Nevada's Pre-Kindergarten Standards

GUIDEBOOK FOR FAMILIES

Part 2:

Mathematics

January 2007

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MATHEMATICS

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Introduction

Nevada's Pre-kindergarten standards are a joint effort supported by the Nevada Department of Education's Office of Special Education, elementary and Secondary Education, and School Improvement Programs, as well as the state of Nevada, Department of Human Resources, Welfare Division, Child Care Assistance Department and the Child Care and Development Fund. These agencies have been challenged by the *Good Start, Grow Smart* initiative to work together to develop standards to be used by all early childhood education programs in Nevada as a guide for child outcomes for preschool.

These standards should be understood as what children may know by the end of preschool before entering kindergarten. It is important to understand that if your child does not meet the standards by the end of preschool it does not mean that they will be ineligible or unsuccessful in kindergarten or beyond. These standards are guides that can be used with all children in any early education setting such as childcare centers, family childcare homes, Head Start, preschools and school district Pre-k programs.

It is important to remember that children are unique individuals and they all develop differently. Children will learn to master new math skills on their own time schedule when they are developmentally ready to understand the concepts that are being introduced to them. Developmentally appropriate practice guides teachers with their interactions and expectations of young children. This term refers to understanding and respecting a child's individual development characteristics and skills. Parents are their children's first and most important teacher and by understanding their child's individual strengths and needs they will continue to help their children to become successful learners.

The following is a guidebook that parents can use to learn more about Nevada's Pre-k standards. This family Math guidebook gives examples of Pre-k standards and how parents can help to provide everyday learning experiences that children will benefit from. Children are inquisitive and active learners who enjoy asking questions and finding out the answers in their own way. Enjoy the educational journey that your child is on.

Note to parents: Each of the following pages contains Pre-k Mathematics standards. The numbers for each standard match the original Pre-k Content Standards document. The standards that are being discussed in this guidebook manual are reworded for simplicity.

Mathematical Definitions*

The following is a list of some definitions associated with the mathematical Pre-K Standards. Teachers, parents, and others may find this a useful list when considering specific math concepts included in the guidebooks.

Attribute: a characteristic or feature of an object such as color, size, shape, weight or number of sides.

Classify: sort or form groups by similar characteristics/attributes.

Compare: think about same and different; describe the relationship between two or more objects.

Count with understanding: attach a number name to a series of objects; to understand that the number spoken when tagging or touching the last object also identifies the total number in the group.

Data: information gathered to answer a question.

Estimate: making an educated guess as to the amount or size of something.

Everyday fractions: numbers that represent parts of whole objects in the child's environment (e.g., half a sandwich).

Exploring data: informal experience with data by collecting, organizing, representing and comparing the information.

Extend: continue a pattern beyond what is shown.

Geometry: the area of mathematics that involves shape, size, position, direction and movement and describes and classifies the physical world we live in.

Location: where an object is in space.

Match: to find two objects that has at least one characteristic in common.

Measurable features: a characteristic or attribute of an object that can be quantified (represented with a number) such as size, shape, weight or number of sides.

Measurement: young children's intuitive notions of comparing volume, area, length and other attributes that they will eventually learn to measure; involves decisions about how much or how long.

Number: a unit belonging to a mathematical system used for counting, measuring, ordering and labeling; the meaning of a number word or numeral.

Number and operations: understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

Number sense: the ability to understand numbers, ways of representing numbers and relationships among numbers (Number sense is much more than counting; it involves the ability to think and work with numbers easily and to understand their uses (counting, measuring, ordering and labeling) and relationships.)

Numerals: conventional symbols that represent numbers (e.g., "1" is the numeral for "one").

One-to-one correspondence: linking a single number name with one object, and only one, at a time.

Operations on numbers: basic number combinations and strategies for computing such as addition and subtraction.

Order: arrange objects or numbers to show a progressive increase or decrease of a specific characteristic.

Ordinal numbers: numbers that indicate the position of an object in a sequence (i.e., first, second, third).

Organize: to arrange information in order to see relationships, often using graphs and charts.

Orientation: the position or arrangement of an object.

Pattern: a sequence of colors, shapes, objects, sounds or movements that repeats again and again in a regular arrangement; patterns are a way for young students to recognize order and to organize their world.

Patterns and relationships (algebra): the primary objective is for young children to be able to identify and analyze simple patterns, extend them and make predictions about them.

Position: the place where an object is in relation to others.

Quantity: how many units are in a set (i.e., an amount or the result of counting).

Regroup: to place or assign objects in two or more groups using a different characteristic than was used the first time the objects were grouped.

Relative difference: the specific characteristic that differs among a group of objects (e.g., size).

Rote count: recite the names of the numerals in order or sequence (e.g., singing a counting song).

Sequence: an arrangement of events or actions in a progressive order over time.

Sort: to place or assign objects in two or more groups on a basis of at least one characteristic.

Spatial sense: children's awareness of themselves in relation to the people and objects around them; it includes knowing boundaries, arrangements and positions.

Three-dimensional: objects that have length, width and depth; solid figures such as cubes, spheres and cylinders.

Two-dimensional: objects that have length and width but not depth; shapes such as squares, triangles and circles.

*All definitions were taken from the Missouri Department of Elementary and Secondary Education Pre-K Standards Teachers Guide: Early Mathematics. The following resources were used to obtain the definitions:

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Fromboluti, C.S., and Rinck, N. (1999). Early *childhood: Where learning begins: mathematics*. Jessup, MD: U.S. Department of Education.
Irons, R.R. (2002). *Growing with Mathematics: Pre-K*. Bothell, WA: Wright Group/McGraw Hill.
National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.
Waite-Stupiansky, S., Church, E.B., Feeney, L., Karnes, M., Katz, L.G., and Ward, C. (1992). *Learning through play: Math, a practical guide for teaching young children*. New York: Scholastic.
Wolf, D.P., and Neugebauer, B. (Eds.). (1996). *More than numbers: Mathematical thinking in the early years*. Redmond, WA: Child Care Information Exchange.

Counting to 10 Numbers, Number Sense, and Computation

Pre-K Standard 1.0

Your child may begin to:

- Ask questions like “How many”.
- Count out of sequence.
- Make guesses about quantity.
- Use fingers to indicate the number (e.g., holds up four fingers to show their age.
- Sing and dance to a number song.
- Draw pictures or symbols to represent a spoken number.

Tips to help your child begin to understand the meaning of numbers in everyday experiences:

- Use number words and numerals, including zero, in meaningful everyday activities.
- Encourage your child to count and share their ideas about numbers.
- Help your child to understand concepts like more, less, bigger, smaller, first, and last.
- Introduce board games to your child and help your child learn math concepts (e.g., counting, thinking, understanding how much).

Family Activity

Children love snack time. Have the whole family help make some nutritious snacks together. Here are some fun ideas.

- **Ants on a log** Celery sticks with cream cheese or peanut butter and raisins on them. Have your children count out how many ants are on the log.
- **Bake Banana Bread:** Let your family take turns adding all of the ingredients to a bowl. Talk about mixing the ingredients. Count out the stirs to mix the batter.

Sort and Classify Objects Patterns, Functions, and Algebra

Pre-K Standard 2.0

Your child may begin to:

- Sort toys by color, shape or size.
- Recognize patterns of colors, shapes or rhymes.
- Compare sets of objects to see which has more of less.
- Start to make a collection of objects smaller or larger when asked.

Tips to help your child to understand how to identity patterns:

- Help your child to learn their shapes, colors and numbers.
- Give your child opportunities to count and sort all kinds of materials.
- Ask your children to classify toys into categories.
- Ask your child to predict what comes next when shown a pattern.

Family Activity

Create a "family collection" of fun easy treasures to sort, count, and classify. Here are some ideas of fun objects to collect.

- Sea shells
- Buttons
- Shiny rocks
- Small toy cars
- Make it fun by sorting out your family's favorite candy treats.

Compare objects to determine size Measurement

Pre-K Standard 3.0

Your child may begin to:

- Make comparisons when talking about objects, toys or people in their conversations.
- Use comparison terms such as tall and short, big and little or light and heavy when they are referring to something that they are playing with.
- Ask questions about the daily events e.g., “What will we do after breakfast?”
- Understand about the difference between nighttime and daytime and the days of the week.

Family Activity

Children like to help measure things. Give your child the opportunity to measure items around the house. Start with measuring your child. Let them see how tall they are and then give them a ruler or a measuring tape to measure other items. Encourage them to write down a list of the measurements that they take.

Tips to help your child to learn about comparison:

- Encourage your child to identify coins by name by helping them to say the name and then save them in a piggy bank.
- Let your child count out coins to purchase something at the grocery store.
- Have your child help you measure out projects at home using a ruler or a tape measure.
- Remind your child of events that are coming up so they can understand the concept of time e.g., “Tomorrow night after dinner we can go to the park.”

Identify geometric shapes Spatial Relationships & Geometry

Pre-K Standard 4.0

Your child may begin to:

- Recognize the basic shapes (i.e., circle, square) and be able to describe them to you.
- Combine objects to create familiar shapes.
- Draw simple shapes and include them into their pictures.
- Use words such as over, under, behind, beside, in front, outside during their playtime.

Family Activity

Children love to create with play dough. Use this fun, easy recipe to create play dough at home and have fun sitting around the table making crazy shape creations. Cookie cutters are great to add to this activity. Children can cut out shapes and create their own masterpiece with the whole family.

Uncooked Play Dough Recipe: Mix 3 cups of flour, 1 1/2 cups of salt, 1 cup of water, ¼ cup of cooking oil, a couple of drops of food coloring. Knead ingredients together until well mixed. Add more water if too dry or more flour if too sticky. Store the play dough in an airtight container or plastic bag.

Cooked Play Dough Recipe: Mix 2 cups flour, 1 cup salt, 2 cups water, ¼ cup oil, 1 tbsp cream of tarter, and a few drops of food coloring in a cooking pot. Cook these ingredients over a medium heat, stirring constantly, until they thicken. Place on a plate until it is cool enough to handle. Knead and then store the play dough in an air tight container or plastic bag.

Tips to help your child to understand basic shapes:

- Take your child on a shape hunt around the house.
- Read books to your child about math shapes.
- Ask your child to find shapes on your daily drives or walks.
- Talk to your children during their play. Ask them what they are building, drawing or creating.

Identify and sort information Data Analysis

Pre-K Standard 5.0

Your child may begin to:

- Sort and classify objects by similar sizes and amounts.
- May identify similarities and differences in objects.
- Use trial and error to solve problems.
- Give a reason why something does not belong in a group.

Family Activity

Children love to put together puzzles. Here is a fun idea that is inexpensive and your children will enjoy it. Cut and create your own puzzles for you and your child together at home. You just need some scissors, old magazines and an envelope to store them if you want to keep them. You can cut the magazine picture into shapes, letters or anything that you want and then encourage your child to put the picture back together.

Tips to help your child to reason and problem solve:

- Ask your child questions about where each toy would go and why?
- Have your child help to sort the laundry. Have them put all of the shirts in a pile, socks in a pile and all of the pants in a pile.
- Play games or put a puzzle together with your child.
- Ask your child to help you with setting the table and other jobs that they can help with and learn what object goes where.

Math Resources

Reading to your child is a great way to spend time together and to introduce mathematical concepts to your child. You will find most of these books at your local library. Some are available in Spanish.

Aker, Suzanne. What Comes in 2s, 3s, & 4s? Simon & Schuster.

Allen, Pamela. Mr.Archimedes' Bath. Lothrop, Lee, and Shepard Books.

Anno, Mitsumasa. Anno's Counting Book. Thomas Y. Crowell.

Anno, Mitsumasa. Anno's Hat Trick. Thomas Y. Crowell.

Anno, Mitsumasa. Anno's Math Games. Thomas Y. Crowell.

Asbjornsen, Peter Christen. The Three Billy Goats Gruff. Harcourt.

Bang, Molly. Ten, Nine, Eight. Greenwillow Books.

Barchers, Suzanne and Peter Rauen. Storybook Stew: Cooking with Books Kids Love.

Bufano, Remo. Jack and the Bean Stalk. Macmillan.

Carle, Eric. My Very First Book of Numbers. Philomel.

Carle, Eric. 1, 2 ,3 To the Zoo. Philomel.

Carle, Eric. The Grouchy Ladybug. Philomel.

Carle, Eric. Rooster Off to See the World. Philomel.

Carle, Eric. Today's Monday. Philomel.

Carle, Eric. The Very Busy Spider. Philomel.

Carle, Eric. The Very Hungry Caterpillar. Philomel.

Children's Television Workshop. The Sesame Street Book of Shapes (Book of Numbers and Book of Puzzles). New York Preschool Press. Time-Life Books.

Christelow, Eileen. Five Little Monkeys Sitting in a Tree. Clarion Books.

Conford, Ellen. What's Cooking, Jenny Archer. Turtleback.

Cooke, Tom. Sesame Street Cookie Monster's Little Kitchen: A Chunky Book.

Crews, Donald. Ten Black Dots. Greenwillow Books.

Falwell, Cathryn. Feast for 10. Clarion Books.

Feelings, Muriel. Moja Means One: Swahili Counting Book. Dial.

Florian, Douglas. A Year in the Country. Greenwillow Books.

Galdone, Paul. Goldilocks and the Three Bears. Seabury Press.

Giganti, Paul Jr. How Many Snails? Greenwillow Books.

Heinst, Marie. My First Book of Numbers. Dorling Kindsley Inc.

Hoban, Tana. Exactly the Opposite. Macmillan Publishing Co., Inc.

Hoban, Tana. More than One. Macmillan Publishing Co., Inc.

Hoban, Tana. 1, 2, 3. Macmillan Publishing Co., Inc.

Hoban, Tana. Round and Round and Round. Macmillan Publishing Co., Inc.

Hoban, Tana. Where is It? Macmillan Publishing Co., Inc.

Hughes, Shirley. Rhymes for Annie Rose. Lothrop, Lee, and Shepard Books.

Hughes, Shirley. The Nursery Collection. Lothrop, Lee, and Shepard Books.

Hulme, Joy N. Sea Squares. Hyperion Books for Children.

Hutchins, Pat. Clocks and More Clocks. Macmillan Publishing Co., Inc.

Hutchins, Pat. The Doorbell Rang. Macmillan Publishing Co., Inc.

Inkpen, Mick. Kipper's Book of Numbers. Red Wagon Books.

Pelham, David. Sam's Pizza: Your Pizza to Go. Dutton Books.

Plummer, David and John Archambault. Counting Kittens. Silver Press.

Prelutsky, John. Read Aloud Rhymes for the Very Young. A. Knopf.

Tafuri, Nancy. Who's Counting? William Morrow & Co.

Ward, Cindy. Cookie's Week. G. P. Putman's Sons.

Informational Articles

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Levin, D. E. (1998)."Remote control childhood? Combating the hazards of media culture." National Association for the Education of Young Children.

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Kamii, C. *Children Reinvent Arithmetic*. Teachers College Press. New York. 1985.

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Williams, C. and C. Kamii. "How Do Children Learn by Handling Objects?" *Young Children*. November 1986. pp 2326.

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Additional Math & Resource Websites

Math in the Home
http://www.ed.gov/pubs/parents/Math/mathhome.html

Who Measures What in Our Neighborhood?
http://www.ed.uiuc.edu/ups/curriculum2002/measure/overview.shtml

Understand measurable attributes of objects and the units, systems, and processes of measurement
http://standards.nctm.org/document/chapter4/meas.htm#bp1

Apply appropriate techniques, tools, and formulas to determine measurement
http://standards.nctm.org/document/chapter4/meas.htm#bp2

http://www.illinoisearlylearning.org/tips.htm#math

http://www.illinoisearlylearning.org/tips.htm

http://theory.lcs.mit.edu/~emjordan/famMath.html

http://www.ed.gov/pubs/EarlyMath/title.html

http://www.doe.nv.gov/standards/standprek.html (To download a complete copy of Nevada's Pre-K Standards)

www.hippyusa.org (Home Instruction for Parents of Preschool Youngsters))

www.patnc.org (Parents as Teachers National Center)

www.pbs.org (PBS)

www.naeyc.org (National Association for the Education of Young Children (See Position Statement on School Readiness and Signs of Quality Programs)

www.nas.edu or www.4nationalacademies.org (National Research Council)

www.pppctr.org (Practical Parenting Partnerships)

www.nea.org/parents (National Education Association)

www.ncpie.org/ (National Coalition for Parent Involvement in Education)

www.npin.org (National Parent Involvement Network)

www.pta.org (Parent Teacher Association)

www.teachersandfamilies.com (Teachers and Families Working Together)

www.teachersfirst.com/getsource.cfm?id=997 (Examples of finger plays for children)

www.teachersandfamilies.com/open/parent/index.html (Parenting tips related to reading and literacy)

www.readwritethink.org/resources/index.asp (Additional listing of resources for children)

www.carolhurst.com (Carol Hurst's Children's literature site)

www.virtualpre-k.org (Activities for parents and children)