Kindergarten Mathematics, Quarter 3, Unit 3.1

Oral Counting to 70 by Ones and Counting On

Overview

Number of instructional days: 5 (1 day = 30 minutes)

Content to be learned

- Rote count to 70 by ones and tens.
- Count forward in sequence beginning at any given number less than 70.
- Understand that when counting objects, the last number named tells the number of objects counted.
- Recognize that the number of objects is the same regardless of the order they are counted or the arrangement.
- Understand that each successive number refers to a quantity that is one larger.

Mathematical practices to be integrated

Look for and make use of structure.

- Discover repeated patterns in the number system.
- Connect the relationship between number and quantity.

Look for and express regularity in repeated reasoning.

- Look for patterns when counting ones and tens.
- Identify regularity in the counting sequence.

Essential questions

- How can you count to 70 by ones? By tens?
- How can you count forward from __? (e.g., 37)
- How can you tell how many objects there are?
- What number comes after/before __? How do you know?
- What is your strategy to be sure your count is correct?

Written Curriculum

Common Core State Standards for Mathematical Content

Counting and Cardinality	K.CC

Know number names and the count sequence.

K.CC.1 Count ~~to 100~~ by ones and by tens.

K.CC.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

Count to tell the number of objects.

K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality.

b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.

c. Understand that each successive number name refers to a quantity that is one larger.

Common Core Standards for Mathematical Practice

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Clarifying the Standards

Prior Learning

Students came to school with a limited and varied educational experiences. Most students have an idea of number, whether it is sequential or not. Students enter with a range of mathematical understanding—for example, they rote count, but have not attached meaning to number. Some may be able to attach a name and symbol and/or represent the number given.

Current Learning

In this unit, students rote count to 70 by ones and tens. They learn to count forward from a given number and count objects in various configurations. Students understand the relationship between number and quantity and that the last number said is the number counted. They understand that each successive number refers to a quantity that is one larger. By the end of kindergarten, they rote count to 100 by ones and tens.

Future Learning

In first grade, students will extend their counting to 120, starting at any number less than 120. They will continue to read, write, and represent a given number of objects with a written number. First graders will understand that the two digits of a two-digit number represent amounts of tens and ones. They will understand that 10 can be thought of as a bundle of 10 ones—called a *ten*. Students will understand place value of the numbers 11 to 19 are composed of a ten and 1, 2, 3, 4, 5, 6, 7, 8, or 9 ones and the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to 1, 2, 3, 4, 5, 6, 7, 8, 9 tens (and 0 ones).

Students will be able to relate counting to addition and subtraction.

Additional Findings

Curriculum Focal Points states, "Children use number, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set, creating a set with a given number of objects, …" (p. 12)

Principles and Standards for School Mathematics states, "They should learn that counting objects in a different order does not alter the result, and they may notice that the next whole number in the counting sequence is one more than the number just named. Children should learn that the last number named represents the last object as well as the total number of objects in the collection." (p. 79)

Kindergarten Mathematics, Quarter 3, Unit 3.2

Comparing Numbers

Overview

Number of instructional days: 5 (1 day = 30 minutes)

Content to be learned

- Identify whether the number of objects in one group is greater than or equal to the number of objects in another group.
- Use matching and counting strategies (up to 10) to compare quantities.
- Compare written numerals between 1 and 10.

Mathematical practices to be integrated

Make sense of problems and persevere in solving them.

- Look for entry points to solve a problem.
- Analyze what is given and look for relationships.
- Use concrete objects or pictures to help conceptualize and solve a problem.
- Question solutions; monitor and adjust path and ask, "Does this make sense?"

Model with mathematics.

- Apply the counting strategies they know to compare quantities.
- Represent a situation with objects or numbers.
- Analyze relationships mathematically to draw conclusions.

Essential questions

- How do you know if the number of objects in this group is more than the number of objects in that group?
- How do you know if the number of objects in this group is equal to the number of objects in that group?
- How can you compare two numerals? Which is greater? How do you know?
- How can you make the groups equal?

Written Curriculum

Common Core State Standards for Mathematical Content

Counting and Cardinality	**K.CC**

Compare numbers.

K.CC.6 Identify whether the number of objects in one group is greater than~~, less than,~~ or equal to the number of objects in another group, e.g., by using matching and counting strategies.[1]

[1] Include groups with up to ten objects.

K.CC.7 Compare two numbers between 1 and 10 presented as written numerals.

Common Core Standards for Mathematical Practice

1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Clarifying the Standards

Prior Learning

Students may have had some understanding that number words refer to a quantity. Some students may have used one-to-one correspondence to solve problems and compare numbers. The range of students' mathematical experience varies depending on their exposure to the concepts.

Current Learning

Students use matching and counting strategies in identifying the number of objects in one group as greater than or equal to the number of objects in another group. They compare numbers between 1 and 10 as written numerals. By the end of the year, students identify the number of objects in one group as less than the number of objects in another group.

Future Learning

In grade 1, students will compare two-digit numbers based on meanings of the tens and ones digits and use the symbols >, =, and < to show greater than, equal to, and less then.

Additional Findings

Curriculum Focal Points states that students "choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the number in a small set, counting, and producing sets of given sizes, counting the number in combined sets and counting backwards, …" (p. 12)

Principals and Standards for School Mathematics states, "During the early years teachers must help students strengthen their sense of number, moving from the initial development of basic counting techniques to more-sophisticated understandings of the size of numbers, number relationships, patterns, operations, and place value." (p. 79)

Kindergarten Mathematics, Quarter 3, Unit 3.3

Understanding and Representing Addition and Subtraction Problems

Overview

Number of instructional days: 15 (1 day = 30 minutes)

Content to be learned

- Represent addition and subtraction in a variety of ways (e.g., drawings, objects, equations).
- Use objects or drawings to solve and represent addition and subtraction word problems within 10.
- Decompose numbers into pairs by using objects or drawings.
- Represent decompositions with drawings or equations.
- Find the number that makes 10 for any number 1 to 9 using drawings or objects.
- Fluently add within 5.

Mathematical practices to be integrated

Reason abstractly and quantitatively.

- Use objects, fingers, mental images, drawings, sounds, acted-out situations, verbal explanations, expressions, or equations to represent addition and subtraction situations.
- Express a word problem in a number sentence.

Model with mathematics.

- Act out an addition or subtraction problem.
- Use a variety of ways to solve addition and subtraction problems in everyday life.

Essential questions

- What are some different ways you can solve a word problem?
- How can you find the answer to this problem? (e.g., 7 – 3 =)
- What number added to ___ gives you 10? (e.g., 4) Explain your thinking.
- What are some different ways you can show the total of ___? (e.g., 9)
- How can you use objects or drawings to make ___ (up to 10) in more than one way? (e.g., 8 is 5 and 3, 4 and 4, 2 and 6, etc.)

Written Curriculum

Operations and Algebraic Thinking K.OA

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings[2], sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

[2] Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards.)

K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

K.OA.3 Decompose numbers ~~less than or equal to 10~~ into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings~~, and record the answer with a drawing or equation~~.

K.OA.5 Fluently add ~~and subtract~~ within 5.

Common Core Standards for Mathematical Practice

2 Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Clarifying the Standards

Prior Learning

Most children had a basic sense of numbers prior to kindergarten. Some children solved quantitative problems by counting the objects within a set. They may have joined and separated objects within a simple context. Children understand the concept of *more,* but many are still struggling with the concept of *less*.

Current Learning

Students use one-to-one correspondence to count objects to 10 and are able to express the written numerals up to 10. They are able to answer the question, "How many?" Students represent addition and subtraction with objects, fingers, mental images, drawings, sounds, and acted-out situations. In addition, they solve the operations using verbal explanations, expressions, and equations. Kindergarteners are encouraged to write equations, but it is not required. Students solve word problems within 10 by using the previously mentioned strategies. They identify that one group is greater than another as well as refer to a quantity that is one larger when counting in succession. When given the quantity 10, students determine the combinations that equal it. They fluently add within 5.

Future Learning

In grade 1. students will solve addition and subtraction word problems within 20. They will equate a symbol for the unknown number to represent the problem. Students will add and subtract within 20 and fluently within 10. The meaning of the equal sign will be internalized, and students will determine if the equations are true or false using the strategies of counting on and making 10. They will determine the unknown whole number in addition and/or subtraction equations relating to three whole numbers. Students will understand the properties of operations as strategies to add and subtract (e.g., if 8 + 3 = 11, then 3 + 8 = 11).

Additional Findings

Curriculum Focal Points states, "Children use numbers, including written numerals, to represent quantities and to solve quantitative problems … and modeling simple joining and separating situations with objects." (p. 12)

Principles and Standards for School Mathematics states,

> "During the primary grades, students should encounter a variety of meanings for addition and subtraction of whole numbers. … Young children might use addition and count on from 2 keeping track with their fingers to get to 5."
>
> "Problem solving is an integral part of all mathematical learning, and so it should not be an isolated part of the mathematics program. The context of the problems can vary from familiar experiences involving students' lives or the school day to applications involving the sciences or the world of work. Good problems will integrate multiple topics and will involve multiple mathematics." (p. 34)

Kindergarten Mathematics, Quarter 3, Unit 3.4

Foundations of Place Value: Composing and Decomposing Numbers into 10 Ones and Some More Ones

Overview

Number of instructional days: 5 (1 day = 30 minutes)

Content to be learned

- Compose and decompose numbers 11 to 19 into 10 ones and some more ones.
- Understand that the numbers 11 to 19 are made up of 10 ones and 1, 2, 3, 4, 5, 6, 7, 8, or 9 ones.

Mathematical practices to be integrated

Construct viable arguments and critique the reasoning of others.

- Explain how numbers 11 to 19 are related.
- Use drawings and objects to represent examples of quantities to 19.
- Use concrete objects or pictures to help conceptualize and make sense of the problem.

Look for and make use of structure.

- Look at the relationship between number names and quantities.
- Discover structure and reasoning of patterns in the number system.
- Develop an understanding of the structure of mathematics (i.e., decomposing and composing).

Essential questions

- How can you use these objects (e.g., cubes) to show ___? (e.g., 17)
- How can you use drawings and objects to decompose (break down) numbers 11 to 19?
- How can you prove that the numbers between 11 and 19 are made of 10 ones and some more ones?

Written Curriculum

Number and Operations in Base Ten	K.NBT

Work with numbers 11–19 to gain foundations for place value.

K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings~~, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8)~~; understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Common Core Standards for Mathematical Practice

3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

Clarifying the Standards

Prior Learning

Students have had very different experiences with number and counting. Some students counted by rote, while others may have had experience with place value. Some composed and decomposed numbers. The range of students' mathematical abilities varies depending on their exposure to the concepts.

Current Learning

Students compose and decompose numbers 11 to 19 into 10 ones and some more ones. They use objects or drawings to represent a number from 11 to 19. Later in the year, students record their composition or decomposition with a drawing or an equation (e.g., 17 = 10 + 7). They understand that these numbers are composed of 10 ones and 1, 2, 3, 4, 5, 6, 7, 8, or 9 ones.

Future Learning

In grade 1, students will understand that the two digits of a two-digit number represent the amounts of tens and ones. They now call the bundle of 10 ones a *ten*. Students compose and decompose a number from 11 to 19 into a ten and 1, 2, 3, 4, 5, 6, 7, 8, or 9 ones. They will refer to the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 as 1, 2, 3, 4, 5, 6, 7, 8, or 9 tens (and 0 ones). Students will use place value understanding to add and subtract. In grade 2, students will extend their understanding to hundreds.

Additional Findings

Curriculum Focal Points states students, "… Connect number words and numerals to the quantities they represent, using various physical models and representations." (p. 23)

Principles and Standards for School Mathematics states, "Concrete models can help students represent numbers and develop number sense; they can also help bring meaning to students' use of written symbols and can be useful in building place-value concepts. But using materials, especially in a rote manner, does not ensure understanding." (p. 80)

Kindergarten Mathematics, Quarter 3, Unit 3.5

Exploring Two- and Three-Dimensional Shapes

Overview

Number of instructional days: 10 (1 day = 30 minutes)

Content to be learned

- Describe measurable attributes of two-dimensional objects such as length or weight.
- Describe several measurable attributes of a single object.
- Compare two objects with a common measurable attribute to see which object has *more of* or *less of* the attribute.
- Classify objects into given categories.
- Count (up to 10) the number of objects in each category and sort the categories by count.
- Identify shapes as two-dimensional or three-dimensional.

Mathematical practices to be integrated

Model with mathematics.

- Apply mathematics they know to solve problems.
- Simplify a complicated problem.
- Identify important quantities in a problem.

Use appropriate tools strategically.

- Use tools to visualize possible solutions.
- Use tools such as concrete models or diagrams to solve a math problem.
- Select the most efficient tools.
- Know when each of these tools might be helpful.
- Use technology tools to explore and deepen their understanding of concepts.

Essential questions

- How can you describe the object?
- How can you tell the difference between shapes?
- How are the shapes alike?
- Which shapes should be in this group? Why?
- How many objects are in this group? Show your thinking.
- What are some ways you can sort these groups of shapes?
- How can you compare the length of these two shapes?
- How can you tell the difference between two- and three-dimensional shapes?

Written Curriculum

Measurement and Data K.MD

Describe and compare measurable attributes.

K.MD.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute~~, and describe the difference~~. *For example, directly compare the heights of two children and describe one child as taller/shorter.*

Classify objects and count the number of objects in each category.

K.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.[3]

[3] Limit category counts to be less than or equal to 10.

Geometry K.G

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

K.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Common Core Standards for Mathematical Practice

4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and

solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

Clarifying the Standards

Prior Learning

Children started forming concepts of shape long before they come to school. Students have had very different experiences with geometry and spatial reasoning. They may have examined shapes of objects and discussed their relative positions. Students found shapes in their environment and described them in their own words. They may have built pictures and designs by combining two- and three-dimensional shapes. Many students solved problems such as deciding which piece fits into a space of a puzzle. The range of students' mathematical abilities varies depending on their exposure to the concepts.

Current Learning

In Unit 2.3, students identify and describe objects in the environment using names of shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, spheres) and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to.*

In this unit, students correctly name shapes regardless of their orientations or overall size. They identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Students describe measurable attributes of objects such as length or weight. They describe several measurable attributes of a single object. Students compare two objects with a measurable attribute in common to see which object has *more of/less of* the attribute and describe the difference (e.g., directly comparing the length of two pencils). Students classify objects into given categories, count the number of objects in each category, and sort the categories. (Counts are limited to less than or equal to 10.)

Future Learning

In grade 1, students will order three objects by length and compare the lengths of two objects indirectly by using a third object. They will express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end. Students will understand that the length measurement of an object is the number of the same-size length units that span it with no gaps or overlaps. (This is limited to contexts where the object being measured is spanned by a whole number of length units.) In grade 2, students will use standard units of measure.

First graders will distinguish between defining attributes (e.g., three-sided and closed) versus nondefining attributes (e.g., color, orientation, overall size). They will build and draw shapes to possess defining attributes. They will compose two- or three-dimensional shapes to create a composite shape and compose new shapes from the composite shape.

Additional Findings

Curriculum Focal Points states,

> "Children integrate their understandings of geometry, measurement, and number." (p. 12)
>
> "Children interpret the physical world with geometric ideas (e.g., shape, orientation, spatial relations) and describe it with corresponding vocabulary.… They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes." (p. 24)

Principles and Standards for School Mathematics states, "Students first learn to recognize a shape by its appearance as a whole (van Hiele 1986) or through qualities such as 'pointiness' (Lehrer, Jenkins, and Osana 1998). They may believe that a given figure is a rectangle because 'it looks like a door.' … The goal is that early experiences with geometry lay the foundation for more-formal geometry in later grades. Using terminology to focus attention and to clarify ideas during discussions can help students build that foundation. Teachers must provide materials and structure the environment appropriately to encourage students to explore shapes and their attributes…." (p. 97)