

# *Kindergarten Mathematics*

## *Number and Operations*

***NCTM FOCAL POINT: Number and Operations: Representing, comparing, and ordering whole numbers and joining and separating sets.*** Children use numbers, 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, comparing and ordering sets or numerals by using both cardinal and ordinal meanings, and modeling simple joining and separating situations with objects. They 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 backward.

### **Enduring Understandings**

Flexibility in thinking about numbers is a hallmark of number sense.

Understanding the size of numbers, developing multiple ways of thinking about and representing numbers, using numbers as referents, and developing accurate perceptions about the effects of operations on numbers builds number sense.

Computing efficiently and accurately (fluency) with single-digit numbers is critical.

### **Essential Questions**

*What does it mean to be “computationally fluent”?*

1. What is a number?
2. How do we use numbers?
3. How do numbers relate to each other?
4. How do operations relate to each other?
5. Why is it important to use numbers and operations fluently (accurately and efficiently) and flexibly?

# *Kindergarten Mathematics*

## *Number and Operations*

### **Outcomes**

The student will:

- A. Understand numbers, ways of representing numbers, relationships among numbers and number systems
  - 1. Conserve number
  - 2. Recognize the number of objects up to 6 without counting
  - 3. Use manipulatives and diagrams to demonstrate understanding (one-to-one relationships) of whole numbers through 31
  - 4. Represent quantities with pictures, numerals, or words
  - 5. Connect number words and numerals to quantities to 31 using various physical models and representations
  - 6. **Sort, count, order and compare sets of objects**
  - 7. **Develop, use, and understand the language of more than, as many as, less, fewer than, equal to, greater than, one more, one less**
  - 8. **Find a number that is 1 more or 1 less than a given number**
  - 9. **Read, write, count, compare, and order numbers to 31 in numerals**
  - 10. **Recognize that a number can be used to represent how many objects are in a set or to represent the position of an object in a sequence**
  - 11. **Use multiple strategies for counting on to and back from 10**
  
- B. Understand meanings of operations and how they relate to one another
  - 1. Use a variety of tools to compute, including concrete objects, paper and pencil, and mental calculations
  - 2. Model, record and describe situations involving addition and subtraction
  - 3. Have experience with the symbols +, -, =
  - 4. **Compose and decompose numbers up to 10 with objects and pictures**
  
- C. Understand how to compute fluently and make reasonable estimates
  - 1. Use a variety of methods and tools, including concrete objects, paper and pencil, and mental calculations to solve real-world and mathematical problems (such as counting on, counting back, and skip counting by 10)
  - 2. Develop and use strategies for combining and separating two quantities using up to 10 concrete objects
  - 3. Add and subtract whole numbers using up to ten concrete items
  - 4. Participate in estimating quantities
  - 5. **Add and subtract whole numbers up to 6, using concrete objects**

# *Kindergarten Mathematics*

## *Algebra*

***NCTM FOCAL CONNECTION: Algebra:*** Children identify, duplicate, and extend simple number patterns and sequential and growing patterns (e.g., patterns made with shapes) as preparation for creating rules that describe relationships.

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### **Enduring Understandings**

Patterns are a way to recognize order and to organize the world.

We make generalizations and use symbols to represent mathematical ideas.

Things change over time.

Models help us represent and solve problems.

### **Essential Questions**

1. What is a pattern?
2. How can we sort, classify, and order objects?
3. How do you break numbers into smaller parts?
4. How do you use symbols to make sense of math?
5. What is equality?
6. How can changes be described mathematically?
7. How are changes predictable?
8. What is a useful model?

# *Kindergarten Mathematics*

## *Algebra*

### **Outcomes**

The student will:

A. Understand patterns, relations, and functions

- 1. Sort, classify, and order objects by one attribute such as size, color, thickness or number**
- 2. Identify an object that does not belong in a set**
- 3. Recognize, describe and extend repeating patterns involving up to three elements using objects, pictures, sounds or movements**

# *Kindergarten Mathematics*

## *Geometry*

***NCTM FOCAL POINT: Geometry: Describing shapes and space.*** Children interpret the physical world with geometric ideas (e.g., shape, orientation, spatial relations) and describe it with corresponding vocabulary. They identify, name, and describe a variety of shapes, such as squares, triangles, circles, rectangles, (regular) hexagons, and (isosceles) trapezoids presented in a variety of ways (e.g., with different sizes or orientations), as well as such three-dimensional shapes as spheres, cubes, and cylinders. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

***NCTM FOCAL CONNECTION: Geometry:*** Children integrate their understandings of geometry, measurement, and number. For example, they understand, discuss, and create simple navigational directions (e.g., “Walk forward 10 steps, turn right, and walk forward 5 steps”).

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### **Enduring Understandings**

Geometry helps us describe, represent, and make sense of our environment.

### **Essential Questions**

1. What is a shape?
2. What are the properties of shapes?
3. How can we describe directions (which way), distance (how far), location (where), and representation (what objects)?
4. What happens when you change a shapes position and orientation (slides, flips, and turns)?
5. What is a symmetrical design?
6. How is the world of geometry connected to the world of numbers?

# *Kindergarten Mathematics*

## *Geometry*

### **Outcomes**

The student will:

- A. Understand characteristics and properties of 2- and 3- dimensional shapes
  1. Investigate and predict the results of putting together and taking apart 2D and 3D shapes
  2. Recognize, name, build, draw, compare, and sort 2D and 3D shapes in their world (comparing and sorting by shape, color, area and length as examples)
  3. Identify and **sort various 2D and 3D shapes, and describe their attributes (square, triangle, circle, rectangle, sphere, cube, rectangular prism and cylinder)**
  
- B. Understand spatial relationships
  1. **Locate and describe placement of objects with terms such as: on, inside, outside, above, below, over, under, beside, between, in front of, behind, next to, top or bottom**
  
- C. Understand transformations and symmetry
  1. Explore symmetrical designs

# *Kindergarten Mathematics*

## *Measurement*

**NCTM FOCAL POINT: Measurement: Ordering objects by measurable attributes.** Children use measurable attributes, such as length or weight, to solve problems by comparing and ordering objects. They compare the lengths of two objects both directly (by comparing them with each other) and indirectly (by comparing both with a third object), and they order several objects according to length.

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### **Enduring Understandings**

Measurement is a way to describe and compare objects or ideas. A specific process is used to measure attributes.

### **Essential Questions**

1. What properties can be measured (length, height, volume, width, area, weight, time, money and temperature)?
2. How do we measure (unit, tool, and process)?
3. What standard units are necessary?
4. When should you estimate? When do you need an exact answer? What makes a useful estimate?

# *Kindergarten Mathematics*

## *Measurement*

### **Outcomes**

The student will:

- A. Understand objects have measurable attributes
  - 1. Apply knowledge of non-standard units to measure length (longer, shorter, the same)
  - 2. **Compare and order objects by length, weight, volume, temperature or size and use appropriate vocabulary (less, least, more, most, same, equal)**
  - 3. **Compare and order events based on time and use appropriate vocabulary through calendar content (days of week, months, yesterday, today, tomorrow)**
  - 4. **Recognize penny, nickel, dime, and quarter**
  - 5. **Know that clocks and calendars are instruments to measure time**

# *Kindergarten Mathematics*

## *Data Analysis and Probability*

***NCTM FOCAL CONNECTION: Data Analysis:*** Children sort objects and use one or more attributes to solve problems. For example, they might sort solids that roll easily from those that do not. Or they might collect data and use counting to answer such questions as, "What is our favorite snack?" They re-sort objects by using new attributes (e.g., after sorting solids according to which ones roll, they might re-sort the solids according to which ones stack easily).

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### **Enduring Understandings**

We collect and use data to help us answer questions and make decisions.

### **Essential Questions**

1. How do we conduct a survey?
2. How can we gather and organize data?
3. How can represent the data we gather?
4. What information can we gather from data, charts, and graphs?

# ***Kindergarten Mathematics***

## ***Data Analysis and Probability***

### **Outcomes**

The student will:

- A. Understand how to collect, organize, display and analyze data to answer a question
  - 1. Answer questions by gathering, organizing and displaying information (experienced as a class with teacher guiding discussion, such as “How many ways did students get to school today; walk, ride, bus?”)
  - 2. Collect data (possibly by counting using 1:1 correspondence)
  - 3. Sort and describe objects by attributes for the purpose of organizing data
  - 4. Record and represent data using concrete objects, pictures, charts, and graphs
  - 5. Compare two sets of data and draw conclusions based on data

