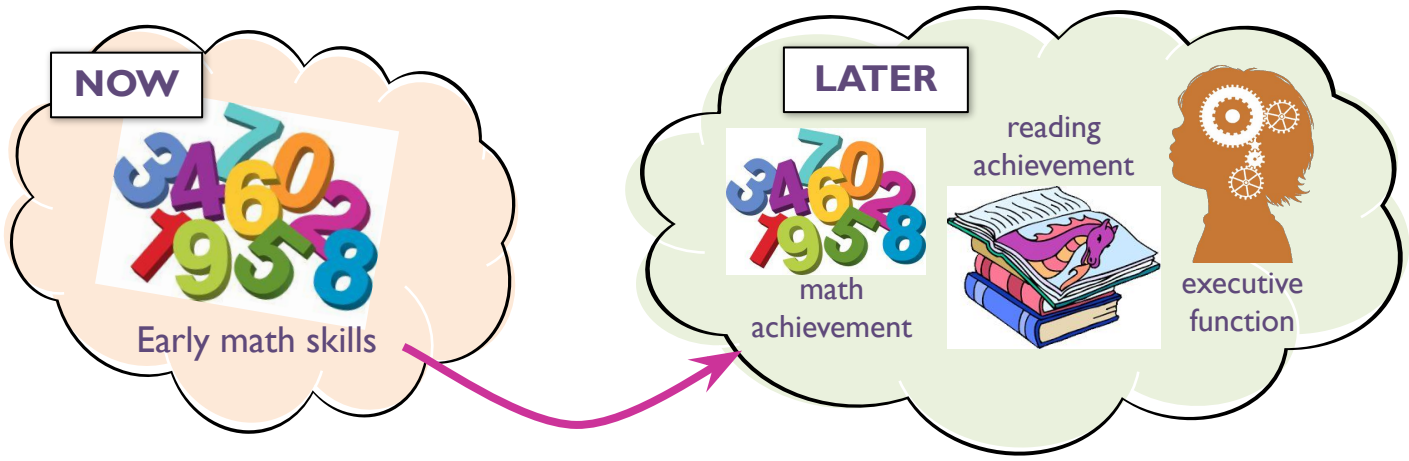
Providing Early Math Experiences

Importance of Early Math Skills

Early math activities are highly engaging for children, promote sequential thinking, and encourage children to work together. They also promote better executive function, greater math achievement *AND* greater reading achievement.



Supporting Young Children's Math Development

Early math instruction can involve so much more than rote counting, numeral recognition and fact memorization! The best way to foster children's mathematical thinking is to follow and encourage their natural curiosity and enthusiasm. In order to do this, adults must look for playful ways to incorporate math into the classroom, and demonstrate to children that math is a fun and interesting way to explore the world around them.

Understand **early math concepts** *and* **how young children learn** them

- Understand the concepts that underlie seemingly simple skills such as counting objects.
- Curriculum materials are often good resources for understanding how children develop different concepts

Use **hands-on activities** to explore and extend children's math thinking

- Notice how children are interacting with manipulatives
- Talk with children one-on-one to probe their thinking and discover what they do/don't know
- Use manipulatives and math toys to foster and clarify children's understanding

Intentionally **plan for math** on a daily basis

- Daily routines (calendar, lining up, tallying votes or attendance)
- Mini group lessons to teach specific concepts
- Model skills & thought processes
  - Think-alouds
  - Nickname strategies
  - Encourage children to work together and share strategies
- Preview new materials and demonstrate playing with them in a "math-y" way

Embrace **unexpected opportunities** for math

- Keep your eyes open and your ears on!
- Model and encourage play in a "math-y" way
- Call attention to math concepts in everyday interactions
- Use math vocabulary to describe what children are doing: "Oh, you and Bailey are comparing your towers to see which one is taller and which one is shorter."
- Spontaneous comments and conversations across the day

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Key Components of Early Math Skills

Numbers & Operations

COUNTING

Number sequence: naming and correctly ordering numbers. This is usually recited by rote however, 11, 12, 13, etc. can be challenging exceptions to the pattern.

One-to-one correspondence: one number name is given/matched to one and only one object in a set (e.g., touch each one)

Cardinality: last number named when counting a set tells how many

ORDER

First, second, third indicate sequence which can be used to describe place in line or position of items in a row. Most children easily understand the meaning of *first*, but struggle with other ordinal numbers.

NUMERALS

Numerals : Math :: Letters : Literacy

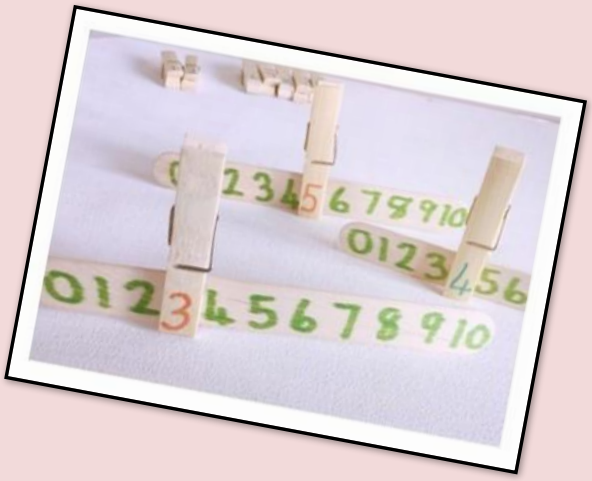
Children should identify symbols that correspond with words in number sequence. However, writing numerals not as important in preschool.

QUANTITY

Understanding how many are in a set (one of the first number ideas a child demonstrates)
This includes subitizing (identifying quantity *without* counting)

COMPARISON

Children can compare by sight or by matching objects in different sets but often don't have the vocabulary to make descriptions.



OPERATIONS

Combining Operations (Adding): combine sets to find *how many in all*

Separating Operations (Subtracting): young children usually understand *take away*. Subtraction can also be demonstrated when child has a set, removes some, and must find how many *are left*

Sharing Operations (Dividing): children begin to understand dividing/making groups when they *share* objects with others. This is also tied to the concept of fairness.

Set-Making Operations (Multiplying): making equal sets (everyone needs 4 crayons, 3 utensils)

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Key Components of Early Math Skills

MEASUREMENT ATTRIBUTES

Length, capacity, weight, area, time

Development: Children often overuse "big" and "little", and need awareness of other terms that differentiate attributes

COMPARING & ORDERING

Development: Most children start by comparing two objects (taller/shorter, bigger/smaller). Comparing 3 or more objects/events and placing them in order is more complex, and requires problem solving skills.

BEHAVIORS & PROCESSES

Conservation: set maintains same quantity no matter how parts are re/arranged (e.g. liquid in diff sized containers, length of bent object)

Transitivity:
if length A is less than length B, and length B is less than length C,
then length A is less than length C

Unit: number and size of units is used consistently for measurement of one object (also appropriateness of units for particular attributes)

Development: Children often experiment with nonstandard measuring tools such as straws, paperclips, or yarn. This is a precursor to understanding the need for and the process of standard measurement

Algebraic Thinking

PATTERNS

Extending patterns: More complex skill is extending patterns in consistent ways; transfer from one representation to another (e.g., AABAABAAB could also be stomp-stomp-clap, stomp-stomp-clap)

Growing patterns, e.g. plus-one (stair step); Old Lady Lived in a Shoe;

A A B A A B A A B A _ B _ A B

CHANGE

Children often discuss qualitative change (I was little, now I'm big; when I was a baby, _____, but now that I'm bigger, _____)

Quantitative change can also be described (e.g., change in own height)

SORTING & CLASSIFYING

Skill that can be used across content areas (e.g., wild vs domesticated)

Development: Children usually master sorting by color, then size, then by shape, and only inconsistently classify by other attributes.

REPRESENTING DATA

Development: physical objects, pictures, symbols (levels of abstraction)

DESCRIBING DATA

more, fewer, same number as, larger than, smaller than

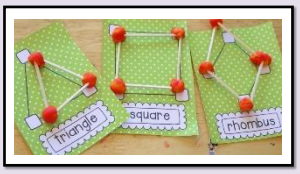
Must be able to compare sets of objects based on specific attribute (has, doesn't have)

More complex than sorting; requires children to articulate what attribute sorting by eventually connect number with data analysis

Data Analysis

SHAPE

Recognize, build with, illustrate, describe attributes of, compare, and sort by characteristics

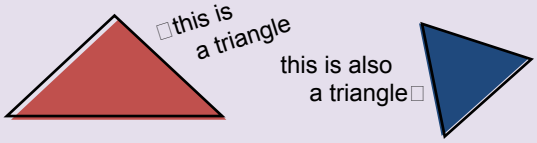


SPACE

Positional words: *near*, *under*, *by*, *on top of*, *right*, *left*

Follow simple verbal directions or simple maps & diagrams (e.g. "Put the cube *under* the table.")

Identify same shapes positioned in different orientations:



TRANSFORMATIONS

Sliding, flipping, turning, and combining are important skills

Activities: Work puzzles, fit blocks on shelf, mold clay into models, create symmetrical shapes

VISUALIZATION

Mentally representing shapes. Children need practice seeing shapes from different orientations & perspectives

Geometry & Spatial Sense