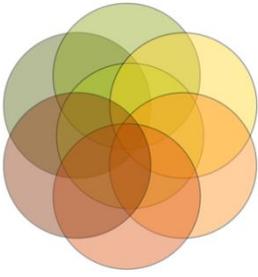


**Oklahoma Academic  
Standards for Mathematics**

**Third DRAFT**

**September, 2015**



# Acknowledgements

The Oklahoma Academic Standards for Mathematics 2015 is the result of the contributions of many mathematics teachers and mathematics educators from across the state. We believe this document reflects a balanced synthesis of the work of all members of the Oklahoma Academic Standards for Mathematics Writing Committee.

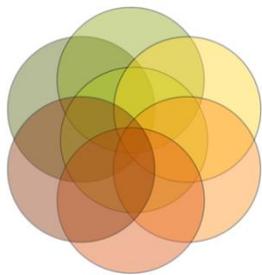
## Oklahoma Academic Standards for Mathematics Writing Committee

### Committee Chairs

Dr. Stacy Reeder, University of Oklahoma (Committee Co-Chair)  
Stacey Weinand, Norman Public Schools (Committee Co-Chair)

### Members

George Abshire, Jenks Public Schools  
Dee Atkins, Stillwater Public Schools  
Paige Bergin, Union Public Schools  
Dr. Shannan Bittle, Union Public Schools  
Andrea Brock, Moore Public Schools  
Dr. Darlinda Cassel, University of Central Oklahoma  
Shari Gierhart, Tuttle Public Schools  
Linda Hall, Retired Educator  
Jennifer Lamb, Oklahoma State Department of Education  
Dr. Courtney Lockridge, Piedmont Public Schools  
Dr. Carol Lucas, University of Central Oklahoma  
Alana McAnally, University of Central Oklahoma  
Julie Owens, El Reno Public Schools  
Levi Patrick, Oklahoma State Department of Education  
Nicole Shobert, K20 Center  
Toni Slagle, Collinsville Public Schools  
Sara Snodgrass, Retired Educator  
Dr. Juliana Utley, Oklahoma State University



# Introduction

The Oklahoma Academic Standards for Mathematics 2015 specify what students should know and be able to do as learners of mathematics at the end of each grade level or course. Students are held responsible for learning standards listed at earlier grade levels as well as their current grade level. Following each of the standards are **Sample Problems or Classroom Activities (Forthcoming)** that clarify the standards and provide possibilities for their implementation.

Throughout this document, the standards are written to allow time for study of additional material at every grade level. The order of the standards at any grade level is not meant to imply a sequence of topics and should be considered flexible for the organization of any course. The document provides standards for PK-7, Pre-Algebra, Algebra I, Geometry, Algebra II with Algebra I as the pre-requisite for both Geometry and Algebra II.

## Development of the Oklahoma Academic Standards for Mathematics

The Oklahoma Academic Standards for Mathematics writing team drew on the work of the National Council of Teachers of Mathematics (NCTM) standards documents; the National Research Council's report *Adding It Up*, the Oklahoma Priority Academic Standards (PASS), and other states' standards documents and curriculum framework guides (e.g., Minnesota, Virginia, and Massachusetts). Please see the reference list at the end of this document for a more complete list of all resources consulted.

## Vision and Guiding Principles

These standards envision all students in Oklahoma will become mathematically proficient and literate through a strong mathematics program that emphasizes and engages them in problem solving, communicating, reasoning and proof, making connections, and using representations. Mathematically proficient and literate students can confidently and effectively use mathematics concepts, computation skills, and numbers to problem-solve, reason and analyze information. Developing mathematical proficiency and literacy for Oklahoma students depends in large part on a clear, comprehensive, coherent, and developmentally appropriate set of standards to guide curricular decisions. The understanding and implementation of these standards throughout PK-12 mathematics experience for students is based on the following guiding principles:

**Guiding Principle 1:** Excellence in mathematics education requires equity--high expectations and strong support for all students.

All students must have opportunities to study—and support to learn—mathematics. Equity does not mean that every student should receive identical instruction; instead, it demands that reasonable and appropriate accommodations be made as needed to promote access and attainment for all students.

**Guiding Principle 2:** Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of mathematics, and develop depth of understanding.

Students need to understand mathematics deeply and use it effectively. To achieve mathematical understanding, students should be actively engaged in doing meaningful mathematics, discussing mathematical ideas, and applying mathematics in interesting, thought provoking situations. Student understanding is further developed through ongoing reflection about cognitively demanding and worthwhile tasks.

Tasks should challenge and engage students in mathematics in multiple ways. Short- and long-term investigations that connect procedures and skills with conceptual understanding are integral components of an effective mathematics program. Activities should build upon curiosity and prior knowledge, and enable students to solve progressively deeper, broader, and more sophisticated problems. Mathematical tasks reflecting significant mathematics should generate active classroom talk, promote the development of conjectures, and lead to an understanding of the necessity for mathematical reasoning.

**Guiding Principle 3:** An effective mathematics program focuses on problem solving.

Mathematical problem solving is the hallmark of an effective mathematics program. Skill in mathematical problem solving requires practice with a variety of mathematical problems as well as a firm grasp of mathematical techniques and their underlying principles. Students who possess a deeper knowledge of mathematics can then use mathematics in a flexible way to attack various problems and devise different ways of solving any particular problem. Mathematical problem solving calls for reflective thinking, persistence, learning from the ideas of others, and going back over one's own work with a critical eye. Success in solving mathematical problems helps to create an abiding interest in mathematics.

**Guiding Principle 4:** Technology is essential in teaching and learning mathematics.

Technology enhances the mathematics curriculum in many ways. Technology enables students to communicate ideas within the classroom or to search for needed information. It can be especially helpful in assisting students with special needs in regular and special classrooms, at home, and in the community. Technology changes what mathematics is to be learned and when and how it is learned. Tools such as measuring instruments, manipulatives (such as base ten blocks and fraction pieces), scientific and graphing calculators, and computers with appropriate software, if properly used, contribute to a rich learning environment for developing and applying mathematical concepts. Appropriate use of calculators is essential; calculators should not be used as a replacement for basic understanding and skills. Although the use of a graphing calculator can help middle and secondary students to visualize properties of functions and their graphs, graphing calculators should be used to enhance their understanding and skills rather than replace them.

## **Standards Overview**

The Oklahoma Academic Standards for Mathematics are developed around both content and process strands. The four main content strands, Algebraic Reasoning and Algebra, Number and Operations,

Geometry and Measurement, and Data and Probability organize the content standards throughout PK-7 and Pre-Algebra. The standards for Algebra I, Algebra II, and Geometry are fundamentally organized around these strands as well. The process standards are defined as the Mathematical Actions and Processes and are comprised of the skills and abilities students should develop and be engaged in developing throughout their PK-12 mathematics education. Among these are the ability to problem solve and communicate and reason about mathematics which will help students be ready for the mathematics expectations of college and the skills desired by many employers. The process and content standards work in concert to create clear, concise and rigorous mathematics standards and expectations for Oklahoma students with the aim of helping them be college and career ready. Both content and process strands are described below.

**Algebraic Reasoning and Algebra Strand:** All students should be able to reason algebraically and learn algebra. This strand provides focus for the PK-7 and Pre-Algebra standards around the notion that algebra is more than moving symbols around. It is about understanding patterns, relations and functions, representing and analyzing mathematical situations and structures using algebraic symbols, using mathematical models to represent and understanding quantitative relationships, and analyzing change in various contexts. Understanding change is fundamental to algebraic reasoning and understanding the concept of function with depth. It is also fundamental to understanding many real-world problems and ideas presented in the news.

**Number and Operations Strand:** A focus on number and operations is the cornerstone of a strong mathematics program. Developing students' fluency with number and operations throughout their PK-12 mathematics experience requires a balance and connection between conceptual understanding and computational proficiency. This strand provides focus on the importance of students' understanding of numbers, ways of representing numbers, relationships among numbers, relationships among number systems, and meanings of operations and how they relate to one another. Further, it requires that students should be able to compute fluently and make reasonable estimates.

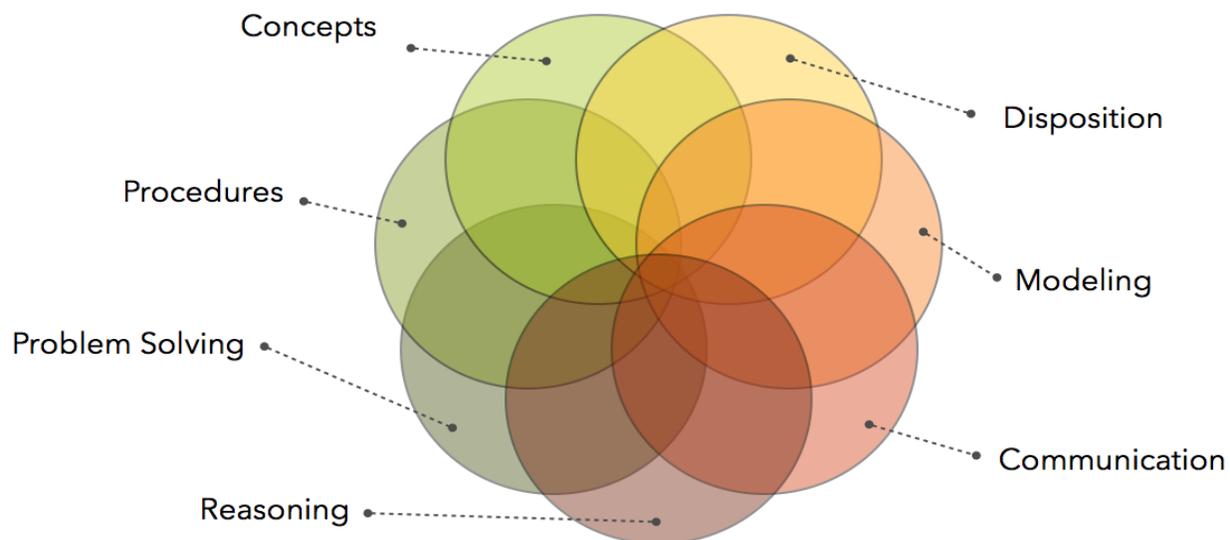
**Geometry and Measurement Strand:** All students should gain experience using a variety of visual and coordinate representations to analyze problems and solve mathematics and learn how to use appropriate units and tools for measuring. This strand provides focus for the PK-7 and Geometry standards around the notion that geometry and measurement help students understand and represent ideas and solve problems they will encounter in their daily lives. A focus on geometry should enable students to analyze characteristics of two- and three-dimensional objects, develop arguments based on geometric relationships, describe spatial relationships using coordinate geometry and other representational systems, apply transformations and symmetry to analyze mathematical situations, and utilize visualization, spatial reasoning and geometric modeling to solve problems. A focus on measurement should enable students to understand measurable attributes of objects and the units, systems, and processes of measurement, and apply appropriate techniques, tools, and formulas to determine measurements.

**Data and Probability Strand:** An increased emphasis on understanding data should span all grade levels. The idea that making sense of data and probability has become a part of our daily lives provides support for the importance of this strand throughout a students' PK-12 mathematics experience. A focus on data and probability should enable all students to formulate questions that can be addressed with data, and collect, organize, and display relevant data to answer them, select and use appropriate statistical methods to analyze data, develop and evaluate inferences and predictions that are based on data, and understand and

apply basic concepts of probability. The study of data is also an opportunity to apply the basic skills of computing with numbers while the study of probability provides application and use of fractions in daily life.

DRAFT

# Mathematical Actions & Processes



Throughout their Pk-12 education experience, mathematically literate students will:



## **Develop a Deep and Flexible *Conceptual* Understanding**

Demonstrate a deep and flexible conceptual understanding of mathematical concepts, operations, and relations while making mathematical and real-world connections.



## **Develop Accurate and Appropriate *Procedural* Fluency**

Pursue efficient procedures for various computations and repeated processes based on a strong sense of numbers. They will develop a sophisticated understanding of the development and application of algorithms and procedures.



## **Develop Strategies for *Problem Solving***

Analyze the parts of complex mathematical tasks and identify entry points to begin the search for a solution. They will select from a variety of problem solving strategies and use corresponding multiple representations (verbal, physical, symbolic, pictorial, graphical, tabular) when appropriate. They will pursue

solutions to various tasks from real-world situations and applications that are often interdisciplinary in nature. They will find methods to verify their answers in context and will always question the reasonableness of solutions.



### **Develop Mathematical *Reasoning***

Explore and communicate a variety of reasoning strategies to think through problems. They will apply their logic to critique the thinking and strategies of others to develop and evaluate mathematical arguments, including making arguments and counterarguments and making connections to other contexts.



### **Develop a Productive Mathematical *Disposition***

Hold the belief that mathematics is sensible, useful and worthwhile. They will develop the habit of looking for and making use of patterns and mathematical structures. They will persevere and become resilient, effective problem solvers.



### **Develop the Ability to Make Conjectures, *Model*, and Generalize**

Make predictions and conjectures and draw conclusions throughout the problem solving process based on patterns and the repeated structures in mathematics. They will create, identify, and extend patterns as a strategy for solving and making sense of problems.



### **Develop the Ability to *Communicate* Mathematically**

Develop the ability to communicate mathematically. They will discuss, write, read, interpret and translate ideas and concepts mathematically. As they progress, students' ability to communicate mathematically will include their increased use of mathematical language and terms and analysis of mathematical definitions.

# Oklahoma Academic Standards for Mathematics

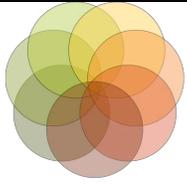
## Pre-Kindergarten

The Pre-kindergarten standards place emphasis on developing the concept of number by counting; recognizing numerals, 0-9; sorting and grouping sets of objects; recognizing and describing simple repeating patterns; and recognizing shapes and sizes of figures and objects. Students will investigate the attributes of objects and sort and organize them based on those attributes.

Problem solving has been integrated throughout the content strands. The development of problem solving skills should be a major goal of the mathematics program at every grade level. Experience with the process of problem solving will need to be integrated early and continuously into each student's mathematics education. Students must be helped to develop a wide range of skills and strategies for solving a variety of problem types.

While learning mathematics, students should be actively engaged, using concrete materials and appropriate technologies such as calculators and computers. However, facility in the use of technology should not be regarded as a substitute for a student's understanding of quantitative concepts and relationships or for proficiency and fluency with basic computations.

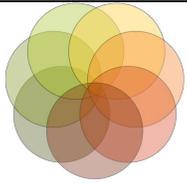
Mathematics has its own language, and the acquisition of specialized vocabulary and language patterns is crucial to a student's understanding, appreciation of, and disposition for the subject. Students should be encouraged to correctly use the concepts, skills, symbols, and vocabulary identified in the following set of standards.



# Algebraic Reasoning and Algebra

**PK.A.1 Apply mathematical actions and processes to recognize, create, complete, and extend patterns.**

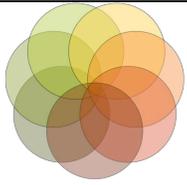
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>PK.A.1.1</b> Sort and group up to 5 objects into a set and explain verbally what the objects have in common (e.g., color, size, shape).</p> <p><b>PK.A.1.2</b> Recognize, duplicate, extend, and create repeating patterns in various formats (e.g., manipulatives, sound, movement).</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Number and Operations

**PK.N.1 Apply mathematical actions and processes to know number names and count in sequence.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Solving Diverse Problems</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>PK.N.1.1</b> Count aloud in sequence to 20.</p> <p><b>PK.N.1.2</b> Recognize and name written numerals 0-9.</p> <p><b>PK.N.1.3</b> Recognize that zero represents the count of no objects.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



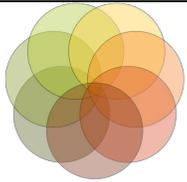
# Number and Operations

**PK.N.2 Apply mathematical actions and processes to count to tell the number of objects.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Solving Diverse Problems</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>PK.N.2.1</b> Identify the number of objects, up to 10, in a horizontal row or column.</p> <p><b>PK.N.2.2</b> Use of one-to-one correspondence in counting objects and matching groups of objects.</p> <p><b>PK.N.2.3</b> Understand the last numeral spoken, when counting aloud, tells how many total objects are in a set.</p> <p><b>PK.N.2.4</b> Count up to 5 items in a scattered configuration; not in a horizontal row or column.</p>

## Sample Problems or Classroom Activities

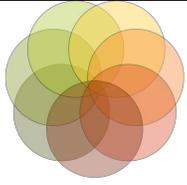
**FORTHCOMING**



# Number and Operations

**PK.N.3 Apply mathematical actions and processes to compare numbers.**

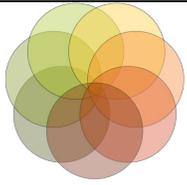
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Solving Diverse Problems</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>PK.N.3.1</b> Compare two sets of 1-5 objects using comparative language such as “same,” “more,” or “fewer”.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Geometry and Measurement

**PK.GM.1 Apply mathematical actions and processes to analyze common shapes.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
Develop a Deep and Flexible Conceptual Understanding Develop Accurate and Appropriate Procedural Fluency Develop Strategies for Solving Diverse Problems Develop Mathematical Reasoning Develop a Productive Mathematical Disposition Develop the Ability to Make Conjectures, Model, and Generalize Develop the Ability to Communicate Mathematically	<b>PK.GM.1.1</b> Identify common shapes by pointing to the shape when given the name (e.g., circle, square, rectangle and triangle).
<b>Sample Problems or Classroom Activities</b>  <b>FORTHCOMING</b>	



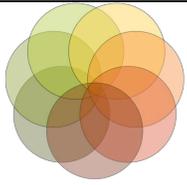
# Geometry and Measurement

**PK.GM.2 Apply mathematical actions and processes to describe and compare measurable attributes.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Solving Diverse Problems</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>PK.GM.2.1</b> Identify measurable attributes of objects. Describe them using age appropriate vocabulary (e.g., little, big, long, short, tall, heavy, and light).</p> <p><b>PK.GM.2.2</b> Directly compare two objects with a common measurable attribute using words such as longer/ shorter (horizontal); heavier/ lighter; or taller/ shorter (vertical).</p> <p><b>PK.GM.2.3</b> Sort objects into sets by one or more attributes.</p>

## Sample Problems or Classroom Activities

**FORTHCOMING**



# Data and Probability

**PK.DP.1 Apply mathematical actions and processes to collect and organize data.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
Develop a Deep and Flexible Conceptual Understanding Develop Accurate and Appropriate Procedural Fluency Develop Strategies for Problem Solving Develop Mathematical Reasoning Develop a Productive Mathematical Disposition Develop the Ability to Make Conjectures, Model, and Generalize Develop the Ability to Communicate Mathematically	<b>PK.D.1.1</b> Collect and organize information about objects and events in the environment.
<b>Sample Problems or Classroom Activities</b>  <p style="text-align: center;"><b>FORTHCOMING</b></p>	

# Oklahoma Academic Standards for Mathematics

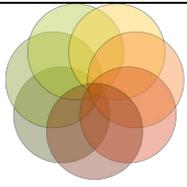
## Kindergarten

The kindergarten standards are divided into four strands: Algebraic Reasoning and Algebra, Number and Operations, Geometry and Measurement, and Data and Probability. The Algebraic Reasoning and Algebra strand lays the foundation for recognizing, creating, completing and extending patterns. The Number and Operations strand emphasizes the development of number by counting; subitizing, combining, sorting, and comparing sets of objects. Students will begin to understand the relationship between quantities and whole numbers. Laying the foundation for fractions begins by distributing sets of objects equally (fair shares) into smaller groups. Students will also begin to recognize value of coins. The Geometry and Measurement strand focuses on students recognizing and identifying simple two- and three-dimensional shapes, sorting objects by measurable attributes, and recognizing time concepts such as today, tomorrow, morning, etc.

Problem solving has been integrated throughout the content strands. The development of problem solving skills should be a major goal of the mathematics program at every grade level. Experience with the process of problem solving will need to be integrated early and continuously into each student's mathematics education. Students must be helped to develop a wide range of skills and strategies for solving a variety of problem types.

While learning mathematics, students should be actively engaged, using concrete materials and appropriate technologies such as calculators and computers. However, facility in the use of technology should not be regarded as a substitute for a student's understanding of quantitative concepts and relationships or for proficiency and fluency with basic computations.

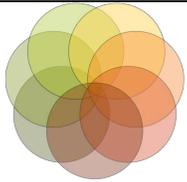
Mathematics has its own language, and the acquisition of specialized vocabulary and language patterns is crucial to a student's understanding, appreciation of, and disposition for the subject. Students should be encouraged to correctly use the concepts, skills, symbols, and vocabulary identified in the following set of standards.



# Algebraic Reasoning and Algebra

**K.A.1 Apply mathematical actions and processes to recognize, create, complete, and extend patterns.**

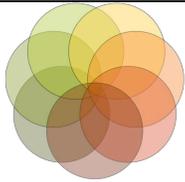
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.A.1.1</b> Sort and group up to 10 objects into a set and explain verbally what the objects have in common (e.g., color, size, shape).</p> <p><b>K.A.1.2</b> Recognize, create, complete, and extend repeating, shrinking and growing patterns using shape, color, size, quantity, sounds and movements.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center; color: red; font-weight: bold; font-size: 1.5em;">FORTHCOMING</p>	



# Algebraic Reasoning and Algebra

**K.A.2 Apply mathematical actions and processes standards to use objects and pictures to develop fluency with addition and subtraction (up to 10) to represent and solve real-world and mathematical problems.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.A.2.1</b> Compose and decompose numbers up to 10 with objects and pictures to develop the concept of fluidity of numbers and lay the foundation for addition and subtraction (e.g., making ten, number bonds).</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center; color: red; font-weight: bold; font-size: 1.5em;">FORTHCOMING</p>	



# Number and Operations

**K.N.1 Apply mathematical actions and processes to understand the relationship between quantities and whole numbers.**

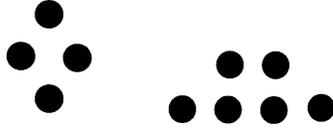
Mathematical Actions and Processes	Mathematical Benchmark
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.N.1.1</b> Count aloud in sequence to 100.</p> <p><b>K.N.1.2</b> Recognize that a number can be used to represent how many objects are in a set up to 10.</p> <p><b>K.N.1.3</b> Use ordinal numbers to represent the position of an object in a sequence up to 10.</p> <p><b>K.N.1.4</b> Recognize without counting (subitizing*) the quantity of a small group of objects in organized and random arrangements up to 10 (e.g. dot patterns).</p> <p><b>K.N.1.5</b> Count forward, with and without objects, from any given number up to 10.</p> <p><b>K.N.1.6</b> Read, write and represent whole numbers from 0 to at least 10. Representations may include numerals, pictures, real objects and picture graphs, spoken words, and manipulatives.</p> <p><b>K.N.1.7</b> Find a number that is 1 more or 1 less than a given number up to 10.</p> <p><b>K.N.1.8</b> Compare and order whole numbers, with and without objects, from 0 to 10 (e.g., more than, less than, equal to).</p> <p>*Subitizing is defined as instantly recognizing the quantity of a set without having to count. "Subitizing" is not a vocabulary word, not for student discussion at this age.</p>

## Sample Problems or Classroom Activities

*Example for KN1.4*

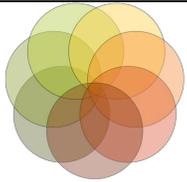
Dot Plate Flash-Hold up a dot plate for only 3 seconds. Ask children, “How many did you see?” “How did you see it?”

Dot Pattern Cards



**FORTHCOMING**

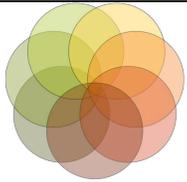
DRAFT



# Number and Operations

**K.N.2 Apply mathematical actions and processes to understand the relationship between whole numbers and fractions through fair share.**

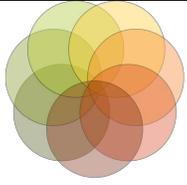
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
Develop a Deep and Flexible Conceptual Understanding Develop Accurate and Appropriate Procedural Fluency Develop Strategies for Problem Solving Develop Mathematical Reasoning Develop a Productive Mathematical Disposition Develop the Ability to Make Conjectures, Model, and Generalize Develop the Ability to Communicate Mathematically	<b>K.N.2.1</b> Distribute equally a set of objects into at least two smaller equal sets.
<b>Sample Problems or Classroom Activities</b>  <b>FORTHCOMING</b>	



# Number and Operations

**K.N.3 Apply mathematical actions and processes to identify coins in order to recognize the need for monetary transactions.**

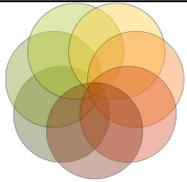
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.N.3.1</b> Identify U.S. coins by name, including pennies, nickels, dimes, and quarters.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Geometry and Measurement

**K.GM.1 Apply mathematical actions and processes to recognize and sort basic two- and three-dimensional shapes; use them to model real-world objects.**

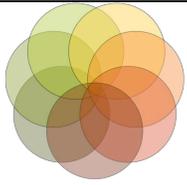
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.GM.1.1</b> Recognize basic two- and three-dimensional shapes such as squares, circles, triangles, rectangles, trapezoids, hexagons, cubes, cones, cylinders and spheres.</p> <p><b>K.GM.1.2</b> Identify attributes of two-dimensional shapes using informal and formal geometric language interchangeably (e.g., a square has 4 corners).</p> <p><b>K.GM.1.3</b> Use smaller shapes to form a larger shape when there is an outline to follow (e.g., create a larger square using 4 small squares).</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Geometry and Measurement

**K.GM.2 Apply mathematical actions and processes to compare and order objects according to location and measurable attributes.**

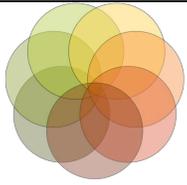
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.GM.2.1</b> Use words to compare objects according to length, size, weight and position.</p> <p><b>K.GM.2.2</b> Order up to 6 objects using measurable attributes, such as length and weight.</p> <p><b>K.GM.2.3</b> Sort objects into sets by more than one attribute.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Geometry and Measurement

**K.GM.3 Apply mathematical actions and processes to tell time.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.GM.3.1</b> Develop an awareness of simple time concepts within his/her daily life (e.g. yesterday, today, tomorrow; morning, afternoon, night).</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Data and Probability

**K.DP.1 Apply mathematical actions and processes to collect and organize data to make it useful for interpreting information.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>K.DP.1.1</b> Collect and analyze information about objects and events in the environment.</p> <p><b>K.DP.1.2</b> Use data to create real-object, picture graphs and Venn diagrams.</p> <p><b>K.DP.1.3</b> Draw conclusions from real-object and picture graphs.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center; color: red; font-weight: bold; font-size: 1.5em;">FORTHCOMING</p>	

# Oklahoma Academic Standards for Mathematics

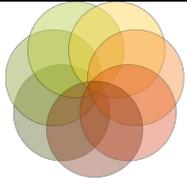
## 1<sup>st</sup> Grade

The first-grade standards are divided into four strands; Number and Operations, Algebraic Reasoning and Algebra, Geometry and Measurement, Data and Probability. The Number and Operations strand places emphasis on the number sequence to 100, quantifying, sorting, and comparing quantities of sets up to 100. Students' understanding of number expands to include explanation of thinking strategies used to solve addition and subtraction problems up to 20. Fractional concepts will be expanded by partitioning regular polygons into equal pieces. The Algebraic Reasoning and Algebra strand emphasizes recognizing and describing simple repeating and growing patterns. The Geometry and Measurement strand emphasizes identifying characteristics of two and three dimensional shapes to develop general ideas about the properties of geometric figures. Students will develop ideas understanding the use of measuring tools. Students will use measuring tools to measure the length of objects in order to reinforce the continuous nature of linear measurement. The Data and Probability strand emphasizes collecting, organizing and interpreting data.

Problem solving has been integrated throughout the content strands. The development of problem solving skills should be a major goal of the mathematics program at every grade level. Experience with the process of problem solving will need to be integrated early and continuously into each student's mathematics education. Students must be helped to develop a wide range of skills and strategies for solving a variety of problem types.

While learning mathematics, students should be actively engaged, using concrete materials and appropriate technologies such as calculators and computers. However, facility in the use of technology should not be regarded as a substitute for a student's understanding of quantitative concepts and relationships or for proficiency and fluency with basic computations.

Mathematics has its own language, and the acquisition of specialized vocabulary and language patterns is crucial to a student's understanding, appreciation of, and disposition for the subject. Students should be encouraged to correctly use the concepts, skills, symbols, and vocabulary identified in the following set of standards.



# Algebraic Reasoning and Algebra

**1.A.1 Apply mathematical actions and processes to recognize, create, complete, and extend patterns.**

Mathematical Actions and Processes	Mathematical Benchmark
Develop a Deep and Flexible Conceptual Understanding Develop Accurate and Appropriate Procedural Fluency Develop Strategies for Problem Solving Develop Mathematical Reasoning Develop a Productive Mathematical Disposition Develop the Ability to Make Conjectures, Model, and Generalize Develop the Ability to Communicate Mathematically	<b>1.A.1.1</b> Recognize and create repeating, shrinking and growing patterns with objects, numbers, or geometric shapes in a variety of contexts (e.g., addition charts, skip counting, calendars, hundreds charts, number lines, real world situations such as art and architecture).

## Sample Problems or Classroom Activities

Examples for 1.A.1.1

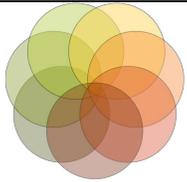
*Pattern Strips: Students work to extend patterns from simple materials such as buttons, colored blocks, connecting cubes toothpicks, etc.*

*Same Pattern, Different Stuff: Have students make a pattern with one set of materials given a pattern strip showing a different set. Mix up the pattern strips and have students find strips that have the same patterns.*

*Predict Down the LINE: Provide students with a pattern to extend. Before they extend the pattern have them predict what element will be in the 10<sup>th</sup> place, 7<sup>th</sup> place, etc.*

*Change the Charts, Change the Patterns: Have students make number charts with fewer than ten numbers in a row. Color skip-counting patterns. Discuss which numbers make diagonal patterns? Which numbers make column patterns? Which numbers skip count by?*

**FORTHCOMING**



# Algebraic Reasoning and Algebra

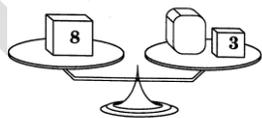
**1.A.2 Apply mathematical actions and processes standards to use number sentences to develop fluency with addition and subtraction (up to 20) to represent and solve real-world and mathematical problems; create real-world situations corresponding to number sentences.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
Develop a Deep and Flexible Conceptual Understanding Develop Accurate and Appropriate Procedural Fluency Develop Strategies for Problem Solving Develop Mathematical Reasoning Develop a Productive Mathematical Disposition Develop the Ability to Make Conjectures, Model, and Generalize Develop the Ability to Communicate Mathematically	<b>1.A.2.1</b> Represent and create real-world situations involving basic addition and subtraction, using objects and number sentences. (e.g., making ten, compatible numbers, number bonds).

## Sample Problems or Classroom Activities

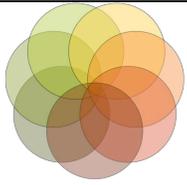
### Example for 1. A.2.1

*A student can see a stack of 7 cubes and know that a stack of 4 cubes and 3 cubes has the same number of cubes and create a pictorial model of the relationship.*



*Balance Tasks*

**MORE FORTHCOMING**



# Number and Operations

**1.N.1 Apply mathematical actions and processes to count, compare and represent whole numbers up to 100, with an emphasis on groups of tens and ones.**

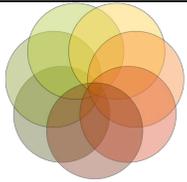
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.N.1.1</b> Recognize numbers to 20 without counting (subitizing*) the quantity of structured arrangements (e.g., ten frames, arrays, dot patterns).</p> <p><b>1.N.1.2</b> Use concrete models to describe whole numbers between 10 and 100 in terms of tens and ones.</p> <p><b>1.N.1.3</b> Read, write and represent whole numbers up to 100. Representations may include numerals, addition and subtraction, pictures, tally marks, number lines and manipulatives, such as bundles of sticks and base 10 blocks.</p> <p><b>1.N.1.4</b> Count forward, with and without objects, from any given number up to 100 by 1s, 2s, 5s and/or 10s.</p> <p><b>1.N.1.5</b> Find a number that is 10 more or 10 less than a given number.</p> <p><b>1.N.1.6</b> Compare and order whole numbers up to 100.</p> <p><b>1.N.1.7</b> Create and use knowledge of number relationships to locate the position of a given whole number on an open number line up to 20.</p> <p><b>1.N.1.8</b> Use objects to model and use words to describe the relative size of numbers, such as more than, less than, and equal to. Explore equivalence through the use of balance scales.</p> <p>*Subitizing is defined as instantly recognizing the</p>

	quantity of a set without having to count. “subitizing” is not a vocabulary word, not for student discussion at this age.
--	--

**Sample Problems or Classroom Activities**

FORTHCOMING

DRAFT



# Number and Operations

**1.N.2 Apply mathematical actions and processes to solve addition and subtraction problems up to 20 in real-world and mathematical contexts.**

Mathematical Actions and Processes	Mathematical Benchmark
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.N.2.1</b> Model and explain strategies used to solve addition and subtraction problems up to 20 using a variety of strategies (e.g., spoken words, objects, pictorial models, number lines, number sentences, compose and decompose numbers, making 10, doubles plus one, part part-whole).</p> <p><b>1.N.2.2</b> Apply basic fact strategies to add and subtract within 20 (e.g., making ten, decomposing a number leading to a ten, doubles plus one).</p> <p><b>1.N.2.3</b> Determine if equations involving addition and subtraction are true.</p> <p><b>1.N.2.4</b> Demonstrate fluency with basic addition facts and related subtraction facts up to 20.</p>

## Sample Problems or Classroom Activities

### Example for 1.N2.1

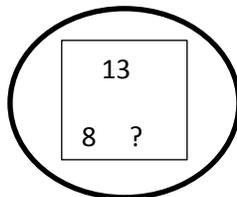
*a. Dot Card Activities—Choose 2 dot cards that equal to any given number up to 20.*

*--Students use dot cards to find different combinations that total given number.*

*b. Math Squares (need to add)*

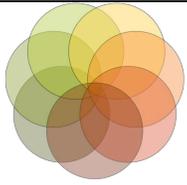
*c. Two Ways (need to add)*

*d. Missing Number cards:*



MORE FORTHCOMING

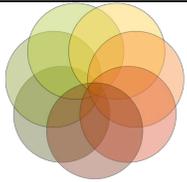
DRAFT



# Number and Operations

**1.N.3 Apply mathematical actions and processes to explore the foundational ideas of fractions.**

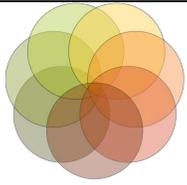
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.N.3.1</b> Partition a regular polygon using physical models into equal pieces (e.g., halves, thirds, fourths).</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Number and Operations

**1.N.4 Apply mathematical actions and processes to identify coins, their values, and the relationships among them in order to recognize the need for monetary transactions.**

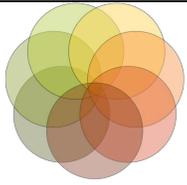
<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.N.4.1</b> Identify U.S. coins, including pennies, nickels, dimes, and quarters, and their value.</p> <p><b>1.N.4.2</b> Write a number with the cent symbol to describe the value of a coin.</p> <p><b>1.N.4.3</b> Use relationships to count by ones, fives, and tens to determine the value of a collection of pennies, nickels, and/or dimes.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Geometry and Measurement

**1.GM.1 Apply mathematical actions and processes standards to analyze attributes of two- and three - dimensional shapes to create new shapes.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.GM.1.1</b> Use smaller shapes to form a larger shape (compose) two- dimensional shapes such as triangles, squares, rectangles, and circles, and three-dimensional shapes such as rectangular prisms and cylinders.</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Geometry and Measurement

## 1.GM.2 Apply mathematical actions and processes to select and use units to describe length and time.

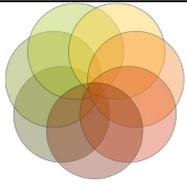
Mathematical Actions and Processes	Mathematical Benchmark
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.GM.2.1</b> Use nonstandard and standard measuring tools to measure the length of objects to reinforce the continuous nature of linear measurement.</p> <p><b>1.GM.2.2</b> Illustrate that the length of an object is the number of same-size units of length that, when laid end-to-end with no gaps or overlaps, reach from one end of the object to the other.</p> <p><b>1.GM.2.3</b> Measure the same object/distance with units of two different lengths and describe how and why the measurements differ.</p> <p><b>1.GM.2.4</b> Describe a length to the nearest whole unit using a number and a unit (e.g., foot, inch, centimeter).</p>

### Sample Problems or Classroom Activities

#### Example for 1.GM2.1:

- a. *Giant Footprints*—Use footprints to measure given objects
- b. *Changing Units*—Have students measure a length with a specified unit. Then provide them with a different unit that is twice as long or half as long as the original unit. Their task is to predict the measure of the same length using the new unit. Students should write down their predictions and explanations of how they were made. Discuss.

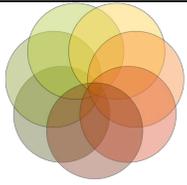
**FORTHCOMING**



# Geometry and Measurement

## 1.GM.3 Apply mathematical actions and processes to tell time.

Mathematical Actions and Processes	Mathematical Benchmark
<p>Develop a Deep and Flexible Conceptual Understanding</p> <p>Develop Accurate and Appropriate Procedural Fluency</p> <p>Develop Strategies for Problem Solving</p> <p>Develop Mathematical Reasoning</p> <p>Develop a Productive Mathematical Disposition</p> <p>Develop the Ability to Make Conjectures, Model, and Generalize</p> <p>Develop the Ability to Communicate Mathematically</p>	<p><b>1.GM.3.1</b> Tell time to the hour and half-hour (analog and digital).</p>
<p><b>Sample Problems or Classroom Activities</b></p> <p style="text-align: center;"><b>FORTHCOMING</b></p>	



# Data and Probability

**1.D.1 Apply mathematical actions and processes to organize data to make it useful for interpreting information and solving problems.**

<b>Mathematical Actions and Processes</b>	<b>Mathematical Benchmark</b>
Develop a Deep and Flexible Conceptual Understanding Develop Accurate and Appropriate Procedural Fluency Develop Strategies for Problem Solving Develop Mathematical Reasoning Develop a Productive Mathematical Disposition Develop the Ability to Make Conjectures, Model, and Generalize Develop the Ability to Communicate Mathematically	<b>1.D.1.1</b> Collect, sort, and organize data in up to three categories using models/representations (e.g., tally marks, tables).  <b>1.D.1.2</b> Use data to create picture and bar-type graphs, to demonstrate one to one correspondence.  <b>1.D.1.3</b> Draw conclusions from picture and bar-type graphs.

## Sample Problems or Classroom Activities

### Example for 1.D.1.1:

Attribute Sort (need to add)

*The First Loops—Give children 2 large loops of yarn or string. Direct them to put all the red pieces inside one string and all triangles inside the other. Let the children try to resolve the difficulty of what to do with the red triangle pieces.*

### Example for 1.D1.2:

*Favorite Food—Have children find out another class's favorite fruit. Graph the results using pictures to make a pictograph.*

**MORE FORTHCOMING**