

TIPS AND TECHNIQUES

In the introduction, the five mathematics content standards were identified. For each of these standards, there are specific concepts and processes as follows:

Number and Operations

- Counting
- One-to-one correspondence
- Comparing numbers
- Identifying numerals (3 and 4 are numerals) that represent quantities (how many)
- Recognizing “how many” in sets of objects
- Writing numerals that represent quantities (how many)
- Demonstrating understanding of addition and subtraction
- Demonstrating understanding of fractions such as $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$

Algebra

- Sorting
- Classifying
- Ordering objects by observable attributes such as size, shape, number and other properties (sometimes referred to as seriation or sequencing)
- Patterning
- Comparing and relating

Geometry (the spatial size of math)

- Identifying shapes such as circles, rectangles, squares, and triangles; two and three dimensional shapes such as spheres (balls) and rectangular solids (boxes)
- Combining and taking apart shapes
- Describing positions and relationships among objects (spatial relationships)

Measurement

- Comparing and ordering objects on basis of attributes such as length, weight and capacity
- Linking a number and a unit (5 pounds, 2 hours)
- Using standard units such as inches, cups and pounds and standard tools such as rulers, thermometers, scales and measuring cups
- Using non-standard units such as hands, feet and paper clips
- Showing an awareness of the attributes of time such as **sequence** (ordering of events such as yesterday, today and tomorrow) and **duration** (length of time such as minutes, hours and days).

Data Analysis and Probability

- Posing questions and gathering data to answer questions about the children, their opinions and surroundings; for example “What does our graph tell us?”
- Applying knowledge of comparing, counting and sorting and classifying as they work with data and information
- Representing data with objects, pictures and symbols

Benchmarks

In the Arkansas Early Childhood Education Framework Handbook for Three and Four Year Old Children, Developmental Learning Strand 3 – Cognitive/Intellectual Learning, there are thirteen Benchmarks that specifically focus on mathematics. They are:

- 3.10 Classifies objects by physical features such as shape or color
- 3.11 Classifies objects conceptually (things that go together)
- 3.12 Recognizes patterns and can repeat them (patterning)
- 3.13 Demonstrates one-to-one correspondence
- 3.14 Demonstrates the ability to order and sequence
- 3.15 Demonstrates an understanding of number (how many) and numeral (3 is a numeral) relationship (numeration)
- 3.16 Demonstrates an understanding of addition and subtraction, using manipulatives
- 3.17 Shows understanding of different relationships of objects in space (spatial relations)
- 3.18 Shows an awareness of time concepts
- 3.27 Uses numbers in daily activities
- 3.28 Describes the characteristics of both two-dimensional shapes and geometric solids
- 3.29 Manipulates and combines two-dimensional shapes
- 3.30 Participates in exploratory measurement activities

A quick comparison of the mathematics content standards and the benchmarks shows that the benchmarks include the standards of number and operations, algebra, geometry and measurement.

A review of the strategies and activities for three and four year old children in the Arkansas Early Childhood Education Framework Handbook gives specific examples of what teachers can do to help children understand the content standards and achieve the benchmarks.

ECERS-R Subscale and Items

In ECERS-R, Math/number is an Item under the Activities Subscale with Indicators that determine the score achieved. Indicators range from

- 1.1 No math/number materials available to
- 7.2 Materials are rotated to maintain interest (Ex. teddy bear counters replaced by dinosaur counters, different objects to weigh).

The curriculum guides that follow will support the content standards, the benchmarks, and the achievement of the higher ECERS-R scores. In addition, the guides will present the strategies and activities in a format that can be part of the classroom curriculum.

Using the Curriculum Guides

Each preschool program will decide how best to use the curriculum guides. Options to consider include:

- Integrating the guides into existing curriculum
- Using the guides as the primary curriculum, adding additional activities to enhance the learning experiences for children
- Combining the first two options

However programs choose to use the curriculum guides, children will be provided opportunities to achieve mathematical competence.

Assessing Children's Achievement of Math Competence

At the beginning of each guide are math content standards with concepts and processes that will be covered in the guide. Benchmarks are also listed for many of the activities. At the end of each guide is a section titled **Assessment Ideas**. In this section, specific activities and/or materials in the environment will be listed; activities and/or materials that can be used to determine a child's progress in achieving competence in specific math concepts and processes and benchmarks.

Teachers are encouraged to involve children in the activities and to encourage and support them as they use the materials. Through your involvement, encouragement, support and observations, you can assess each child's mathematical competence.

Create a Mathematics Environment in Your Classroom

Following is a list of materials to consider when creating a math environment in your classroom. Some of the items may be found in the center or in the home. Others can be purchased, and some can be made by the teachers. Be creative in looking for additional math items to add to the learning environment.

Number and Operations

- number puzzles
- pegs and pegboards (one-to-one correspondence)
- nuts and bolts (one-to-one correspondence)
- bear counters
- magnetic numerals
- number cubes (dice)

Algebra

- beads and laces (patterning)
- links (patterning)
- bear counters and sorting bowls
- unifix cubes
- sequencing pictures (growing flowers, creating a snack, retelling a story)

- attribute blocks and pattern cards

Geometry

- wood unit blocks
- tabletop wood blocks
- parquetry blocks and pattern cards
- geoboards
- geometric shapes
- 2 and 3 dimensional shapes
- hoops

Measurement

- pan balance scales
- ruler
- cloth tape measure
- timer
- clocks
- thermometer
- growth chart
- measuring cups and spoons
- unifix cubes

Data Analysis and Probability

- Activities such as graphing will be included in the guides.
- Questions that invite children to predict and to check their predictions will be included.

Mathematics Materials in the Environment

Consider the following three approaches to including mathematics in the learning environment:

- Providing a math center with the majority of available math materials in the center
- Including materials in various areas of the environment rather than in a math center
- Balancing materials by providing both a math center and the inclusion of math materials in various areas of the environment