the classroom. Use attributes to describe it. Let the children take turns guessing which item you are describing.

### Spatial relationships: Understanding position and direction

#### Vocabulary

**Words and phrases such as** above, below, on top of, high, low, top, up, down, middle, bottom, far, near, next to, over, around, behind, on, off, start, under, away, down, first, next, last, here, there, beside, end, forward, outside

#### Activities

- Play games like Simon Says, Ring Around the Rosie, London Bridge Is Falling Down, Hokey Pokey, and Go in and Out the Windows. Call attention to the directional and positional words in each game.
- Set up an obstacle course. As children move through the course, ask them to describe their movements.
- Discuss top, middle, and bottom. Fold sheets of drawing paper into thirds and give each child a piece of paper. Invite the children to draw a picture that covers the paper. Talk about the things that are in the top section, middle section, and bottom section of the paper.
- Help children construct buildings, bridges, homes, and more with blocks. As you build, mention where you are placing blocks (**on top of**, **next to**, **behind**, and so on).
Classification: Sorting and grouping items

Vocabulary

Words such as alike, different, not, set, sort, classify, group, regroup, shape, color, member, same, size

Activities

- Invite children to sort the toys in the classroom. Help create categories like “new/not new,” “plastic/not plastic,” and “soft/not soft.” Notice these categories are open; in other words, there are many correct ways to classify. Using categories like “not new,” “not plastic,” and “not soft”—instead of “old,” “metal,” and “hard”—allows more items to be included.
- Encourage children to sort through the items in the junk boxes and classify them. Ask them about their criteria for classifying.
- Take a nature walk, and collect leaves. Bring the leaves back to the classroom, and classify them by size, shape, color, type of edge, visibility of veins, and so on.
- Classify foods you eat during a lunch time or snack time. Are they sweet, salty, hard, soft, crunchy, smooth, cold, or hot?

Patterning: Recognizing, copying, extending, and creating the repetition of specific items, as well as the increase or decrease of a constant amount as you see in the repeated rise and run of a stairway

Vocabulary

Words such as before, beginning, end, continue, extend, copy, create, next, pattern, repeat, again

Activities

- Make a game of looking for patterns around the school. You’ll be surprised by how many things you will find. Even the sun can create patterns as it shines through the slats on the fence in the playground or though the blinds on the window. Is there a set of stairs nearby where students can observe a pattern with a repetition of a constant amount?
- Help your children create verbal sound patterns like shhh, cluck, shhh, cluck and hand movement patterns like clap, snap, clap, snap.
- Discuss the patterns of daily routines. Everyday we wake up, brush our teeth, eat breakfast, and so forth. You might also want to talk about patterns in seasons and days of the week.
- Invite children to help prepare a snack that forms a pattern, like banana pudding. Use a clear bowl so children can see the pattern created by layering cookies, pudding, bananas, cookies, pudding, bananas.
### One-to-One Correspondence: Pairing or matching objects to compare the size of sets using the terms *greater than, less than, or equivalent to*

**Vocabulary**

**Words and phrases such as** equal, equal to, equivalent, few, fewer than, greater than, less than, more, one to one, same, fewer, greater, less, member, more than, pair, set

**Activities**

- Encourage children to match items that come in pairs, such as socks, mittens, earrings, and shoes. Move on to pairing items that go together but aren’t identical pairs, like a jar and lid, brush and comb, hand and glove, and ball and bat.
- Invite children to match items that can be matched evenly (matched one for one—there are no extra items), for example, toothbrushes to members of the family or eggs in an egg carton. Let children help set the table for lunch or snack. Point out the equivalent match of one person for each place setting and one place setting for each person.
- Allow children to help you serve cookies, cake, or any item where there will be more servings than people. Point out that there are a greater number of servings than there are people.
- Provide board games. Use the acts of rolling the dice and moving the game tokens to point out the one-to-one correspondence of spaces moved to the number on the dice.

### Ordering: Organizing materials and information in a specific order based on relationship

**Vocabulary**

**Words such as** big, bigger, biggest, heavy, heavier, heaviest, long, longer, longest, small, medium, large, short, shorter, shortest, top, middle, bottom, first, next, last, light, lighter, lightest, most, least, small, smaller, smallest, tall, taller, tallest

**Activities**

- Encourage children to arrange objects from smallest to largest. Cups and plastic containers work well.
- Talk to children about the daily schedule. Encourage them to predict which activity comes next. What is the first thing you do each day? What is the last thing you do each day?
- Invite children to help you bake. As you follow the recipe, discuss the order in which ingredients are added.
**Numeration: Understanding the concept of number and assigning a numeral to that number**

**Vocabulary**

**Words and phrases such as** adding on, addition, counting on, empty set, equals, five, four, member, minus, none, number, number family, numeral, one, plus, set, subtraction, sum, symbol, two, three

**Activities**

- Encourage children to count things like markers, crayons, books, or blocks.
- Point out numerals in everyday life. Look at phone numbers, addresses, license plates, and other things with numerals.
- Make number bags. Place counters in zipper-closure plastic bags. Make bags for the numbers 3, 4, 5, and 6. Use a permanent marker to draw a vertical line down the center of each bag, leaving an inch at the bottom of the bag. In the open space, write the numeral that corresponds to the number of counters in the bag. Teach the children how to move the counters in each bag to discover all the ways that the number can be expressed. For example, for the number 3 you will have 0 + 3, 1 + 2, 2 + 1, and 3 + 0.
- Sing and recite familiar songs and rhymes that have numbers in them like “This Old Man” and “One, Two, Buckle My Shoe.”

**Applying new learning to geometric figures**

**Vocabulary**

**Words and phrases such as** shapes, circle, square, triangle, rectangle, round, oval, side, corner, curved lines, straight lines

**Activities**

- Provide play dough. Show the children how to shape circles, squares, rectangles, and triangles. Point out lines, sides, and corners where applicable.
- Play circle games such as Duck, Duck, Goose and Dog and Bone. Point out the shape made by the position of the players. Teach the children a square dance. Point out the shape created by the position of the dancers.
- Provide Wikki Stix to bend into shapes. Count the corners and the sides.
- Provide shape crackers for snack. Discuss the number of sides and corners of each shape.
- Go on a shape hunt. Look around indoors and outdoors for shapes.
CONCLUSION

Helping preschool children build a sound foundation in mathematics is a gift that will stay with them throughout their school experience. That foundation is nurtured when we make math fun, teach it with hands-on experiences, maintain consistent language and strategies, and present skills in an appropriate developmental sequence. Wouldn’t it be wonderful to raise a generation of children who grew up actually liking math?

BOOKS THAT SUPPORT MATH CONCEPTS
(Most libraries have these books.)

Free Exploration

- The Mixed-Up Chameleon by Eric Carle
- Little Blue and Little Yellow by Leo Lionni
- This Little Train by Pam Schiller and Richele Bartkowiak

Spatial Relationships

- Inside, Outside, Upside Down by Stan and Jan Berenstain
- Over, Under & Through (and Other Spatial Concepts) by Tana Hoban
- Rosie’s Walk by Pat Hutchins
### Books That Support Math Concepts (continued)

#### Classification

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Billy’s Button</strong></td>
<td>William Accorsi</td>
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<tr>
<td><strong>Is It Red? Is It Yellow? Is It Blue?</strong></td>
<td>Tana Hoban</td>
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<tr>
<td><strong>Sorting</strong></td>
<td>Henry Pluckrose</td>
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#### Patterning

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<thead>
<tr>
<th>Title</th>
<th>Author</th>
</tr>
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<tbody>
<tr>
<td><strong>Goldilocks and the Three Bears</strong></td>
<td>Jan Brett</td>
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<tr>
<td><strong>Dots, Spots, Speckles, and Stripes</strong></td>
<td>Tana Hoban</td>
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<tr>
<td><strong>Caps for Sale: A Tale of a Peddler, Some Monkeys and Their Monkey Business</strong></td>
<td>Esphyr Slobodkina</td>
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#### One-to-One Matching and Set Comparison

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
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<tbody>
<tr>
<td><strong>Knots on a Counting Rope</strong></td>
<td>Bill Martin, Jr., and John Archambault</td>
</tr>
<tr>
<td><strong>Whose Hat?</strong></td>
<td>Margaret Miller</td>
</tr>
<tr>
<td><strong>Some Things Go Together</strong></td>
<td>Charlotte Zolotow</td>
</tr>
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### Ordering

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>Who Sank the Boat?</td>
<td>Pamela Allen</td>
</tr>
<tr>
<td>Is It Larger? Is It Smaller?</td>
<td>Tana Hoban</td>
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<tr>
<td>My Doggie Brought to Me</td>
<td>Pam Schiller</td>
</tr>
</tbody>
</table>

### Numeration

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
</tr>
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<tbody>
<tr>
<td>Anno's Counting Book</td>
<td>Mitsumasa Anno</td>
</tr>
<tr>
<td>Five Little Monkeys Jumping on the Bed</td>
<td>Eileen Christelow</td>
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<tr>
<td>Five Little Ladybugs</td>
<td>Pam Schiller and Richele Bartkowiak</td>
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</table>

### Geometric Figures

<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td>My Very First Book of Shapes</td>
<td>Eric Carle</td>
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<td>Shapes, Shapes, Shapes</td>
<td>Tana Hoban</td>
</tr>
<tr>
<td>Circles, Triangles and Squares</td>
<td>Tana Hoban</td>
</tr>
</tbody>
</table>
### Number, Number Sense and Operations Standard

**Pre-K–2 Benchmark**

**A. Use place value concepts to represent whole numbers using numerals, words and physical models.**

- Represent quantity using invented forms.
- Write numerical representations (e.g., scribbles, reversals) or numerals in meaningful context.
- Identify and name numerals 0-9.
- Relate, read and write numerals for single-digit numbers (0 to 9).
- Use place value concepts to represent whole numbers using numerals, words, expanded notation and physical models with ones and tens. For example:
  - Develop a system to group and count by twos, fives and tens.
  - Identify patterns and groupings in a 100's chart and relate to place value concepts.
  - Recognize the first digit of a two-digit number as the most important to indicate size of a number and the nearness to 10 or 100.
- Read and write the numerals for numbers to 100.

**Pre-K–2 Benchmark**

**B. Recognize, classify, compare and order whole numbers.**

- Compare and order whole numbers up to 5.
- Compare and order whole numbers up to 10.
- Compare the number of objects in two or more sets when one set has one or two more, or one or two fewer objects.
- Compare the number or quantity of sets up to 5 without counting; e.g., recognize without counting the dot arrangement on a domino as 5.
- Use ordinal numbers to order objects; e.g., first, second, third.
- Recognize and generate equivalent forms for the same number using physical models, words and number expressions; e.g., concept of ten is described by “10 blocks”, full tens frame, numeral 10, 5+5, 15 – 5, one less than 11, my brother’s age.
- Count forward to 100, count backwards from 100, and count forward or backward starting at any number between 1 and 100.
- Demonstrate that equal means “the same as” using visual representations.
- Use place value concepts to represent, compare and order whole numbers using physical models, numerals and words, with ones, tens and hundreds. For example:
  - Recognize 10 can mean “10 ones” or a single entity (1 ten) through physical models and trading games.
  - Recognize and classify numbers as even or odd.
Early Learning Content Standards

Number, Number Sense and Operations Standard

Pre-K–2 Benchmark
F. Count, using numerals and ordinal numbers.

- Touch objects and say the number names when counting in the context of daily activities and play.
- Demonstrate one-to-one correspondence when counting objects.
- Count to 10 in the context of daily activities and play.
- Determine “how many” in sets of 5 or fewer objects.

Kindergarten

- Explain rules of counting, such as each object should be counted once and that order does not change the number.
- Count to twenty; e.g., in play situations or while reading number books.
- Determine “how many” in sets (groups) of 10 or fewer objects.

Grade 1

- Count forward to 100, count backwards from 100, and count forward or backward starting at any number between 1 and 100.

Grade 2

- Use organizational strategies (e.g., brainstorming, lists, webs and Venn diagrams) to plan writing.

Geometry and Spatial Sense Standard

Pre-K–2 Benchmark
C. Sort and compare two-dimensional figures and three-dimensional objects according to their characteristics and properties.

- Match identical two- and three-dimensional objects found in the environment in play situations.
- Sort and classify similar two- and three-dimensional objects in the environment and play situations.
- Identify, name, create and describe common two-dimensional shapes in the environment and play situations.
- Identify, name and describe three-dimensional objects using the child’s own vocabulary.

Kindergarten

- Identify and sort two-dimensional shapes and three-dimensional objects.
  For example:
  a. Identify and describe two-dimensional figures and three-dimensional objects from the environment using the child’s own vocabulary.
  b. Sort shapes and objects into groups based on student-defined categories.
  c. Select all shapes or objects of one type from a group.
  d. Build two-dimensional figures using paper shapes or tangrams; build simple three-dimensional objects using blocks.

Grade 1

- Identify, compare, and sort two-dimensional shapes; i.e., square, circle, ellipse, triangle, rectangle, rhombus, trapezoid, parallelogram, pentagon, and hexagon.
  For example:
  a. Recognize and identify triangles and rhombuses independent of position, shape or size;
  b. Describe two-dimensional shapes using attributes such as number of sides and number of vertices (corners, or angles).

Grade 2

- Identify, describe, compare, and sort three-dimensional objects.
### Early Learning Content Standards

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<th>Grade 2 Indicators</th>
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<tr>
<td><strong>Geometry and Spatial Sense Standard</strong></td>
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<tr>
<td><strong>Pre-K–2 Benchmark</strong></td>
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<tr>
<td>F. Describe location, using comparative (before, after), directional (above, below), and positional (first, last) words.</td>
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<tr>
<td>• Demonstrate and begin to use the language of the relative position of objects in the environment and play situations.</td>
<td>• Name and demonstrate the relative position of objects as follows: a. place objects over, under, inside, outside, on, beside, between, above, below, on top of, upside-down, behind, in back of, in front of; b. describe placement of objects with terms such as on, inside, outside, above, below, over, under, beside, between, in front of, behind.</td>
<td>• Extend the use of location words to include distance (near, far, close to) and directional words (left, right).</td>
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<tr>
<td><strong>Patterns, Functions and Algebra Standard</strong></td>
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<tr>
<td><strong>Pre-K–2 Benchmark</strong></td>
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<tr>
<td>A. Sort, classify, and order objects by size, number, and other properties, and describe the attributes used.</td>
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<tr>
<td>• Sort, order and classify objects by one attribute.</td>
<td>• Sort, classify and order objects by size, number and other properties. For example: a. Identify how objects are alike and different. b. Order three events or objects according to a given attribute, such as time or size. c. Recognize and explain how objects can be classified in more than one way. d. Identify what attribute was used to sort groups of objects that have already been sorted.</td>
<td>• Sort, classify and order objects by two or more attributes, such as color and shape, and explain how objects were sorted.</td>
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### Patterns, Functions and Algebra Standard

**Pre-K–2 Benchmark**

**B. Extend sequences of sounds and shapes or simple number patterns, and create and record similar patterns.**

<table>
<thead>
<tr>
<th>Pre-K Indicators</th>
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<th>Grade 2 Indicators</th>
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</thead>
</table>
| • Identify, copy, extend and create simple patterns or sequences of sounds, shapes and motions in the context of daily activities and play. | • Identify, create, extend and copy sequences of sounds (such as musical notes), shapes (such as buttons, leaves or blocks), motions (such as hops or skips), and numbers from 1 to 10. | • Extend sequences of sounds, shapes or simple number patterns, and create and record similar patterns. For example:  
  a. Analyze and describe patterns with multiple attributes using numbers and shapes.  
  b. Continue repeating and growing patterns with materials, pictures and geometric items. | • Extend simple number patterns (both repeating and growing patterns), and create similar patterns using different objects, such as using physical materials or shapes to represent numerical patterns. |

**Pre-K–2 Benchmark**

**C. Create and extend patterns and describe the rule in words.**

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</thead>
</table>
| • Sequence or order events in the context of daily activities and play. | • Describe orally the pattern of a given sequence. | • Describe orally the basic unit or general plan of a repeating or growing pattern. | • Use patterns to make generalizations and predictions; e.g., determine a missing element in a pattern.  
• Create new patterns with consistent rules or plans, and describe the rule or general plan of existing patterns. |

### Data Analysis & Probability Standard

**Pre-K–2 Benchmark**

**A. Pose questions and gather data about everyday situations and familiar objects.**

<table>
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<th>Pre-K–2 Benchmark</th>
<th>Kindergarten Indicators</th>
<th>Grade 1 Indicators</th>
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| • Gather, sort and compare objects by similarities and differences in the context of daily activities and play. | • Gather and sort data in response to questions posed by teacher and students; e.g., how many sisters and brothers, what color shoes. | • Construct a question that can be answered by using information from a graph. | • Pose questions, use observations, interviews and surveys to collect data, and organize data in charts, picture graphs and bar graphs.  
• Recognize that data may vary from one population to another; e.g., favorite TV shows of students and of parents. |
MATH RESOURCES


REFERENCES AND RECOMMENDED READING


About the Author

Pam Schiller is an early childhood curriculum specialist. Dr. Schiller has worked as a child-care administrator and has also taught in the public schools as a kindergarten teacher. She served as head of the Early Childhood Department at the University of Houston, where she also directed the Lab School. Dr. Schiller has shared her knowledge in workshops, in radio and television interviews, and as a keynote speaker and author. She is the author of five early childhood curriculums, eleven children’s books, more than thirty teacher and parent resource books, and a number of other projects such as activity books, DVDs, and CDs. To find out more, you can visit her website.

A collaborative project of

For more information

Contact Nancy Brannon at nbrannon@ohiorc.org or Nicole Luthy at nluthy@ohiorc.org. Visit http://rec.ohiorc.org to see the REC website. Also see other Early Childhood Building Blocks.