



## Bridge Documents for 2007 South Carolina Mathematics Standards (DRAFT)

The purpose of these bridge documents is to clarify the relationship between the 2007 and 2002 South Carolina mathematics standards. The 2007 standards contain six standards at each grade level (K – 8), with each standard divided into a set of indicators. The indicators, not the standards, are central to planning instruction and designing assessments.

The first standard at each grade level is the Process Standard. It is the same for all grade levels and it states that: “The student will have a basic understanding of the mathematical processes of problem solving, reasoning and proof, communication, connections, and representation.” The Process Standard is NOT included in the bridge documents. The next five standards at each grade level are, in order, Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability. These standards ARE included in the bridge documents. The number of indicators per standard ranges from two (Kindergarten Data Analysis and Probability) to 12 (Third Grade Number and Operations). The average number of indicators per standard is about six or seven.

For each grade level, the format is the same and each standard within the grade level. The first page contains three columns. The left-hand column contains a list of the new indicators related to the standard. The middle column contains the 2002 South Carolina mathematics standards (referred to in the 2002 document as “expectations”) that are most closely related to the new indicators. The right-hand column contains a summary of the major changes between the “old” and the “new.” If there is no “old expectation” that is clearly related to the new indicator, the word NEW! appears in the right-hand column. Note that when there are a large number of indicators, the three-column table spills over onto a second page. Also note that when an asterisk appears to the right of an old expectation in the middle column, the asterisk has the same meaning as it did in the 2002 standards document.

The page after the three-column table contains a list of the 2002 expectations that have been deleted from that particular grade level and standard. If the old expectation has been moved somewhere else, this fact is noted by placing a > in front of the old expectation to indicate movement and placing the location to which it has been moved in italicized brackets after the old expectation (e.g., *[Moved to Grade 2]*).

Following the list of deletions, there is a summary of the essence of that standard (e.g., Number and Operations) for that grade level (e.g., Grade 3). This summary is divided into three parts: key concepts, key facts, and key skills. These correspond quite closely to the three types of knowledge included in the Revised Bloom’s Taxonomy on which the new standards and indicators are based: Conceptual Knowledge, Factual Knowledge, and Procedural Knowledge.

It is hoped that these bridge documents will help teachers understand how the new standards and indicators compare with the old standards and expectations. In this way, teachers can build on what they have done in the past to teach mathematics, rather than believe they have to start over. Finally, these bridge documents are not “set in stone.” If, as you use these documents, you notice errors that have been made or find connections that have been missed, please let us know. We will update these documents every six weeks so that they truly represent our collective best thinking about the relationship between the two sets of standards.

**KINDERGARTEN NUMBER AND OPERATIONS (Standard K-2)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Recall numbers by counting forward to 99 and backward from 10.	Count forward to 20 and backward from 10. (*)	Increases the upper bound on counting forward to 99
2. Translate between numeral and quantity through 31.	Given a set containing 10 or fewer concrete items, tell how many are in a set by counting the number of items orally using 1:1 correspondence (*). Identify the numeral that matches a quantity (1–10).(*)	Increases the upper bound on the number of objects to 31
3. Compare sets of no more than 31 objects using the terms “more than,” “less than,” or “the same as.”	Given a set of 10 or fewer concrete items, identify and describe one set as having more, fewer, or the same number of members as the other set. (*)	Increases the maximum number of objects or items from 10 to 31
4. Represent simple joining and separating situations through 10.	Add and subtract whole numbers using up to ten concrete items. (*)	Change in terminology: Adding becomes joining; subtracting becomes separating
5. Understand that addition results in increase and subtraction results in decrease	Relate the operation of addition to increase in quantity and subtraction to decrease in quantity.	Change in terminology only
6. Represent the place value of each digit in a two-digit whole number		NEW!
7. Identify ordinal positions through 31 <sup>st</sup> .	Identify the positions first through tenth using an ordered set of objects.	Increase in upper bound to 31 <sup>st</sup> .

## WHAT'S BEEN DELETED?

Discuss and explain how numerals are used in the environment (e.g., house numbers, phone numbers, dates)  
Divide a set of objects into equal groups.

## WHAT IS THE ESSENCE OF KINDERGARTEN NUMBER AND OPERATIONS?

### Key Concepts

Numeral  
Quantity  
Less than, greater than, equal to  
Add (join)  
Subtract (separate)  
Addition  
Subtraction  
Place value  
Position (ordinal numbers)

### Key Skills

How to count forward to 99 and backward from 10  
How to compare whole numbers up to 31

**KINDERGARTEN ALGEBRA (Standard K-3)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Identify simple growing patterns	Order objects by size, quantity, and other properties	“Identify patterns” replaces “order objects” (with ordering being a simple growing pattern)
2. Analyze simple repeating and growing relationships to extend patterns	Identify, describe, and extend a repeating relationship (pattern) found in common objects, sounds, and movements (*)	Three verbs in the old expectation replaced with a single verb “analyze.” This suggests students should be able to examine a pattern, determining whether it is repeating or growing, and then extend the pattern based on that determination.
3. Translate simple repeating and growing patterns into rules	Determine a rule for repeating and growing patterns	Change in terminology only.
4. Classify objects according to one or more attributes such as color, size, shape, and thickness	Sort and classify objects by to one attribute (size, shape, and color) Sort and classify objects by more than one attribute (size, shape, and color)	This indicator basically combines the two old expectations; the attribute of thickness is added to size, shape, and color

## WHAT'S BEEN DELETED?

Construct two-part and three-part patterns

Using concrete materials, construct addition and subtraction models

>Use language such as less than, more than, or the same number as to describe the relative sizes of sets of concrete objects (\*) [*Moved to Number and Operations, Standard K-2*]

Combine two sets of objects and count the result (\*)

Given a set of objects, remove some and then count the result

## WHAT IS THE ESSENCE OF KINDERGARTEN ALGEBRA?

### Key Concepts

Patterns

Repeating patterns

Growing patterns

### Key Skills

How to classify objects according to one or more attributes such as color, size, shape, and thickness

### KINDERGARTEN GEOMETRY (Standard K-4)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Identify the two-dimensional shapes square, circle, triangle, and rectangle and the three-dimensional shapes cube, sphere, and cylinder	Identify, model, and draw two-dimensional geometric shapes (circle, square, triangle, rectangle) (*) Identify examples of three-dimensional shapes seen in the environment (cube, sphere, cone, cylinder) Identify and describe objects in the environment that depict geometric figures (triangle, rectangle, square, and circle).	This indicator combines three old expectations
2. Represent two-dimensional geometric shapes	Identify, model, and draw two-dimensional geometric shapes (circle, square, triangle, rectangle) (*)	The emphasis in this indicator is on “represent” (that is, “model” or “draw”).
3. Use the positional words <i>near, far, below, above, beside, next to, across from,</i> and <i>between</i> to describe the location of an object	Use positional words to describe the location of objects ( <i>near, far, up, down, below, above, beside, next to, between, over, under</i> ). (*)	Basically a wording change. Also, slightly fewer positional words.
4. Use the directional words <i>left</i> and <i>right</i> to describe movement		NEW!

## WHAT'S BEEN DELETED?

Identify, sort, and classify two-dimensional geometric shapes according to their attributes (size, shape, color).  
Compare the size (larger/smaller) and shape of plane geometric figures (circles, triangles, squares, rectangles) (\*)  
Locate two-dimensional shapes on parts of three-dimensional objects.  
Combine and subdivide geometric shapes and discuss the results (square, rectangle, triangle, circle)  
>Identify and describe shapes in the world that show symmetry across a line (nature, art, the human body) [*Move to Grade 1*]/  
Recall the configuration of dots on dominoes or name objects seen briefly.  
>Identify, describe, and extent a repeating pattern found in common objects, numerals, sounds, and movements. [*Moved to Algebra*]  
Compare the relative size of objects as bigger, smaller, or the same.  
Connect geometrical patterns and their relationships with other aspects of mathematics and with other disciplines.

## WHAT IS THE ESSENCE OF KINDERGARTEN GEOMETRY?

### Key Concepts

Two-dimensional shapes  
Three-dimensional shapes  
Positional words  
Directional words

### Key Skills

How to represent two-dimensional geometric shapes.

### KINDERGARTEN MEASUREMENT (Standard K-5)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Identify a penny, a nickel, a dime, a quarter, and a dollar and the value of each	Identify a penny, nickel, dime, quarter, and dollar.	Knowing the monetary value of each coin has been added.
2. Compare the lengths of two objects, both directly and indirectly, to order objects according to length	Compare two objects by using direct comparisons according to one or more of the following attributes: length, height, weight, and time (*) Order objects by length, height, and weight.	Focus exclusively on length. Other than that, a wording change.
3. Use nonstandard units to explore the measurement concepts of length and weight	Use nonstandard linear measures (fingers, hands, feet, and arms). Use nonstandard measures to explore the area of everyday objects.	Focus exclusively on length and weight.
4. Identify rulers, yardsticks, and tape measures as devices used to measure length; scales and balances as devices used to measure weight; calendars and analog and digital clocks as devices used to measure time; and digital and standard thermometers as devices used to measure temperature	Identify the instruments used to measure length (ruler), weight (scale), time (digital and analog clocks), day, month, and season (calendar), and temperature (thermometer).(*)	Wording change.
5. Understand which measure—length, weight, time, or temperature—is appropriate for a given situation		NEW! Goes beyond indicator #4 to ensure students know when to use which measure.
6. Use analog and digital clocks to tell time to the hour	Tell time to the hour by using analog and digital clocks.(*)	Wording change.
7. Use a calendar to identify dates, days of the week, and months of the year	Use a calendar to do the following: (a) read and write numerals to 31, (b) identify the day and the date, (c) identify the days of the week, (d) identify the months of the year, and (e) identify “yesterday,” “today,” and “tomorrow.”	This indicator emphasizes (b), (c), and (d).
8. Recall equivalencies associated with time: 7 days = 1 week and 12 months = 1 year		NEW!

## WHAT'S BEEN DELETED?

Identify the attributes of length, volume, weight, area, and time by using manipulatives.  
Compare quantities using nonstandard units of capacity.  
Use appropriate units of linear measure (foot rulers, yard tape measures).  
Make and use estimates of measurements.  
Identify the relationship between the minute hand and the hour hand on an analog clock.

## WHAT IS THE ESSENCE OF KINDERGARTEN MEASUREMENT?

### **Key Concepts**

Coins, identification and value of  
Length  
Width  
Nonstandard units of measure  
Measuring instruments for length, weight, time, and temperature  
Analog clocks  
Digital clocks  
Calendar

### **Key Facts**

Equivalencies associated with time (7 days = 1 week; 12 months = 1 year)

### **Key Skills**

How to sequence objects according to their length  
How to determine which measure is appropriate for a given situation (length, weight, time, or temperature)  
How to use calendar to identify dates, days of the week, and months of the year

## KINDERGARTEN DATA ANALYSIS AND PROBABILITY (Standard K-6)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Organize data in graphic displays in the form of drawings and pictures.	Display information by using object graphs, pictorial graphs, and tables (*)	This indicator emphasizes “organize” rather than “display.” Also, the emphasis is on the more general “drawings and pictures” than on “graphs and tables.”
2. Interpret data in graphic displays in the form of drawings and pictures.	Interpret information on a graph.	Basically a wording change; like the previous indicator “drawings and pictures” have replaced “graph.”

### WHAT’S BEEN DELETED?

Collect data related to familiar experiences (\*).  
Compare, sort, and group objects by a given attribute.

### WHAT IS THE ESSENCE OF KINDERGARTEN DATA ANALYSIS AND PROBABILITY?

#### Key Concepts

Data  
Graphic displays

#### Key Skills

How to organize data in graphic displays  
How to interpret data in graphic displays

### FIRST GRADE NUMBER AND OPERATIONS (Standard 1-2)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Translate between numeral and quantity through 100.	Given a set of 10 to 100 objects, tell how many items there are by using 1:1 correspondence. Write the numeral that corresponds to a given set up to 100 (*)	Primarily a wording change combining two old expectations. However, the difference between numeral and quantity is something that runs through several grade levels.
2. Use estimation to determine the approximate number of objects in a set of 20 to 100 objects.	Estimate the number of objects in a set of from 5 to 20 objects.	The range of objects is increased from 5 to 20 to 20 to 100.
3. Represent quantities in word form through ten.		NEW! The primary difference between this indicator and the next one is that the emphasis in #3 is on quantities (e.g., number of objects) whereas the emphasis in #4 is on the numerals themselves (e.g., 1, 2, 3).
4. Recognize whole-number words that correspond to numerals through twenty.	Read whole numbers from a number line labeled from 0 to 180 (180 school days) (*) Write in words whole numbers through 10.	Primarily a wording change combining two old expectations. Also, the upper limit is 20, rather than either 180 or 10.
5. Compare whole number quantities through 100 using terms “is greater than,” “is less than,” and “is equal to.”	Compare the magnitudes of three given quantities (a one-digit numeral, a two-digit numeral, and a three-digit numeral). Describe pairs of numerals each less than 100 using the words <i>is greater than</i> , <i>is less than</i> , and <i>equals</i>	Primarily a wording change combining two old expectations. The upper limit is set at 100.
6. Recall basic addition facts through $9 + 9$ and corresponding subtraction facts.	Recall basic addition facts with sums up to 18 and the corresponding subtraction facts (*)	Wording change only.
7. Summarize the inverse relationship between addition and subtraction.		NEW! In the 2002 this indicator was placed in the Algebra strand.
8. Generate strategies to add and subtract without regrouping through two-digit numbers	Add and subtract pairs of two-digit whole numbers without regrouping (*) Explain/describe strategies for addition/subtraction. Solve story and picture problems using one-step solutions and basic addition facts with sums up to 18 and corresponding subtraction facts (*). Determine the most reasonable answer for an addition or subtraction problem	This indicator combines four of the old expectations.

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
9. Analyze the magnitude of digits through 999 on the basis of their place values.	Represent up to three-digit numerals using various concrete and pictorial models (*)	Primarily a wording change; the old expectation seems to be a bit clearer.

### WHAT'S BEEN DELETED?

Construct representations of number combinations up to 10 (e.g., number stories, equations, pictures).

>Identify odd and even numerals up to 100(\*) *[Moved to Grade 3, Indicator 3-2.9].*

>Identify and represent  $\frac{1}{4}$ ,  $\frac{1}{3}$ , and  $\frac{1}{2}$  of a whole using concrete and pictorial models (\*) *[Moved to Grade 3].*

>Demonstrate concretely and symbolically the meaning of one-digit and two-digit addition and subtraction. *[Moved to Kindergarten].*

>Identify the place value of each digit in a three-digit numeral *[Moved to Kindergarten.]*

>Identify the positions first through twentieth using an ordered set of objects (\*) *[Moved to Kindergarten]*

### WHAT IS THE ESSENCE OF FIRST GRADE NUMBER AND OPERATIONS?

#### Key Concepts

Numeral

Quantity

Estimation

Place value

Position (ordinal numbers)

#### Key Facts

Addition facts

Subtraction facts

#### Key Skills

How to represent words as numbers and vice versa

How to compare whole numbers up to 100

How to add and subtract two-digit whole numbers

**FIRST GRADE ALGEBRA (Standard 1-3)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze numeric patterns in addition and subtraction to develop strategies for acquiring basic facts.	Use concrete and pictorial models to develop an understanding of the concepts of addition and subtraction of whole numbers.	Change in emphasis from models to strategies; also change from concepts of addition and subtraction to basic facts
2. Translate patterns into rules for simple addition and subtraction.		NEW!
3. Illustrate the commutative property based on basic facts.		NEW!
4. Analyze numeric relationships to complete and extend simple patterns.	Using symbols and objects, identify, create, and extend a wide variety of patterns (*)	Focus on analyze relationships.
5. Classify a number as odd or even.		NEW!
6. Classify change over time as quantitative or qualitative.	Describe the change in one attribute over time. Compare a wide variety of measurements over time (e.g., students' heights, plant growth)	Both quantitative and qualitative changes are included, with an emphasis on the differences between them

## WHAT'S BEEN DELETED?

- >Sort and classify concrete objects according to one or more attributes including color, size, shape, and thickness [*Moved to Kindergarten*].
- Sequence random numerals between 1 and 100(\*) .
- Use letters to represent a created pattern (e.g., ABC, ABC).
- >Use numerical patterns to skip count by 2s, 5s, and 10s (\*). [*Moved to Grade 2*]
- >Create a repeating or growing pattern [*Moved to Kindergarten*]
- Identify missing numerals and elements in a pattern or sequence.
- Identify inverse relationships between addition and subtraction facts (fact families) (\*)
- Recognize that the equal sign (=) indicates that the quantities on each side are equivalents.

## WHAT IS THE ESSENCE OF FIRST GRADE ALGEBRA?

### **Key Concepts**

Numeric patterns  
Commutative property  
Odd numbers  
Even numbers  
Quantitative change  
Qualitative change

### **Key Skills**

How to translate patterns into rules for simple addition and subtraction

**FIRST GRADE GEOMETRY (Standard 1-4)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Identify the three-dimensional geometric shapes prism, pyramid, and cone.	Recognize three-dimensional shapes (cube, cone, cylinder, sphere, rectangular prism) (*)	Basically a wording change; slightly fewer shapes mentioned.
2. Analyze the two-dimensional shapes circle, square, triangle, and rectangle.	Draw, describe, and order triangles, squares, rectangles, and circles according to the number of sides, corners, and square corners.	Basically a wording change. Analyze shapes in terms of number of sides, corners, and square corners.
3. Classify two-dimensional shapes as polygons or nonpolygons.		NEW!
4. Identify a line of symmetry.	Draw lines of symmetry through shapes to divide them into congruent shapes. (*)	Basically a wording change with a shift of verb from “draw” to “identify.”
5. Use the positional and directional terms <i>north</i> , <i>south</i> , <i>east</i> , and <i>west</i> to describe location and movement.	Apply a knowledge of relative position to objects in space through conversations, demonstrations, and stories.	This indicator is a much clearer statement of the old expectation, deleting the “how to do it” portion (e.g., conversation).

## WHAT'S BEEN DELETED?

Describe and draw two-dimensional shapes and match plane figures to the appropriate name (circle, square, triangle, rectangle)

Sort two- and three-dimensional models given prescribed criteria.

Classify concrete two- and three-dimensional objects according to one or more attributes including color, size, shape, and thickness (\*)

Using manipulatives, combine and subdivide geometric shapes to create a new shape or design.

>Describe the direction from one object to another on a pictorial map using words such as *up, down, left, and right* [*Moved to Kindergarten*]

>Identify locations on a pictorial map using the position words *next to, beside, between, and across* [*Moved to Kindergarten*] (\*)

Choose the figure that is the result of a transformation of a geometric shape (slide, flip, or turn).

Draw geometric objects based on a mental image.

Recognize geometric shapes in different positions.\

Find and identify geometric patterns in real-world settings (tile floors, sidewalks, art).

Reproduce collections of shapes and dot configurations after viewing them briefly.

>Compare/contrast two different units of length used to measure the same object. [*Moved to Measurement*].

Identify and describe geometry in the environment, including applications in science, art, and architecture.

## WHAT IS THE ESSENCE OF FIRST GRADE GEOMETRY?

### Key Concepts

Three-dimensional shapes

Polygons

Non-polygons

Line of symmetry

Positional terms

Locational terms

### Key Skills

How to analyze two-dimensional shapes

### FIRST GRADE MEASUREMENT (Standard 1-5)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use a counting procedure to determine the value of a collection of pennies, nickels, dimes, and quarters totaling less than a dollar.	Determine the total value of a collection of pennies, nickels, and dimes (not to exceed 100 cents) (*)	Basically a wording change, with emphasis on the procedure for determining the total value of the collection (not just the answer)
2. Represent a nickel, a dime, a quarter, a half-dollar, and a dollar in combinations of coins.	Find money equivalencies in a given amount.	Neither of these, old or new, is crystal clear in terms of its intent.
3. Represent money by using the cent and dollar notations.	Identify the correct usage of the cent symbol, collar symbol, and decimal point.	Basically a wording change.
4. Use whole-inch units to measure the length of an object.	Measure the length of an object in whole inches.	Wording change.
5. Generate common referents for whole inches.		NEW!
6. Use common referents to make estimates in whole inches.	Compare and contrast estimates of measurement to actual findings.	The common thread is estimates. The new indicator focuses on the use of common referents to make estimates. The old expectation focuses on comparing estimates with actual measurements.
7. Use nonstandard units to measure the weight of objects.	Compare the weights of two objects using a balance scale (*)	The balance scale is one way of introducing nonstandard units of weight measurement.
8. Use analog and digital clocks to tell and record time to the half hour.	Tell and record time to the half-hour, using analog and digital clocks (*)	Wording change.
9. Illustrate past and future dates on a calendar.		NEW!
10. Represent dates in standard form (June 1, 2007, for example) and numeric form (6-1-2007, for example)	Use a calendar to do the following (a) sequence the days of the week and the months of the year, and (b) construct and use a calendar to identify dates in standard and numeric forms (January 1, 2001 and 1/1/01).	This indicator is virtually identical to (b) in the old expectation.
11. Use Celsius and Fahrenheit thermometers to measure temperature	Read temperatures using Fahrenheit thermometers.	This indicator adds Celsius thermometers.

## WHAT'S BEEN DELETED?

Compare objects to identify longer, longest, taller, tallest, smaller, smallest, shorter, shortest, and so forth.

Compare the volumes of two or more containers (\*)

Complete a time sequence (example: 9:00, 10:00, \_\_\_\_\_, 12:00)

Use non-standard units to measure the length of an object.

Measure the length of an object in whole centimeters.

>Recall which measuring instrument is needed in a specified measurement situation [*Moved to Kindergarten*].

Relate measurements to other aspects of mathematics and to other disciplines.

## WHAT IS THE ESSENCE OF FIRST GRADE MEASUREMENT?

### Key Concepts

Whole inches (common referents)

Nonstandard units of weight

Past

Future

Standard form of calendar dates

Numeric form of calendar dates

Celsius scale

Fahrenheit scale

### Key Facts

¢ = cents

\$ = dollars

### Key Skills

How to use a counting procedure to determine the value of a collection of coins

How to use whole-inch units to measure length

How to tell time to the half-hour

How to use thermometers to measure temperature

**FIRST GRADE DATA ANALYSIS AND PROBABILITY (Standard 1-6)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use survey questions to collect data.	Pose and answer questions about charts and graphs relating to familiar experiences (e.g., recording daily temperature, the lunch count, class attendance, favorite flavors of ice cream).	This indicator focuses on “survey questions to collect data.” The old expectation focuses on “questions about charts and graphs” (where the data already are collected).
2. Organize data in picture graphs, object graphs, bar graphs, and tables.	Use organized data to construct picture, object, and bar graphs (*)	This indicator focuses on “organize data.” The old expectation focuses on “using (already) organized data.” These are very different skills.
3. Interpret data in picture graphs, object graphs, bar graphs, and tables by using the comparative terms <i>more</i> , <i>less</i> , <i>greater</i> , <i>fewer</i> , <i>greater than</i> , and <i>less than</i> .	Interpret information displayed in a picture graph, object graph, and bar graph using the vocabulary <i>more</i> , <i>less</i> , <i>fewer</i> , <i>greater than</i> , and <i>less than</i> .	Wording change.
4. Predict on the basis of data whether events are <i>likely</i> or <i>unlikely</i> to occur.	Identify an event as likely or unlikely to occur.	Basically a wording change.

## WHAT'S BEEN DELETED?

Compare, sort, and group objects by observable attributes.

## WHAT IS THE ESSENCE OF FIRST GRADE DATA ANALYSIS AND PROBABILITY?

### **Key Concepts**

Picture graphs

Object graphs

Bar graphs

Tables

Likely

Unlikely

More and less

Greater and fewer

Greater than and less than

### **Key Skills**

How to organize data in graphs and tables

How to interpret data presented in graphs and tables

How to predict whether an event is likely or unlikely

## SECOND GRADE NUMBER AND OPERATIONS (Standard 2-2)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Generate estimation strategies to determine the approximate number of objects in a set of no more than 1,000 objects.	Given choices, select a reasonable estimate for a set of at most 1,000 objects.	Emphasis on generating strategies, rather than estimates <i>per se</i> .
2. Represent quantities in word form through twenty.	Write in words whole numbers through 20.	Rewording of old expectation.
3. Represent multiples of ten in word form through ninety.		NEW!
4. Compare whole-number quantities through 999 using the terms “is less than,” “is greater than,” and “is equal to” and the symbols $<$ , $>$ , and $=$ .	Compare and write two whole numerals between 0 and 999, using symbols and words ( $>$ , $<$ , $=$ , <i>is greater than</i> , <i>is less than</i> , and <i>equals</i> ) (*)	Delete “write;” otherwise no change.
5. Interpret models of equal grouping (multiplication) as repeated addition and arrays.	Describe models of equal groupings (multiplication) as repeated addition and arrays (*).	Slight rewording “describe” becomes “interpret.”
6. Interpret models of sharing equally (division) as repeated subtraction and arrays.	Describe models of sharing equally (division) as repeated subtraction and arrays (*).	Slight rewording “describe” becomes “interpret.”
7. Generate strategies to add and subtract pairs of two-digit whole numbers with regrouping.	Select the most efficient method to solve an addition or subtraction problem. Add and subtract pairs of two-digit whole numbers with and without regrouping (*)	Emphasis on generating strategies, rather than selecting method or getting right answers.
8. Generate addition and subtraction strategies to find missing addends and subtrahends in number combinations through 20.	Find missing addends and subtrahends in number combinations up to 20 (*).	Emphasis on generating strategies, rather than selecting method or getting right answers.
9. Generate strategies to round numbers through 90 to the nearest 10.	Round numbers up to 90 to the nearest 10 (*).	Emphasis on generating strategies for rounding, rather than rounding <i>per se</i> .
10. Analyze the magnitude of digits through 9,999 on the basis of their place values.	Using a calculator, explain the patterns in the numeration system relating to place value in numerals up to four digits. Identify the place value of each digit in a four-digit numeral (*)	Basically a rewording, with an explicit upper bound (9,999).

## WHAT'S BEEN DELETED?

- >Name the positions first through thirtieth, using an ordered set of objects [*Moved to Kindergarten*].
  - >Write the fractions that represent  $\frac{1}{4}$ ,  $\frac{1}{3}$ , and  $\frac{1}{2}$  of a set or region [*Moved to Grade 3*].
  - >Using models, order  $\frac{1}{4}$ ,  $\frac{1}{3}$ , and  $\frac{1}{2}$  (\*) [*Moved to Graded 4*]
  - >Demonstrate the inverse relationship between addition and subtraction. [*Moved to Grade 1*].
- Demonstrate the connection between the base-ten concepts and computational strategies (\*).
- Solve addition and subtraction problems (two-step solutions) using data from simple charts and picture graphs (\*).
- >Write addition and subtraction facts in numerical sentences (\*). [*Moved to Grade 1*].
- Justify the most reasonable answer for an addition and subtraction problem using paper and pencil and using a calculator.

## WHAT IS THE ESSENCE OF SECOND GRADE NUMBER AND OPERATIONS?

### Key Concepts

Estimating  
Quantity  
Multiple  
Multiplication (equal grouping)  
Division (sharing equally)  
Place value

### Key Skills

How to represent quantities and multiples in word form  
How to add and subtract two-digit numbers  
How to find missing addends and subtrahends  
How to round whole numbers to nearest ten

**SECOND GRADE ALGEBRA (Standard 2-3)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze numeric patterns in skip counting that uses the numerals 1 through 10	Skip count by any numeral (1 – 10) using mental mathematics, paper and pencil, hundreds charts, calculators, and concrete objects (*)	Focus on analyzing patterns rather than skip counting.
2. Translate patterns into rules for simple multiples	Create and describe a general rule for a growing pattern and a repeating pattern, both orally and in writing	Wording change with a focus on simple multiples.
3. Analyze relationships to complete and extend growing and repeating patterns involving numbers, symbols, and objects	Create, extend, and label a wide variety of patterns, orally and in writing, by using symbols and objects	Focus on analyzing patterns rather than creating, extending, and labeling them
4. Identify quantitative and qualitative change over time		NEW! Basically a prerequisite to New Indicator #5 (below)
5. Analyze quantitative and qualitative change over time	Compare and contrast the attribute changes over time in two or more qualities. Compare and contrast the quantitative changes over time in two or more quantities.	This indicator combines two old expectations.

## WHAT'S BEEN DELETED?

Sequence random numerals between 1 and 1,000.

Use symbolic notation to represent a statement of equality ( $\_ + 1 = 5$ ;  $3 + 6 = \_$ ) (\*)

Use concrete and pictorial models to develop an understanding of the concepts of addition, subtraction, multiplication, and division of whole numbers (\*)

## WHAT IS THE ESSENCE OF SECOND GRADE ALGEBRA?

### Key Concepts

Numeric patterns

Growing patterns

Repeating patterns

Quantitative change

Qualitative change

### Key Skills

How to “skip count”

How to translate patterns into rules for simple multiples

### SECOND GRADE GEOMETRY (Standard 2-4)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze the three-dimensional shapes spheres, cubes, cylinders, prisms, pyramids, and cones according to the number and shape of the faces, edges, corners, and bases of each.	Compare and describe three-dimensional shapes according to the number and shape of faces, edges, bases, and corners (cube, rectangular solid, square pyramid). (*)	Basically a wording change. Analyze three-dimensional shapes according to faces, edges, and bases.
2. Identify multiple lines of symmetry.	Using various concrete materials, create figures that are symmetrical across a line (*)	The emphasis in this indicator is on multiple lines of symmetry for shapes and figures.
3. Predict the results of combining and subdividing polygons and circles.	Predict the results of combining and partitioning two- and three-dimensional geometric shapes.	“Subdividing” is used rather than “partitioning.” Only two-dimensional shapes, specifically polygons and circles, are included in the new indicator.

## WHAT'S BEEN DELETED?

Describe, model, and draw two-dimensional geometric shapes with up to eight sides.

Identify, name, model, and draw two-dimensional geometric shapes with up to eight sides.

Compare and contrast plane and solid geometric shapes (circle/sphere, square/cube, triangle/pyramid, rectangle/rectangular solid) (\*).

Compare distances between objects on a pictorial map using words such as *closer to* and *farther than*.

>Identify locations on a pictorial map using the positional words *left, right, north, south, east, and west*. [*Moved to Grade 1*]. (\*)

Predict the results of and demonstrate transformations of geometric shapes, including slides, flips, and turns.

Create geometric objects based on mental images.

Describe congruent and similar shapes.

Analyze and predict the effect on the number of pieces used to form a geometric shape when various arrangements are formed using the same number of pieces.

Using square tiles, grid paper, and unifix cubes, connect geometry to related concepts in measurement and number.

Describe relationships among geometric shapes in the environment, including applications in science, art, and architecture.

Recognize, describe, extend, and create a wide variety of patterns using geometric symbols and objects.

## WHAT IS THE ESSENCE OF SECOND GRADE GEOMETRY?

### Key Concepts

Multiple lines of symmetry

Polygons

### Key Skills

How to analyze three-dimensional shapes

How to predict results of combining and subdividing polygons and circles

## SECOND GRADE MEASUREMENT (Standard 2-5)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use a counting procedure to determine the value of a collection of coins and bills	Determine the total value of a collection of coins.	Bills have been added to coins and a specific procedure has been included.
2. Use coins to make change up to one dollar	Make change up to one dollar by counting up (*)	Basically a wording change.
3. Use appropriate tools to measure objects to the nearest whole unit: measuring length in centimeters, feet, and yards; measuring liquid volume in cups, quarts, and gallons; measuring weight in ounces and pounds; and measuring temperature on Celsius and Fahrenheit thermometers	Use actual measuring devices to measure length, volume, and mass. Use tools to compare units of measure within a given system: (a) tell and write time to the quarter hour, using analog and digital clocks; (b) using a calendar, determine past and future days of the week and identify specific dates; (c) convert money and make money exchanges; and (d) read temperature using Celsius and Fahrenheit thermometers (*). Use actual measuring devices to compare metric and U. S. customary units for measuring liquid volume, using the concepts of <i>more</i> , <i>less</i> , and <i>equivalent</i> .	This indicator emphasizes “measuring,” whereas the old expectations include “comparing” as well as “measuring.” Also, the new indicator focuses on length, liquid volume, weight, and temperature. The old expectations include time, money, and mass.
4. Generate common measurement referents for feet, yards, and centimeters		NEW!
5. Use common measurement referents to make estimates in feet, yards, & centimeters		This indicator follows quite logically from the previous one.
6. Predict whether the measurement will be greater or smaller when different units are used to measure the same object	Make, use, and evaluate the reasonableness of estimates of measurement.	This indicator emphasizes “prediction,” whereas the old expectation focuses on “make,” “use,” and “evaluate.” Also, the new indicator focuses on “greater” or “smaller,” whereas the old expectation focuses on “reasonableness.”
7. Use analog and digital clocks to tell and record time to the nearest quarter hour and to the nearest five-minute interval		NEW!
8. Match <i>a.m.</i> and <i>p.m.</i> to familiar situations		NEW!
9. Recall equivalencies associated with length and time: 12 inches = 1 foot, 3 feet = 1 yard, 60 minutes = 1 hour, and 24 hours = 1 day		NEW!

## WHAT'S BEEN DELETED?

Discriminate among the functions of length, capacity, weight (mass), perimeter, area, time and temperature (\*)

Measure the length of an object in inches and/or half inches.

Determine the appropriate unit and instrument needed for specific measurement in length, volume, weight/mass, area, and temperature.

Create and solve money-story problems (\*)

Relate measurement to other aspects of mathematics and to other disciplines.

## WHAT IS THE ESSENCE OF SECOND GRADE MEASUREMENT?

### Key Concepts

Common referents for feet, yards, and centimeters.

A. M.

P. M.

### Key Facts

Equivalencies with length (e.g., 12 inches = 1 foot) and time (e.g., 60 minutes = 1 hour).

### Key Skills

How to determine the value of a collection of coins and bills.

How to make change up to one dollar.

How to measure length, liquid volume, weight, and temperature.

How to estimate length using common referents for feet, yard, and centimeters.

How to predict changes in measurement when different units of measurement are used.

How to tell time to the nearest quarter hour and five-minute interval using analog and digital clocks.

## SECOND GRADE DATA ANALYSIS AND PROBABILITY (Standard 2-6)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Create survey questions to collect data	Collect data using surveys.	The emphasis has shifted from “using surveys” to “creating survey questions.”
2. Organize data in charts, pictographs, and tables	Collect, sort, and organize data (*). Use organized data to create charts, graphs, and tables (*).	This indicator combines the two old expectations and eliminates “collect” and “sort.”
3. Infer trends in a data set as increasing, decreasing, or random	Explain the trends of a data set (e.g., increasing, decreasing, random).	Basically a wording change.
4. Predict on the basis of data whether events are <i>more likely</i> or <i>less likely</i> to occur	Describe events as more likely or less likely to occur (*).	Basically a wording change, with a shift from “describe” to “predict.”

### WHAT’S BEEN DELETED?

Nothing

### WHAT IS THE ESSENCE OF SECOND GRADE DATA ANALYSIS AND PROBABILITY?

#### **Key Concepts**

Survey questions  
 Charts, pictographs, and tables  
 Trends (increasing, decreasing, random)  
 More likely  
 Less likely

#### **Key Skills**

How to create survey questions.  
 How to organize data in various displays.  
 How to infer trends in data sets.  
 How to predict whether events are more or less likely to occur.

### THIRD GRADE NUMBER AND OPERATIONS (Standard 3-2)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Compare whole number quantities through 999,999 using words and symbols.	Compare whole numbers using symbols ( $>$ , $<$ , $=$ ) and words ( <i>is greater than</i> , <i>is less than</i> , and <i>equals</i> ).	Upper bound is specified (999,999)
2. Represent in word form whole numbers through nine hundred ninety-nine thousand.	Read and write whole numbers. Write three-digit whole numbers in standard form, in expanded form, and in words.	Once again, the upper bound is specified.
3. Apply an algorithm to add and subtract whole numbers fluently.	Demonstrate fluency in the use of both addition and subtraction algorithms and explain the steps involved (*). Use the associative property to add efficiently. Compare and contrast different addition and subtraction algorithms to select the most efficient one for solving a given problem. Select appropriate methods and tools and use the selected method or tool to solve addition and subtraction problems (*). Estimate whole number sums and differences, describe the method used, and determine the reasonableness of the results.	Because the emphasis is on applying the whole number addition and subtraction algorithm, it is very similar to the first old expectation listed.
4. Apply procedures to round any whole number to the nearest 10, 100, or 1000.	Round whole numbers to the nearest 10, 100, and 1,000.	Basically a rewording.
5. Understand fractions as parts of a whole.	Represent equivalent forms of commonly used fractions using concrete and pictorial models. (*) Describe fractional parts of a unit or a group of objects ( $\frac{1}{100}$ , $\frac{1}{10}$ , $\frac{1}{8}$ , $\frac{1}{6}$ , $\frac{1}{5}$ , $\frac{1}{4}$ , $\frac{1}{3}$ , and $\frac{1}{2}$ ) (*).	The phrase “parts of a whole” seems to omit the phrase “parts of a group of object” in the old expectations.
6. Represent fractions that are <u>greater than</u> or equal to 1.		NEW!
7. Recall basic multiplication facts through $12 \times 12$ and the corresponding division facts.	Recall multiplication and division facts through 9.	Increase in upper bound from $9 \times 9$ to $12 \times 12$ .
8. Compare the inverse relationship between multiplication and division.	Describe the meaning of multiplication using concrete and pictorial models. (*) Describe the meaning of division using concrete and pictorial models. (*)	NEW! Seems to pull together the two previous old expectations.

### THIRD GRADE NUMBER AND OPERATIONS (Standard 3-2)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
9. Analyze the effect that adding, subtracting, or multiplying odd and/or even numbers has on the outcome.	Describe and identify the characteristics of even and odd numbers by examining their divisibility by 2.	This indicator is far more complex than the old expectation. Even and odd numbers are still included, but their effect on adding, subtracting, and multiplying is the emphasis.
10. Generate strategies to multiply whole numbers by using one single digit factor and one multidigit factor.	Construct and analyze concrete models (rectangular arrays) for multiplication of one- and two-digit numbers.	Change from “models” to “strategies.” Also, change from “construct and analyze” to “generate.”
11. Use basic number combinations to compute related problems in multiplication using multiples of 10.	Use basic number combinations to compute related problems in multiplication and division using multiples of 10 (e.g., using $3 \times 5$ to compute $30 \times 5$ ) (*).	Slight wording change with division deleted.
12. Analyze the magnitude of digits through 999,999 on the basis of their place value.	Explain the place value structure of whole numbers through hundred thousands (*) Recognize equivalent representations for the same whole number by decomposing and composing whole numbers up through three digits (*).	This indicator seems to combine two old expectations; also, upper bound is specified (999,999).

## WHAT'S BEEN DELETED?

- >Identify the place value of decimals through hundredths using concrete and pictorial models [*Moved to Grade 5*].
  - >Read and write decimals through hundredths based on concrete and pictorial models [*Moved to Grade 5*].
  - >Compare decimals (through hundredths) using symbols ( $>$ ,  $<$ , and  $=$ ) and words (*is greater than*, *is less than*, and *equals*) with concrete and pictorial models [*Moved to Grade 4*].
- Read and write amounts of money using the dollar sign (\$) and decimal notation (\*).
- >Use the inverse relationships between addition and subtraction to solve problems (\*) [*Moved to Grade 1*].
- Recognize commutativity in the addition facts.

## WHAT IS THE ESSENCE OF THIRD GRADE NUMBER AND OPERATIONS?

### Key Concepts

Fractions  
Equivalency  
Place Value

### Key Facts

Multiplication facts  
Division facts

### Key Skills

How to compare whole numbers  
How to represent qualities in word form  
How to add and subtract whole numbers  
How to multiply whole numbers  
How to apply divisibility rule for 2  
How to round whole numbers (100, 1,000)

### THIRD GRADE ALGEBRA (Standard 3-3)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Create numeric patterns that involve whole-number operations	Describe, create, and extend numeric patterns with and without models and calculators	This indicator emphasizes “create.” It also focuses on whole-number operations.
2. Apply procedures to find missing numbers in numeric patterns that involve whole-number operations	Determine the pattern to identify missing numbers in a sequence and in a table of number pairs. Use pattern identification to solve problems (*)	This indicator combines elements of the two old expectations. Again, the focus is on whole-number operations.
3. Use symbols to represent an unknown quantity in a simple addition, subtraction, or multiplication equation	Use concrete or pictorial models and symbols to represent missing addends or factors Use concrete or pictorial models and symbols to identify missing addends or factors in equations that express relationships between two quantities	This indicator combines elements of the two old expectations. Adds subtrahends (that is, addends, subtrahends, or factors).
4. Illustrate situations that show change over time as increasing	Identify real situations and events that show change	Basically a rewording. Shift in emphasis from “identify” to “illustrate” situations and events.

## WHAT'S BEEN DELETED?

Use patterns and relationships in a variety of real-world contexts (\*)

## WHAT IS THE ESSENCE OF THIRD GRADE ALGEBRA?

### **Key Concepts**

Numeric patterns  
Unknown quantity  
Change over time

### **Key Skills**

How to find missing numbers in numeric patterns involving whole-number operations  
How to represent an unknown quantity in addition, subtraction, or multiplication equations  
How to illustrate change over time

### THIRD GRADE GEOMETRY (Standard 3-4)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Identify the specific attributes of circles: center, radius, circumference, and diameter	Using appropriate vocabulary, describe properties of circles (center, radius, and diameter) (*)	Change in wording, with the addition of circumference
2. Classify polygons as either triangles, quadrilaterals, pentagons, hexagons, or octagons according to the number of their sides	Using appropriate vocabulary, identify and describe attributes of polygons including triangles, quadrilaterals, pentagons, hexagons, and octagons (*)	This indicator emphasizes classification according to the number of sides.
3. Classify lines and line segments as either parallel, perpendicular, or intersecting	Create representations of points, lines (intersecting, perpendicular, and parallel), line segments (including intersecting and parallel), rays, and angles in a plane (*)	This indicator focuses on classifying, not creating and is but one part of the old expectation.
4. Classify angles as either right, acute, or obtuse		NEW!
5. Classify triangles by the length of their sides as either scalene, isosceles, or equilateral and by the size of their angles as either acute, obtuse, or right		NEW!
6. Exemplify points, lines, line segments, rays, and angles	Create representations of points, lines (intersecting, perpendicular, and parallel), line segments (including intersecting and parallel), rays, and angles in a plane (*)	Basically a wording change.
7. Analyze the results of combining and subdividing circles, triangles, quadrilaterals, pentagons, hexagons, and octagons	Combine two-dimensional shapes to form new shapes and draw conclusions about area and fractional relationships	There are two changes. First, the old expectation focuses on combining shapes, whereas the new indicator includes subdividing shapes as well. Second, “draw conclusions” is replaced by “analyze.”
8. Predict the results of one transformation—either slide, flip, or turn—of a geometric shape	Use slides, flips, and turns informally with models to determine whether or not two shapes are congruent.	This indicator is more general than the old expectation, which focused on determining whether the shapes are congruent after the transformation. Congruence has been moved to Grade 4.

## WHAT'S BEEN DELETED?

Using appropriate vocabulary, identify and describe attributes of three-dimensional shapes including prisms, pyramids, spheres, cones, & cylinders (\*)

Classify three-dimensional shapes according to their attributes.

Compare two-dimensional shapes to determine if they exactly match (congruence) (\*)

Using models, make and test conjectures about geometric properties and relationships and explain the conclusions.

Give instructions (direction, distance, turns) for moving from one location to another.

Specify locations on maps and grids using direction and distance.

Locate points corresponding to given whole numbers on a number line (\*).

Identify and describe the line symmetry of two-dimensional shapes (\*)

Build or draw two-dimensional geometric objects (\*)

Identify two-dimensional shapes given a verbal description

Describe the path that results from following specific directions in moving from one location to another

Identify and build a cube from its two-dimensional representation (net)

Identify and build a two-dimensional representation (net) or a cube

## WHAT IS THE ESSENCE OF THIRD GRADE GEOMETRY?

### Key Concepts

Circles (center, radius, circumference, diameter)

Polygons (triangles, quadrilaterals, pentagons, hexagons, octagons)

Lines (parallel, perpendicular, intersecting)

Angles (right, acute, obtuse)

Triangles (scale, isosceles, equilateral, acute, obtuse, right)

Points, lines, line segments, rays, angles

### Key Skills

How to analyze the results of combining and subdividing polygons

How to predict the results of a transformation of a geometric shape

**THIRD GRADE MEASUREMENT (Standard 3-5)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use the fewest possible number of coins when making change		NEW!
2. Use appropriate tools to measure objects to the nearest unit: measuring length in meters and half inches; measuring liquid volume in fluid ounces, pints, and liters; and measuring mass in grams	Use metric and U. S. customary units to measure length, liquid volume, temperature, and weight/mass (*) Use a variety of objects to measure length, volume, and area Select and use an appropriate tool to measure time, length, mass/weight, and liquid volume (*)	This indicator combines the three old expectations, deleting time, temperature, and area
3. Recognize the relationship between meters and yards, kilometers and miles, liters and quarts, and kilograms and pounds		NEW!
4. Use common referents to make comparisons and estimates associated with length, liquid volume, and mass and weight: meters compared to yards, kilometers to miles, liters to quarts, and kilograms to pounds	Develop a sense for measurement by using appropriate benchmarks (e.g., the distance from the elbow to the index finger is about a foot, a paper clip is about a gram).	This indicator uses the phrase “common referents” to replace “appropriate benchmarks”
5. Generate strategies to determine the perimeters of polygons	Develop strategies and determine the perimeters of polygons (*)	Basically a wording change
6. Use analog and digital clocks to tell time to the nearest minute		NEW!
7. Recall equivalencies associated with time and length: 60 seconds = 1 minute and 36 inches = 1 yard		NEW!

## WHAT'S BEEN DELETED?

Compare the size of a given angle with a right angle (greater than, less than, or equal to) and classify as obtuse, acute, or right (\*)

Select appropriate units of measurement – length, weight/mass, and time – and explain the basis for the selection

Explain the need for measuring with standard units

Determine an appropriate measurement unit to measure time, length, weight, and volume

Read temperature to the nearest degree from a Celsius thermometer and from a Fahrenheit thermometer

Estimate the conversion of Celsius and Fahrenheit units relative to familiar situations (e.g., water freezes at 0 degrees Celsius and 32 degrees Fahrenheit)

Use concrete and graphic models to find areas of common two-dimensional shapes.

## WHAT IS THE ESSENCE OF THIRD GRADE MEASUREMENT?

### Key Concepts

Common referents (for measurement units)

### Key Facts

Relationships between meters and yards, kilometers and miles, liters and quarts, and kilograms and pounds

Equivalencies associated with time (60 seconds = 1 minute) and length (36 inches = 1 yard)

### Key Skills

How to use the fewest possible number of coins when making change

How to use measuring tools to measure to the nearest unit

How to determine the perimeters of polygons

How to tell time to the nearest minute (analog and digital clocks)

### THIRD GRADE DATA ANALYSIS AND PROBABILITY (Standard 3-6)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Apply a procedure to find the range of a data set.		NEW!
2. Organize data in tables, bar graphs, and dot plots.	Construct line (dot) plots for data sets (*)	This indicator expands the type of representation to tables, bar graphs, and dot plots.
3. Interpret data in tables, bar graphs, pictographs, and dot plots.	Read and interpret information from tables, pictographs, bar graphs, and line (dot) plots (*)	Wording change.
4. Analyze dot plots and bar graphs to make predictions about populations.	Use line (dot) plots and bar graphs to make conjectures about populations based on data sets	Wording change.
5. Compare the benefits of using tables, bar graphs, and dot plots as representations of a given data set.	Compare the tabular, line (dot) plot, and bar graph representations of a given data set and explain the benefits of each	Wording change.
6. Predict on the basis of data whether events are <i>likely, unlikely, certain, or impossible</i> to occur.	Identify common events as <i>likely, unlikely, certain, or impossible</i>	Wording change.
7. Understand when the probability of an event is 0 or 1.		NEW!

## WHAT'S BEEN DELETED?

Write questions about objects and events that can be investigated by collecting data

Collect data using observations

Define and give examples of categorical data

Describe the shape of a line (dot) plot or bar graph of numerical data (i.e., where the data are concentrated, values for which there are no data, the range, and data points with unusual values)

Find the median and mode of a data set and explain what each indicates about the data set (\*)

Record the possible outcomes for a simple event (e.g., tossing a coin) and systematically keep track of the outcomes when the event is repeated many times (\*).

## WHAT IS THE ESSENCE OF THIRD GRADE DATA ANALYSIS AND PROBABILITY?

### Key Concepts

Range

Dot plot, bar graph, pictograph

Data set

Population

Likely event, Unlikely event, Certain event, Impossible event

Probability of an event (0 or 1)

### Key Skills

How to find the range of a data set

How to organize data in tables, bar graphs, and dot plots

How to interpret data

How to analyze data to make predictions about populations

How to compare the benefits of tables, bar graphs, and dot plots as data representations

How to predict whether events are certain, likely, unlikely, or impossible

How to determine the probability of an event

#### FOURTH GRADE NUMBER AND OPERATIONS (Standard 4-2)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Recognize the period in the place-value structure of whole numbers (units, thousands, millions, billions).	Explain the place value structure of whole numbers, including periods (thousands, millions, billions).	Shifts the emphasis from the place value structure to the concept of “period”
2. Apply divisibility rules for 2, 5 and 10.	Apply divisibility rules for 2, 5, and 10.	No change.
3. Apply an algorithm for multiplying whole numbers fluently.	<p>Demonstrate fluency in the use of a multiplication algorithm and explain the steps involved (*).</p> <p>Use the associative and distributive properties to multiply efficiently (*).</p> <p>Construct and analyze algorithms for all operations on whole numbers (*)</p> <p>Estimate and determine the reasonableness of the product of whole numbers (one factor with two digits or less and the other factor with three digits or less) (*).</p>	This indicator and the first old expectation are basically the same. The other old expectations seem to be folded into this indicator.
4. Explain the effect on the product when one of the factors in changed.	Explain the effect on the product when one of the factors is changed.	No change.
5. Generate strategies to divide whole numbers by single-digit divisors.	Estimate the quotient of whole numbers with a one-digit divisor, a two-digit divisor, and multiples of 10 and determine the reasonableness of results.	The emphasis has shifted from estimating to generating strategies. Also, multiples of 10 have been deleted.
6. Analyze the magnitude of digits through hundredths on the basis of their place value.		NEW!
7. Compare decimals through hundredths using words and symbols.	Compare decimals (through hundredths) using symbols (>, <, and =) and words ( <i>is greater than, is less than, and equals</i> ) (*)	No change.
8. Apply strategies and procedures to find equivalent forms of fractions.	Write equivalent forms of common used fractions.	Basically a wording change, but with a greater emphasis on strategies and procedures.

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
9. Compare the relative size of fractions to benchmarks (0, $\frac{1}{2}$ , 1).	Relate the size of fractions to the benchmark fractions of 0, $\frac{1}{2}$ , and 1 Compare concrete or pictorial models of fractions using the symbols $>$ , $<$ , and $=$ . Locate points on a number line corresponding to a unit fraction and its multiples between 0 and 1	With wording changes, this indicator is the same as the first old expectation.
10. Identify common fraction/decimal equivalents ( $\frac{1}{100}$ , $\frac{1}{10}$ , $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{3}$ , $\frac{2}{3}$ , $\frac{3}{4}$ )	Identify and represent common fraction-decimal equivalents (*) Write equivalent forms of decimals	The most common fraction/decimal equivalents are specified; other than that, simply a wording change.
11. Represent improper fractions, mixed numbers, and decimals.		NEW!
12. Generate strategies to add and subtract decimals through hundredths.	Develop and use strategies to estimate sum and difference of decimals. Add and subtract decimals through hundredths using concrete and pictorial models.	This indicator is basically a combination of the two old expectations.

### WHAT'S BEEN DELETED?

Write whole numbers in standard form, in expanded form, and in words.

Describe fractional parts of collections of objects.

Identify situations in which numbers less than 0 are used.

Determine the factors of a given number up to 50

Determine common multiples of pairs of whole numbers each of which is less than or equal to 12 (\*).

Explain the meaning of a remainder.

Compare the size of the quotient to the dividend when dividing two whole numbers.

>Use the inverse relationships between multiplication and division to solve problems (\*). *[Moved to Grade 3]*

Recognize commutativity in the multiplication facts.

>Use basic number combinations to compute related problems in multiplication and division using multiples of 100 and 1,000. *[Moved to Grade 3]*

Round whole numbers to the nearest 10,000, 100,000, and 1,000,000.

Refine estimates using terms such as *closer to*, *between*, and *a little more than*.

Explain why a particular method or tool may be the most appropriate one to use in solving a given problem (\*).

Round decimals to the nearest tenth and hundredth.

## WHAT IS THE ESSENCE OF FOURTH GRADE NUMBER AND OPERATIONS?

### **Key Concepts**

Fraction (improper, mixed)  
Decimal  
Product  
Factor  
Equivalence  
Period (in the whole number place value structure)  
Place value (decimals)

### **Key Facts**

Common fraction/decimal equivalents

### **Key Skills**

How to compare fractions to benchmarks of 0,  $\frac{1}{2}$ , and 1.  
How to compare decimals.  
How to multiply and divide whole numbers.  
How to represent decimal quantities in words.  
How to use number line to locate points corresponding with fractions.  
How to add and subtract decimals  
How to apply division rules for 5 and 10  
How to round whole numbers

#### FOURTH GRADE ALGEBRA (Standard 4-3)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze numeric, nonnumeric, and repeating patterns involving all operations and decimal patterns through hundredths.	Using models and calculations, create, extend, and analyze numeric patterns (including decimal patterns through thousandths).	This indicator (1) specifies the nature of the patterns, (2) focuses on analyze, and (3) limits decimals to hundredths.
2. Generalize a rule for numeric, nonnumeric, and repeating patterns involving all operations.	Determine the rule to identify missing numbers in a sequence or table (*)	Basically a wording change, with the inclusion of nonnumeric patterns.
3. Use a rule to complete a sequence or a table.	Describe and represent number relationships with tables.	This indicator emphasizes the use of a rule and also sequential relationships.
4. Translate among, letters, symbols, and words to represent quantities in simple mathematical expressions or equations	Use variables to represent an unknown quantity using a letter or symbol.	This indicator seems to be a clear description of the objective.
5. Apply procedures to find the value of an unknown letter or symbol in a whole-number equation.		NEW! Note. The emphasis is on apply procedures to find the value of an unknown, rather than using equations to represent relationships (see below – What’s Been Deleted?)
5. Illustrate situations that show change over time as either increasing, decreasing, or varying.	Using charts and graphs, describe changes over time as increasing, decreasing, and varying (*). Describe how rate of growth varies over time.	Basically a wording change.

## WHAT'S BEEN DELETED?

Use equations to represent relationships (\*)

## WHAT IS THE ESSENCE OF FOURTH GRADE ALGEBRA?

### **Key Concepts**

Numeric, nonnumeric, and repeating patterns

Sequential relationships

Change over time

### **Key Skills**

How to find the value of an unknown letter or symbol in a whole-number equation

#### FOURTH GRADE GEOMETRY (Standard 4-4)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze the quadrilaterals squares, rectangles, trapezoids, rhombuses, and parallelograms according to their properties.		NEW!
2. Analyze the relationship between three-dimensional geometric shapes in the form of cubes, rectangular prisms, and cylinders and their two-dimensional nets.	Identify and build rectangular prisms and cylinders from a given two-dimensional representation (net) (*). Identify and build a two-dimensional representation (net) of a given rectangular prism.	The focus has shifted from identify and building two-dimensional figures and three-dimensional objects to analyzing three-dimensional objects in terms of the two-dimensional figures that comprise them.
3. Predict the results of multiple transformations of the same type—translation, reflection, or rotation—on a two-dimensional geometric shape.	Using models, describe the results of translations (slides), reflections (flips), and rotations (turns).	This indicator makes it clear that the prediction is based on MULTIPLE transformations.
4. Represent the two-dimensional shapes, trapezoids, rhombuses, and parallelograms and the three-dimensional shapes cubes, rectangular prisms, and cylinders.	Identify and build rectangular prisms and cylinders from a given two-dimensional representation (net) (*). Identify and build a two-dimensional representation (net) of a given rectangular prism.	The primary difference between this indicator and the second one (above) seems to be the emphasis on representation (which is much like the old expectations) rather than analysis.
5. Use transformation(s) to prove congruency.	Using models, describe the results of translations (slides), reflections (flips), and rotations (turns).	According to this indicator, the purpose of the transformation(s) is to prove congruency. This is similar to one of the old expectations in Grade 3.
6. Represent points, lines, line segments, rays, angles, and polygons.	Draw and label representations of points, lines, line segments, rays, and angles, using mathematical notation (*).	Basically a wording change.
7. Represent with ordered pairs of whole numbers the location of points in the first quadrant of a coordinate grid.	Identify and name points on a coordinate grid using an ordered pair of whole numbers.	Basically a wording change.
8. Illustrate possible paths from one point to another along vertical and horizontal grid lines in the first quadrant of the coordinate plane.	Investigate possible paths from one point to another along vertical and horizontal grid-lines (*). Describe a path along grid lines from one point to another	Basically a wording change, with the expressed focus on the first quadrant (or whole numbers).

## WHAT'S BEEN DELETED?

Choose appropriate models of two- and three-dimensional shapes from descriptions of attributes (\*)

>Classify triangles by lengths of sides and sizes of angles (\*) [*Moved to Grade 3*]

>Subdivide two-dimensional shapes to form new shapes and draw conclusions about area and fractional relationships [*Moved to Grade 3*]

Using models and mathematical vocabulary, make and test conjectures about geometric properties and relationships and explain the conclusions.

Describe location and movement using common language and geometric vocabulary and illustrate both with and without technology

Using models and technology, create simple tessellations.

Draw two-dimensional shapes that are related by translations (slide) or reflection (flip) (\*)

Given a shape and its translation (slide) or reflection (flip), describe the motion that has been applied

Write a description of a given three-dimensional object (\*)

Given a verbal description, draw two- or three-dimensional objects

Connect geometry to other areas of mathematics, to other disciplines, and to the world outside the classroom.

## WHAT IS THE ESSENCE OF FOURTH GRADE GEOMETRY?

### Key Concepts

Quadrilaterals (squares, rectangles, rhombuses, trapezoids, parallelograms)

Cubes, rectangular prisms, cylinders

Transformations (translation, reflection, rotation)

Congruency

Points, lines, line segments, rays, angles

Ordered pairs

Coordinate grid

Quadrants

### Key Skills

How to analyze quadrilaterals according to their properties

How to analyze the relationship between three-dimensional objects and two-dimensional figures

How to predict the results of multiple transformations on a two-dimensional geometric shape

How to represent two-dimensional shapes and three-dimensional shapes

How to use transformations to prove congruency

How to represent the location of points on a coordinate grid using ordered pairs of numbers

How to illustrate possible paths from one point to another along vertical and horizontal grid lines

#### FOURTH GRADE MEASUREMENT (Standard 4-5)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use appropriate tools to measure objects to the nearest unit: measuring length in quarter inches, centimeters, and millimeters; measuring liquid volume in cups, quarts, and liters; and measuring weight and mass in pounds, milligrams, and kilograms.	Select and use an appropriate tool to measure liquid volume including pints and quarter (*)	This indicator expands on the old expectation by including length and weight/mass as well as liquid volume.
2. Compare angle measures with referent angles of 45 degrees, 90 degrees, and 180 degrees to estimate angle measures	Investigate and compare angle measures using models and manipulatives with angles of measure 45 degrees, 90 degrees, and 180 degrees (*)	Basically a rewording, focusing on comparing with “referent angles” and deleting “investigate.”
3. Use equivalencies to convert units of measure within the U.S. Customary System: converting length in inches, feet, yards, and miles; converting weight in ounces, pounds, and tons; converting liquid volume in cups, pints, quarts, and gallons; and converting time in years, months, weeks, days, hours, minutes, and seconds.	Convert units of measure with the metric system -- length, mass, and capacity – and within the customary system – length, weight, and liquid volume (*).	Basically a rewording, with time measurement added to the new indicator.
4. Analyze the perimeter of a polygon.		NEW!
5. Generate strategies to determine the area of rectangles and triangles.	Using models, find the area of geometric shapes (*)	This indicator emphasizes “strategies” rather than “models.” Also, new indicator is limited to rectangles and triangles.
6. Apply strategies and procedures to determine the amount of elapsed time in hours and minutes within a 12-hour period, either a.m. or p.m.	Determine the amount of elapsed time in hours and minutes within a twelve-hour period.	Basically a rewording, with the inclusion of A. M. and P. M. (which used to be in another old expectation – see What’s Been Deleted).
7. Use Celsius and Fahrenheit thermometers to determine temperature changes during time intervals.	Determine temperature changes during time intervals from a Celsius thermometer and a Fahrenheit thermometer.	Change in wording only.

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
8. Recall equivalencies associated with liquid volume, time, weight, and length: 8 liquid ounces = 1 cup, 2 cups = 1 pint, 2 pints = 1 quart, 4 quarts = 1 gallon; 365 days = 1 year, 52 weeks = 1 year; 16 ounces = 1 pound, 2,000 pounds = 1 ton; and 5,280 feet = 1 mile.	Convert units of time including days, hours, minutes, and seconds.	This indicator expands beyond time to include liquid volume, weight, and length.
9. Exemplify situations in which highly accurate measurements are required.		NEW!

## WHAT'S BEEN DELETED?

Apply counting procedures to estimate measurements of length, area, volume, and weight/mass.  
Select units appropriate for the attributes being measured (length and area) and explain the basis for the selection.  
Develop and describe strategies for estimating the area and perimeter of irregular shapes using manipulatives.  
Estimate the distance to objects of places and determine the amounts of various units of time it will take to reach those objects or places.  
Using analog and digital clocks, tell time to the nearest minute and to the nearest five-minute interval, including use of A. M. and P. M.  
Use concrete and graphic models to discover formulas for finding the area of common two-dimensional shapes (\*)

## WHAT IS THE ESSENCE OF FOURTH GRADE MEASUREMENT?

### Key Concepts

Perimeter  
Polygon  
Importance of accuracy in measurement

### Key Facts

Equivalencies for conversions with the U. S. Customary System of measurement (length, weight, liquid volume, and time)  
Equivalencies associated with liquid volume, time, weight, and length (U. S. Customary System of measurement)

### Key Skills

How to measure to the nearest unit  
How to compare angles with referent angles (45 degrees, 90 degrees, 180 degrees)  
How to calculate the area of rectangles and triangles  
How to calculate elapsed time  
How to calculate temperature changes

#### FOURTH GRADE DATA ANALYSIS AND PROBABILITY (Standard 4-6)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Compare how data-collection methods impact survey results.	Develop strategies for administering a simple survey to obtain unbiased results Systematically collect data using surveys	This indicator emphasizes how the methods impact the results of the survey. The old expectations focus on the development and use of strategies for collecting data from surveys.
2. Interpret data in tables, line graphs, bar graphs, and double bar graphs whose scale increments are greater than or equal to 1.	Read and interpret information from tables, line graphs, and bar graphs (*)	Basically a wording change, with the addition of “double bar graphs”
3. Organize data in tables, line graphs, and bar graphs whose scale increments are greater than or equal to 1.	Construct bar graphs for collected data sets with scale increments of one or greater (*)	This indicator adds tables and line graphs to the bar graphs in the old expectation.
4. Distinguish between categorical and numerical data.		NEW!
5. Match categorical and numerical data to appropriate graphs.	Describe types of graphs that may be used to represent categorical data Describe types of graphs that may be used to represent numerical data	This indicator combines the two old expectations and focuses on the appropriateness of the use of the graphs for each type of data.
6. Predict on the basis of data whether events are <i>likely, unlikely, certain, impossible, or equally likely</i> to occur.	Give examples of events for which the probability is a fraction between 0 and 1 inclusive and explain (*)	This indicator focuses on prediction rather than giving examples and uses likely, unlikely, certain, and impossible rather than specific fractions.
7. Analyze possible outcomes for a simple event.	Using models, determine the probability of a given simple event	Basically a wording change.

## WHAT'S BEEN DELETED?

Compare the shapes of graphs of two different numerical data sets that address the same question for different populations

Use the mode to describe a set of categorical data

Compare the line graph and bar graph representations of a given data set and explain the benefits of each

>Use line graphs to make conjectures about populations based on data sets (\*) [*Moved to Grade 3*]

Record the outcomes of a multiple-stage event (e.g., tossing two coins), explain the method used, and determine whether the outcomes are equally likely

Construct tree diagrams to list the possible outcomes for multiple-stage events (e.g., tossing two coins)

## WHAT IS THE ESSENCE OF FOURTH GRADE DATA ANALYSIS AND PROBABILITY?

### Key Concepts

Survey

Line graphs

Bar graphs

Double bar graphs

Scales

Scale increments

Categorical data

Numerical data

Probability of events (certain, likely, unlikely, impossible)

### Key Skills

How to compare the effect on data-collection methods on survey results

How to interpret data presented in various formats when the scale increments are greater than or equal to 1

How to determine which graphs are more appropriate for categorical versus numerical data

How to predict the probability of events

How to analyze possible outcomes for a single event

**GRADE 5 NUMBER AND OPERATIONS (Standard 5-2)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze the magnitude of a digit on the basis of its place value, using whole numbers and decimal numbers through thousandths.	Describe the place value structure of decimals.	This indicator is a slight rewording of the old expectation and includes whole numbers as well as decimals.
2. Apply an algorithm to divide whole numbers fluently.	Demonstrate fluency in the use of a division algorithm and explain the steps involved (*) Find the quotient and remainder given a dividend of four digits or less and a divisor of two digits or less. Create and solve problems involving addition, subtraction, multiplication, and division or whole numbers using appropriate methods and tools. (*)	This indicator is a slight rewording of the first old expectation. The other old expectations are also related to the indicator.
3 Understand the relationship among the divisor, dividend, and quotient.	Describe and explain the effect on the quotient when the divisor is changed.	Basically a wording change, with the addition of the concept “dividend.”
4 Compare whole numbers, decimals and/or fractions, and mixed numbers (<, >, and =)	Order lists of three or more numbers that contain whole numbers, decimals, or both. (*) Compare fractions using symbols (>, <, and =) and words (is greater than, is less than, and equals). (*) Locate points on a number line corresponding to mixed numbers and improper fractions. Represent fractions as decimals and percents using concrete and pictorial models. Identify equivalent relationships among fractions, decimals, and percents (*)	This indicator combines comparing and ordering (or sequencing). It does not include percents, which were included in the old expectations.
5. Apply an algorithm to add and subtract decimals through thousandths.	Add and subtract decimals through thousandths. (*) Estimate the sum and difference of decimals through thousandths and determine the reasonableness of the results. (*)	This indicator is basically the same as the first old expectation.

**GRADE 5 NUMBER AND OPERATIONS (Standard 5.2) (continued)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
6. Classify numbers as prime, composite, or neither.		NEW!
7. Generate strategies to find the greatest common factor and least common multiple of two whole numbers	Determine the least common multiple of two whole numbers. (*)	This indicator is a rewording and extension of the old expectation. The extension is the inclusion of “greatest common factor.”
8. Generate strategies to add and subtract fractions with like and unlike denominators	Add and subtract commonly used fractions using concrete models, pictorial models, and equivalent forms. (*)	The old expectation includes three of the strategies that should be included when teaching the new indicator. Also, fractions with both like and unlike denominators are specified.
9. Apply divisibility rules for 3, 6, and 9	Apply the divisibility rules for 3, 6, and 9.	No change.

**WHAT’S BEEN DELETED?**

Name and write mixed numbers and improper fractions shown in concrete and pictorial models.  
 Explain the relationship between fractions and division.  
 >Relate the size of fractions to the benchmark fractions 0,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and 1 [*Moved to Grade 4*].  
 >Describe numbers less than 0 using real world models. [*Moved to Grade 6*].  
 Identify a number as prime, composite, or neither.  
 >Explain the characteristics of prime numbers and composite numbers. (\*) [*Moved to Algebra Strand, Standard 5-3*].  
 Solve problems using multiplication and division. (\*)  
 >Describe and explain the effect on the product when both factors are changed. [*Moved to Grade 4*].  
 Describe the relationships among the four operations. (\*)  
 Solve multiplication problems such as rates and applications of the Fundamental Counting Principle.  
 Use estimation as a tool for judging the reasonableness of calculator, mental, and paper-and-pencil computations.  
 Apply a variety of computational estimation strategies to solve problems involving whole numbers. (\*)  
 Multiply commonly used fractions (including decimals) using area models.  
 Relate connections between products of fractions and products of decimals using area models.  
 Round decimals to the nearest tenth, hundredth, and thousandth.  
 Read and write decimals.  
 Write decimals (ten thousandths) in standard form, expanded form, and words.

## WHAT IS THE ESSENCE OF GRADE 5 NUMERATION?

### **Key Concepts**

Whole numbers, decimals, fractions, and mixed numbers

Divisor, dividend, and quotient

Greater common factor

Least common multiple

### **Key Skills**

How to divide whole numbers

How to add and subtract decimals

How to add and subtract fractions

How to round decimals (tenths, hundredths, thousandths)

### GRADE 5 ALGEBRA (Standard 5-3)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Represent numeric, algebraic, and geometric patterns in words, symbols, algebraic expressions, and algebraic equations.	Using models and calculators, analyze and extend numeric and geometric patterns such as triangular numbers, perfect squares, and arithmetic sequences.	This indicator focuses on “representing” patterns; the old expectation focused on “analyzing” and “extending” patterns. Also, the specified patterns in the old expectation have been deleted.
2. Analyze patterns and functions with words, tables, and graphs.	Represent and analyze patterns and functions using words, tables, and graphs (*).	Basically a wording change, with the verb “represent” deleted.
3. Match tables, graphs, expressions, equations, and verbal descriptions of the same problem situation.	Associate tables, graphs, and stories of the same event (*) Represent situations with number tables, graphs, and verbal descriptions. Use variables to write a mathematical expression in symbolic form. Use a variable to write an open sentence representing a given mathematical relationship (*) Use a single variable to create a problem situation based on a given open sentence.	This indicator is basically a rewording of the first old expectation, adding expressions and equations to the list.
4. Identify applications of commutative, associative, and distributive properties with whole numbers.		NEW!
5. Analyze situations that show change over time.	Create charts and graphs to show change over time.	This indicator focuses on “analyzing situations” whereas the old expectation emphasizes “creating charts and graphs”

## WHAT'S BEEN DELETED?

Find the missing elements in numeric and nonnumeric patterns.  
Analyze, describe, and use function rules to make generalizations.  
Describe the relationship among distance, speed, and time.

## WHAT IS THE ESSENCE OF GRADE 5 ALGEBRA?

### **Key Concepts**

Algebraic expressions  
Algebraic equations  
Commutative property  
Associative property  
Distributive property

### **Key Skills**

How to analyze patterns and functions  
How to represent problem situations using tables, graphs, expressions, equations, and verbal descriptions  
How to analyze situations that show change over time

### GRADE 5 GEOMETRY (Standard 5-4)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Apply the relationships of quadrilaterals to make logical arguments about their properties.		NEW!
2. Compare the angles, side lengths, and perimeters of congruent shapes.		NEW!
3. Classify shapes as congruent.	Describe the series of motions that may be used to show that two shapes are congruent	The emphasis has shifted from “describing the series of motions” to “classifying shapes as congruent”
4. Translate between two-dimensional representations and three-dimensional objects.	Sketch the front, top, and side views of a model of a three-dimensional shape build with cubes (*) Build and draw three-dimensional objects (*)	The old expectation provides a specific way (sketching) of doing the “translating” mentioned in the new indicator. Also, while the first old expectation is limited to cubes, the new expectation expands to three-dimensional objects in general (as in the second old expectation)
5. Predict the results of multiple transformations on a geometric shape when combinations of translation, reflection, and rotation are used.	Predict the results of geometric motion of shapes, including combinations of translations, reflections, and rotations (*)	Change in wording.
6. Analyze shapes to determine line symmetry and/or rotational symmetry.	Determine whether given two-dimensional shapes and designs have rotational symmetry.	Basically a change in wording, with the addition of line symmetry to rotational symmetry.

## WHAT'S BEEN DELETED?

>Using models and appropriate vocabulary, compare and analyze attributes of polygons [*Moved to Grade 4*], attributes of polyhedra, and attributes of cones and cylinders.

Using models and appropriate vocabulary classify quadrilaterals, polyhedra, cones, and cylinders according to their attributes (\*)

Develop definitions for classes of two- and three-dimensional shapes.

Compare two-dimensional shapes to determine if they are similar by transformations of magnifying or shrinking (\*)

Make and test conjectures about geometric properties and relationships and then develop logical arguments to justify the conclusions (\*)

>Using ordered pairs of numbers, locate and name points in the first quadrant of a coordinate system (\*) [*Moved to Grade 4*]

Find the distance between points in the first quadrant of a coordinate system along horizontal and vertical lines (\*)

Investigate and describe symmetry and congruence drawn on a grid.

## WHAT IS THE ESSENCE OF GRADE 5 GEOMETRY?

### Key Concepts

Congruence

Congruent shapes

Translation

Reflection

Rotation

Line symmetry

Rotational symmetry

### Key Skills

How to apply the relationship of quadrilaterals to make logical arguments about their properties

How to compare the angles, side lengths, and perimeters of congruent shapes

How to translate between two-dimensional representations and three-dimensional objects

How to predict the results of multiple transformations when combinations of translation, reflect, and rotation are used.

How to analyze shapes to determine line symmetry and rotational symmetry

### GRADE 5 MEASUREMENT (Standard 5-5)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use appropriate tools and units to measure objects to the precision of one-eighth inch.	Describe factors that affect precision such as the limitations of the measuring tool, the scale on the measuring instrument, and the need for accuracy. Select and use appropriate tools and units to measure given items to an indicated precision (*)	This indicator and the old expectations emphasize precision. However, this indicator specifies a precision of one-eighth inch (which limits the measurement to that of length)
2. Use a protractor to measure angles from 0 to 180 degrees.	Using a protractor, measure angles between 0 and 180 degrees inclusive (*)	Wording change.
3. Use equivalencies to convert units of measure within the metric system: converting length in millimeters, centimeters, meters, and kilometers; converting liquid volume in milliliters, centiliters, liters, and kiloliters; and converting mass in milligrams, centigrams, grams, and kilograms.		NEW! Note. This indicator is parallel to a new indicator in Grade 4 which focuses on the U. S. Customary System.
4. Apply formulas to determine the perimeters and areas of triangles, rectangles, and parallelograms.	Describe and determine the area of rectangles and related triangles and parallelograms (*) Investigate and solve problems involving area, using concrete, graphic or pictorial models to identify patterns and develop formulas for determining area	This indicator includes perimeters as well as areas and adds rectangles to triangles and parallelograms.
5. Apply strategies and formulas to determine the volume of rectangular prisms.	Using models, develop and describe strategies for determining the volume and surface area of rectangular solids (*). Using models, create examples of right prisms with a given volume and explain (*)	This indicator is very similar to the first old expectation, focusing on strategies and deleting surface area. Also, the phrase “rectangular prisms” is used instead of “rectangular solids”
6. Apply procedures to determine the amount of elapsed time in hours, minutes, and seconds within a 24-hour period.	Determine an amount of elapsed time in hours, minutes, and seconds within a 24-hour period (*)	Wording change.
7. Understand the relationship between the Celsius and Fahrenheit temperature scales.		NEW!

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
<p>8. Recall equivalencies associated with length, liquid volume, and mass: 10 millimeters = 1 centimeter, 100 centimeters = 1 meter, 1000 meters = 1 kilometer; 10 milliliters = 1 centiliter; 100 centiliters = 1 liter, 1000 liters = 1 kiloliter; and 10 milligrams = 1 centigram, 100 centigrams = 1 gram, 1000 grams = 1 kilogram.</p>		<p>NEW! Note. This indicator is parallel to Grade 4 indicator focusing on the U. S. Customary System.</p>

## WHAT'S BEEN DELETED?

Using models, investigate and describe the measure of circumference of a circle as length (\*)

Identify, describe, and draw right, acute, and obtuse angles

Using models, create examples of polygons with a given area and explain

Select units appropriate for the attributes being measured (length, area, and volume) and explain the basis for the selection.

Compare changes in area and changes in total perimeter when shapes are combined or subdivided

Construct models to demonstrate the effect of holding one variable constant while changing the value of another variable such as building rectangles with varying perimeters and constant areas

Compare and evaluate different strategies for estimating area and perimeter of irregular shapes.

Develop and describe strategies for estimating volumes of irregular shapes.

## WHAT IS THE ESSENCE OF GRADE 5 MEASUREMENT?

### **Key Concepts**

Precision (measurement)

Celsius and Fahrenheit scales

### **Key Facts**

Equivalencies for converting units of measure in the metric system

Equivalencies associated with length, liquid volume, and mass (metric system)

### **Key Skills**

How to use a protractor

How to use formulas to calculate perimeters and areas of triangles, rectangles, and parallelograms

How to calculate the volume of rectangular prisms

How to determine the amount of elapsed time in a 24-hour period

**GRADE 5 DATA ANALYSIS AND PROBABILITY (Standard 5-6)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Design a mathematical investigation to address a question.		NEW!
2. Analyze how data-collection methods affect the nature of the data set.	Compare data sets collected in different ways to address a given question and then determine how the methods of collection affected the data sets	This indicator basically is a rewording of the second half of the old expectation
3. Apply procedures to calculate the measures of central tendency (mean, median, and mode).	Find the mean, median, and mode of a numerical data set and explain what each indicates about the data set (*)	The old expectations have been divided into two new indicators, this one and the one that follows.
4. Interpret the meaning and application of the measures of central tendency.	Find the mean, median, and mode of a numerical data set and explain what each indicates about the data set (*)	See above
5. Represent the probability of a single-stage event in words and fractions.	Determine the probability of a simple single-stage and a two-stage event (*)	This indicator is basically a rewording of the old expectation, with the deletion of a two-stage event.
6. Conclude why the sum of the probabilities of the outcomes of an experiment must equal 1.	Explain why the sum of the probabilities of the outcomes of an experiment must equal 1.	Minor wording change; actually the wording of the old expectation is clearer (“Explain why”).

## WHAT'S BEEN DELETED?

Collect data using observations, surveys, and experiments

Determine appropriate horizontal and vertical scales for data sets and then how to represent zero on a graph

>Construct and interpret tables and line graphs for data sets from applied situations (\*) *[Moved to Grade 4]*

>Explain what type of graph may be appropriate for a given data set *[Moved to Grade 4]*

>Compare the types of graphs that may be used for categorical data with the types that may be used for numerical data (\*) *[Moved to Grade 4]*

Describe the features of a data set, including measures of center, range, and outliers (\*)

>Compare the different types of graphs to represent a given data set and explain the benefits of each *[Moved to Grade 4]*

Make and justify predictions based on data from a variety of applied situations

Consider alternative explanations to the conjectures formed on the basis of presentations of data and then design further studies to test the conjectures

Create a problem statement involving probability based on information from a given problem situation.

Understand when the probability of an event is 0 or 1 and give examples in each case.

## WHAT IS THE ESSENCE OF GRADE 5 DATA ANALYSIS AND PROBABILITY?

### Key Concepts

Measures of central tendency (mean, median, mode)

Single-stage event

### Key Fact

The sum of the probabilities of the outcomes of an experiment must equal 1.

### Key Skills

How to design a mathematical investigation to address a question

How to analyze how data-collect methods affect the nature of a data set

How to calculate the mean, median, and mode

How to interpret means, medians, and modes

How to represent the probability of a single-stage event in words and fractions

### SIXTH GRADE NUMBER AND OPERATIONS (Standard 6-2)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Understand whole-number percentages through 100.		NEW!
2. Understand integers.	Use integers to describe real-world phenomena in order to develop meanings for integers.	Rewording makes this indicator broader in scope than the old expectation.
3. Compare rational numbers and whole-number percentages through 100 using symbols.	Use order symbols to compare two fractions, two decimals, or two percents.	Basically a wording change.
4. Apply an algorithm to add and subtract fractions.	Select appropriate methods and tools to solve problems requiring the addition and subtraction of fractions and decimals. Estimate the sums and differences of fractions, describe the method used, and determine the reasonableness of results.	This indicator combines the two old expectations and emphasizes the application of the methods (algorithms) over selection and estimation.
5. Generate strategies for to multiply and divide fractions and decimals.	Use models and numbers to develop and analyze algorithms with fractions and decimals. Using models, divide commonly used fractions (including decimals) (*). Add, subtract, multiply, and divide fractions (including decimals) to solve a variety of applied and mathematical problems.	This indicator is most closely aligned with the first old expectation, with an emphasis on multiplication and division.
6. Understand the relationship between ratio/rate and multiplication/division.	Connect the concept of ratio and fractions by determining the equivalence of two ratios.	A completely different emphasis. The indicator focuses on the ratio/rate and multiplication/division. The old expectation focuses on ratio, fractions, and equivalence.
7. Apply strategies and procedures to determine values of powers of ten (up to 10 to the 6 <sup>th</sup> power).	Evaluate powers of ten up to $10^6$ .	Basically a wording change, with the word “evaluate” replaced with “determine values of.”
8. Represent the prime factorization of numbers using exponents.	Solve problems using prime factorization, common multiples, and common factors and then explain the reasoning used.	This indicator is a subset of the old expectation, with emphasis on prime factorization and exponents.
9. Represent whole numbers in exponential form		NEW! Note. This has been moved down from Grade 7.

## WHAT'S BEEN DELETED?

Show the relationship among fractions, decimals, and percents (\*)

>Use models to represent percents greater than 100 percent and solve problems involving them [*Moved to Grade 7*].

Explain the meaning and effects of adding, subtracting, multiplying, and dividing.

Apply the commutative, associative, and distributive properties to simplify computations with whole numbers, fractions, and decimals.

## WHAT IS THE ESSENCE OF SIXTH GRADE NUMBER AND OPERATIONS?

### Key Concepts

Percent

Fractions

Decimals

Ratios

Rates

Power

Exponent

Prime Factorization

### Key Skills

How to compare fractions, decimals, and percents

How to add and subtract decimals and percents

How to multiply and divide decimals and percents

### SIXTH GRADE ALGEBRA (Standard 6-3)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze numeric and algebraic patterns and pattern relationships.	Describe, extend, and write rules for a wide variety of patterns (*)	This indicator emphasizes analyzing patterns, whereas the old expectation focuses on describing, extending, and writing patterns
2. Apply order of operations to simplify whole-number expressions.	Use order of operations to evaluate numerical expressions (*)	This indicator emphasizes “simplifying whole-number expressions” whereas the old expectation focuses on “evaluating numerical expressions”
3. Represent algebraic relationships with variables in expressions, simple equations, and simple inequalities.	Write simple equations and inequalities accurately to represent relationships.	Wording change, with expressions added to equations and equalities
4. Use the commutative, associative, and distributive properties to show that two expressions are equivalent.	Use commutative, associate, and distribute properties to examine equivalencies of a variety of simple algebraic expressions.	Wording change
5. Use inverse operations to solve one-step equations that have whole-number solutions and variables with whole-number coefficients.		NEW!

## WHAT'S BEEN DELETED?

Use graphs and tables to solve applied problems.

## WHAT IS THE ESSENCE OF SIXTH GRADE ALGEBRA?

### **Key Concepts**

Algebraic patterns  
Commutative property  
Associative property  
Distributive property  
Equivalent expressions  
Inverse operations

### **Key Facts**

The proper order of operations is numbers in parentheses, then exponents, then multiplication and division, and finally addition and subtraction.

### **Key Skills**

How to analyze numeric and algebraic patterns and pattern relationships  
How to represent algebraic relationships with variables  
How to use commutative, associative, and distribute properties to show that two expressions are equivalent.  
How to use inverse operations to solve one-step equations

### SIXTH GRADE GEOMETRY (Standard 6-4)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Represent with ordered pairs of integers the location of points in a coordinate grid.		NEW!
2. Apply strategies and procedures to find the coordinates of the missing vertex of a square, rectangle, or right triangle when given the coordinates of the polygon's other vertices.	Given the coordinates of three vertices of a rectangle or square oriented horizontally or vertically, use the first quadrant of the rectangular coordinate system to locate the other vertex	Basically a wording change, but no longer limited to the first quadrant
3. Generalize the relationship between line symmetry and rotational symmetry for two-dimensional shapes		NEW!
4. Construct two-dimensional shapes with line or rotational symmetry.	Identify and describe point and line symmetry in two-dimensional shapes.	This indicator emphasizes "construct," rather than "identify" and "describe." Also, rotational symmetry has been added.
5. Identify the transformation(s) used to move a polygon from one location to another in the coordinate plane.	Describe the transformation used to move a polygon from one location to another in the first quadrant	Basically a wording change, but no longer limited to the first quadrant
6. Explain how transformations affect the location of the original polygon in the coordinate plane.	Apply a transformation to a polygon and describe how it has changed	This indicator emphasizes "explain," whereas the old expectation focused on "apply."
7. Compare the angles, side lengths, and perimeters of similar shapes.		NEW!
8. Classify shapes as similar.	Distinguish between similarity and congruence.	This indicator focuses only on similarity and emphasizes "classify" rather than "distinguish"
9. Classify pairs of angles as either complementary or supplementary.		NEW!

## WHAT'S BEEN DELETED?

Compare and contrast prisms, cylinders, and pyramids with their polygons or circles that constitute their faces  
Describe relationships among angles, side lengths, perimeters, and areas of similar polygons  
Plot the vertices of squares and rectangles and determine the relationship among the coordinates  
Use symbols for parallel lines and perpendicular lines to describe polygons and figures where appropriate  
Given the top, side, and front views, construct a three-dimensional model using cubes  
Identify and apply geometric concepts in a variety of practical contexts.

## WHAT IS THE ESSENCE OF SIXTH GRADE GEOMETRY?

### **Key Concepts**

Ordered pairs of numbers  
Coordinate grid  
Vertex  
Line symmetry  
Rotational symmetry  
Transformation  
Similar shapes  
Complementary angles  
Supplementary angles

### **Key Skills**

How to find the coordinates of the missing vertex of a square, rectangle, and right triangle  
How to generalize the relationship between line symmetry and rotational symmetry for two-dimensional shapes  
How to construct two-dimensional shapes with line and rotational symmetry  
How to identify the transformation(s) used to move polygons in the coordinate plane  
How to explain how transformations affect the location of the original polygon in the coordinate plane  
How to compare the angles, side length, and perimeters of similar shapes

**SIXTH GRADE MEASUREMENT (Standard 6-5)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Explain the relationships among the circumference, diameter, and radius of a circle.		NEW!
2. Apply strategies and formulas with an approximation of $\pi$ (3.14, or $\frac{22}{7}$ ) to find the circumference and area of a circle.		NEW!
3. Generate strategies to determine the surface area of a rectangular prism and a cylinder.		NEW!
4. Apply strategies and procedures to estimate the perimeters and areas of irregular shapes.	Estimate and justify estimates of perimeter and area of irregular shapes	Change in wording.
5. Apply strategies and procedures of combining and subdividing to find the perimeters and areas of irregular shapes.		NEW!
6. Use proportions to determine unit rates.		NEW!
7. Use a scale to determine distance.	Use a scale to find distance.	No change.

## WHAT'S BEEN DELETED?

Estimate angle measure using 45 degrees, 90 degrees, 180 degrees, 270 degrees, and 360 degrees as referents and use the appropriate tools to measure any angle.

Use appropriate units of measure to label angles, perimeter, and area.

Using standard and nonstandard units of measure, estimate and then determine length, weight/mass, area, and volume/capacity (\*).

Select and use appropriate tools and units to measure to the degree of accuracy required in a particular situation.

Investigate and describe the relationship between areas of rectangles and triangles for other quadrilaterals.

Develop and apply the formulas for the area of triangles and parallelograms (\*).

## WHAT IS THE ESSENCE OF SIXTH GRADE MEASUREMENT?

### Key Concepts

Circle, circumference, diameter, radius

*Pi*

Perimeter

Area

Irregular shapes

Proportions

Unit rates

Scale

### Key Skills

How to find the circumference and area of a circle

How to find the surface area of a rectangular prism and a cylinder

How to estimate the perimeters and areas of irregular shapes

How to combine and subdivide to find the perimeters and areas of irregular shapes

How to use proportions to determine unit rates

How to use a scale to determine distance

### SIXTH GRADE DATA ANALYSIS AND PROBABILITY (Standard 6-6)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Predict the characteristics of one population based on the analysis of sample data.		NEW!
2. Organize data in frequency tables, histograms, or stem-and-leaf plots as appropriate.	Organize and display data in a variety of ways including frequency tables, histograms, and stem-and-leaf plots Describe the relationship between a data set and its corresponding histogram or stem-and-leaf plot (*)	This indicator is basically a rewording of the first old expectation. In addition, the inclusion of the phrase “as appropriate” seems to connect this indicator to the second old expectation
3. Analyze which measure of central tendency (mean, median, or mode) is the most appropriate for a given purpose.	Create and solve problems involving the mean, median, mode, and range of a set of data Analyze and list the differences between two data sets	This indicator focuses on the <u>appropriateness</u> of the mean, median, and mode for a given purpose. In contrast, the old expectation emphasized creating and solving problems for which the mean, median, mode, and range were appropriate.
4. Use theoretical probability to determine the sample space and probability for one- and two-stage events such as tree diagrams, models, lists, charts, and pictures.	Create a sample space for one- or two-stage events and represent it in the form of a list, chart, picture, or tree diagram Making a tree diagram or using models, determine the number of possible outcomes in two-stage events	This indicator is basically a rewording of the first old expectation (for sample space) borrowing the “number of possible outcomes” to determine probability from the second old expectation
5. Apply procedures to calculate the probability of complementary events.	Identify and describe complementary events.	This indicator emphasizes calculating the probability of complementary events, rather than identifying and describing them.

## WHAT'S BEEN DELETED?

Given a problem situation involving one population, collect, analyze, and interpret data.

Interpret histograms and stem-and-leaf plots

Analyze and list the differences between two data sets

From a given sample space, determine and interpret the probability of an event (\*)

## WHAT IS THE ESSENCE OF SIXTH GRADE DATA ANALYSIS AND PROBABILITY?

### Key Concepts

Population

Sample

Sample space

Frequency tables

Histograms

Tree diagrams

Stem-and-leaf plots

Measures of central tendency (mean, median, mode)

Theoretical probability

Complementary events

One- and two-stage events

### Key Skills

How to predict the characteristics of one population based on the analysis of sample data

How to organize data in various formats

How to determine which measure of central tendency is most appropriate for a given purpose

How to use theoretical probability to determine the sample space and probability for one- and two-stage events

How to calculate the probability of complementary events

**SEVENTH GRADE NUMBER AND OPERATIONS (Standard 7-2)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Understand fractional percentages and percentages greater than one hundred.		NEW!
2. Represent the location of rational numbers and square roots of perfect squares on a number line.	Identify, represent, and find the approximate location of fractions, decimals, percents, and square roots of perfect squares on a number line and then justify the reasoning used.	Rewording with emphasis on “represent.”
3. Compare rational numbers, percentages, and square roots of perfect squares using symbols.	Use order symbols to compare fractions, decimals, percents, and square roots of perfect squares and then justify the reasoning used Compare and order integers	Rewording of first old expectation. The second old expectation if a subset.
4. Understand the meaning of absolute value.		NEW!
5. Apply ratios, rates, and proportions to discounts, taxes, tips, interest, unit costs, and similar shapes.	Create and write ratios and proportions from applied situations and explain the reasoning used (*)	Focus on apply and focus on particular applications (discounts, taxes, etc.)
6. Translate between standard form and exponential form.	Translate to standard form a number written in exponential form, in scientific notation, and in calculator notation	The old expectation is divided into two indicators (#6 and #7).
7. Translate between standard form and scientific notation.	Translate to standard form a number written in exponential form, scientific notation, and calculator notation	See comment immediately above.
8. Generate strategies to add, subtract, multiply, and divide integers.	Use models and numbers to develop and analyze the algorithms for computing with integers (*) Add, subtract, multiply, and divide integers to solve a variety of applied and mathematical problems (*). Estimate the sums and differences of integers, describe the method used, and determine the reasonableness of results	This indicator is basically a rewording of the first old expectation.
9. Apply an algorithm to multiply and divide fractions and decimals.	Estimate the products, and quotients of fractions and decimals, describe the method used, and determine the reasonableness of results	The emphasis shifts from “estimate” to “apply.”
10. Understand the inverse relationship between squaring and finding square roots of perfect squares.	Using models and numbers, explain the inverse relationships between squaring and finding square roots of perfect squares.	Basically a rewording.

## WHAT'S BEEN DELETED?

Write and use the appropriate equivalent forms of whole numbers, fractions, decimals, and percents.

Use models to represent percents less than 1 percent and solve problems involving them.

Apply primes, composites, factors, multiples, and relatively prime numbers in a variety of applied and mathematical situations & explain the reasoning used.

Explain the meaning and effects of arithmetic operations with integers.

Apply the associative, commutative, and distributive properties for operations on integers, fractions, and decimals.

Applying all operations to fractions, decimals, and integers, select appropriate methods and tools to solve problems.

Explain the equivalent ratio method of solving problems involving proportions.

## WHAT IS THE ESSENCE OF SEVENTH GRADE NUMBER AND OPERATIONS?

### Key Concepts

Fractional percent

Square root

Perfect square

Integer

Ratio

Rate

Proportion

Standard form

Expanded form

Scientific notation

Inverse relationship

Absolute value

### Key Skills

How to use a number line to represent location of fractions decimals, percents, and square roots.

How to solve problems involving ratios, rates, and proportions.

How to add and subtract integers

How to multiply and divide integers

### SEVENTH GRADE ALGEBRA (Standard 7-3)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze geometric patterns and pattern relationships.	Describe, extend, analyze, and create a wide variety of patterns to investigate relationships and to solve problems.	Basically a rewording, with an emphasis on analysis of patterns and relationships
2. Analyze tables and graphs to describe the rate of change between and among quantities.	Examine tables and graphs to determine if there is a constant rate of change between the quantities. Analyze quantitative changes by comparing and contrasting numerical patterns in tables with their respective graphs in the coordinate plane.	This indicator is some combination of two old expectations, with an emphasis on rate of change (not just constant rate of change) and a focus on analyze, not simply examine.
3. Understand slope as a constant rate of change.		NEW!
4. Use inverse operations to solve two-step equations and two-step inequalities.	Recognize and apply the additive and multiplicative inverses.	Basically a rewording, with a focus on two-step equations and inequalities.
5. Represent on a number line the solution of a two-step inequality.	Use models and numbers to solve one-step linear equations and inequalities in one variable.	This indicator focuses exclusively on the use of a number line, rather than models in general; also, the new indicator increases the number of steps (from one to two) but deletes equations.
6. Represent proportional relationships with graphs, tables, and equations.		NEW!
7. Classify relationships as either directly proportional, inversely proportional, or nonproportional.	From a graph, describe a linear relationship as positive or negative.	This indicator emphasizes proportionality, rather than positive or negative relationships.

## WHAT'S BEEN DELETED?

Use different forms of representing information (e.g., graphical, symbolic, tabular)

Explain the use of a variable as a quantity that can change its value, as a quantity on which other value depend, and as a generalization of patterns.

State the coordinates of the x and y intercepts from a graph.

Use variables to describe numerical expressions and relationships.

Use graphs, tables, and equations to solve applied problems involving tips, discounts, sales tax, and simple interest (\*).

## WHAT IS THE ESSENCE OF SEVENTH GRADE ALGEBRA?

### Key Concepts

Slope

Inverse operations

Two-step equations

Two-step inequalities

Proportion relationships

Directly proportional

Indirectly proportional

### Key Skills

How to analyze geometric patterns and pattern relationships

How to analyze tables and graphs to describe the rate of change between and among quantities.

How to use inverse operations to solve two-step equations and inequalities.

How to use a number line to represent the solution of a two-step inequality.

How to use graphs, tables, and equations to represent proportional relationships.

How to classify relationships as directly proportional, inversely proportional, or nonproportional.

**SEVENTH GRADE GEOMETRY (Standard 7-4)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Analyze geometric properties and the relationships among the properties of triangles, congruence, similarity, and transformations to make deductive arguments.		NEW!
2. Explain the results of the intersection of two or more geometric shapes in a plane.		NEW!
3. Illustrate the cross section of a solid.		NEW!
4. Translate between two- and three-dimensional representations of compound figures.	Construct nets for three-dimensional figures.	This indicator focuses on the translations from two-dimensional to three-dimensional and vice versa.
5. Analyze the congruent and supplementary relationships—specifically, alternate interior, alternate exterior, corresponding, and adjacent—of the angles formed by parallel lines and a transversal.		NEW!
6. Compare the areas of similar shapes and the areas of congruent shapes.	Compare and contrast attributes of similar figures and attributes of congruent figures	This indicator focuses only on areas of similar and congruent shapes
7. Explain the proportional relationship among attributes of similar shapes.		NEW!
8. Apply proportional reasoning to find missing attributes of similar shapes.		NEW!
9. Create tessellations with transformations.	Identify transformations in tessellations, use transformations to draw tessellations, and describe relationships among figures that tessellate.	This indicator is most similar to the “use” phrase in the old expectation
10. Explain the relationship of the angle measurements among shapes that tessellate.	Identify transformations in tessellations, use transformations to draw tessellations, and describe relationships among figures that tessellate.	This indicator is a more specific statement of the “describe” phrase in the old expectation.

## WHAT'S BEEN DELETED?

Classify polygons as regular or nonregular and investigate relationships between the number of diagonals and the number of sides of a regular polygon.

Describe relationships between the edge lengths and the volume of similar prisms (\*)

Identify and graph ordered pairs in the four quadrants of a coordinate plane.

State relationships among the coordinates of the vertices of rectangles, squares, parallelograms, trapezoids, and rhombuses oriented horizontally (\*).

>Describe the transformation used to move a polygon in one quadrant to another quadrant in the coordinate plane [*Moved to Grade 6*]

>Determine the type of symmetry (point or line) found in a reflection or a rotation [*Moved to Grade 6*]

Draw two-dimensional objects from a geometric description and write a description of geometric properties for a given object (\*)

Compare and contrast the number of faces, vertices, and edges of three-dimensional figures.

Given a network with up to six vertices, determine the number of paths.

## WHAT IS THE ESSENCE OF SEVENTH GRADE GEOMETRY?

### Key Concepts

Congruence

Similarity

Similar shapes

Transformation

Tessellation

Deductive argument

Cross section of a solid

Compound figures

Congruent and supplementary relationships

Parallel lines and transversals

Angles (alternate interior, alternate exterior, corresponding, adjacent)

Proportional relationships and proportional reasoning

### Key Skills

How to analyze geometric properties and relationships to make deductive arguments.

How to explain the results of the intersection of two or more geometric shapes in a plane.

How to illustrate the cross section of a solid.

How to translate between two- and three-dimensional representations of compound figures

How to analyze the congruent and supplementary relationships of the angles formed by parallel lines and a transversal

How to compare the areas of similar and congruent shapes

How to explain the proportional relationship among attributes of similar shapes and apply proportional reasoning to find missing attributes

How to create tessellations with transformations

How to explain the relationship of the angle measurements among shapes that tessellate.

**SEVENTH GRADE MEASUREMENT (Standard 7-5)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use ratio and proportion to solve problems involving scale factors and rates.		NEW!
2. Apply strategies and formulas to determine the surface area and volume of the three-dimensional shapes prism, pyramid, and cylinder.	Use appropriate units of measure to label surface area and volume. Investigate and describe the relationship between the area of the base and the volume of a prism, pyramid, and cylinder (*).	This indicator emphasizes the use of strategies and formulas to determine surface area and volume, rather than the use of appropriate units of measurement
3. Generate strategies to determine the perimeters and areas of trapezoids.		NEW!
4. Recall equivalencies associated with length, mass and weight, and liquid volume: 1 square yard = 9 square feet, 1 cubic meter = 1 million cubic centimeters, 1 kilometer = $\frac{5}{8}$ mile, 1 inch = 2.54 centimeters; 2.2 kilograms = 1 pound; and 1.06 quarts = 1 liter.		NEW!
5. Use one-step unit analysis to convert between and within the U.S. Customary System and the metric system.	Compare and convert units of measure for length, weight/mass, and volume within the U. S. customary system and the metric system	Basically a wording change

## WHAT'S BEEN DELETED?

Explain the relationship between the metric system and the base-ten number system.

Add and subtract mixed units of measure and express answers in appropriate form.

>Analyze a variety of measurement situations to determine the necessary degree of accuracy and precision *[Moved to Grade 8]*

Use measurements and formulas to solve real-world and mathematical problems.

Use concrete materials or computer models, derive approximations for pi from measurements for circumference and diameter.

>Create and solve problems by finding the circumference and/or area of a circle when given the diameter or radius (\*) *[Moved to Grade 6]*

>Determine the unit rate (\*) *[Moved to Grade 6]*

Apply rates to solve problems in real-world situations.

## WHAT IS THE ESSENCE OF SEVENTH GRADE MEASUREMENT?

### Key Concepts

Ratio

Proportion

Scale factor

Rates

Trapezoids

Area

Perimeter

### Key Facts

Equivalencies associated with length, mass and weight, and liquid volume

### Key Skills

How to use ratio and proportion to solve problems involving scale factors and rates

How to apply strategies and formulas to determine the surface area and volume of three-dimensional shapes

How to generate strategies to determine the perimeters and areas of trapezoids

How to use one-step analysis to convert between and within the U. S. Customary System and the metric system

**SEVENTH GRADE DATA ANALYSIS AND PROBABILITY (Standard 7-6)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Predict the characteristics of two populations based on the analysis of sample data.	Make inferences and predicts based on the analysis of sample data	This indicator includes two populations.
2. Organize data in box plots or circle graphs as appropriate.	Organize, display, and interpret data in a variety of ways including box-and-whisker plots Describe the relationship between a data set and its corresponding box plot or circle graph (*)	This indicator combines the two old expectations, with an emphasis on organizing the data.
3. Apply procedures to calculate the interquartile range.	Compute, describe, and interpret the interquartile range	The emphasis in this indicator is on calculating (computing) the interquartile range, not interpreting it. Interpreting is the focus of the next indicator (#4).
4. Interpret the interquartile range for data.	Compute, describe, and interpret the interquartile range	See previous comment.
5. Apply procedures to calculate the probability of mutually exclusive simple or compound events.	Identify and describe mutually exclusive events	This indicator emphasizes calculating the probability of mutually exclusive events, rather than identifying or describing them.
6. Interpret the probability of mutually exclusive simple or compound events.	Identify and describe mutually exclusive events	This indicator emphasizes interpreting the probability of mutually exclusive events, rather than identifying or describing them.
7. Differentiate between experimental and theoretical probability of the same event.	Investigate and describe the differences between the probability of an event found through simulation and the theoretical probability of that same event	Basically a wording change
8. Use the fundamental counting principle to determine the number of possible outcomes for a multistage event.	Using the fundamental counting principle or other techniques, determine the number of possible outcomes in a multistage event	This indicator focuses on the fundamental counting principle (excluding “other techniques”)

## WHAT'S BEEN DELETED?

Given a problem situation involving two populations, collect, analyze, and interpret data  
Construct circle graphs and interpret the meaning  
Compute the probability of two independent events (\*)

## WHAT IS THE ESSENCE OF SEVENTH GRADE DATA ANALYSIS AND PROBABILITY?

### Key Concepts

Box plots and circle graphs  
Interquartile range  
Mutually exclusive events  
Simple events, compound events, and multistep events  
Experimental probability  
Theoretical probability  
Fundamental counting principle

### Key Skills

How to predict the characteristics of two populations based on the analysis of sample data  
How to organize data in box plots and circle graphs as appropriate  
How to calculate and interpret the interquartile range for data  
How to calculate and interpret the probability of mutually exclusive events (both simple and compound)  
How to use the fundamental counting principle to determine the number of possible outcomes for a multistage event

**EIGHTH GRADE NUMBER AND OPERATIONS (Standard 8-2)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Apply an algorithm to add, subtract, multiple, and divide integers.		NEW! Note. Moved from 7 <sup>th</sup> grade.
2. Understand the effect of multiplying and dividing a rational number by another rational number	Select appropriate methods and tools to solve problems requiring the use of rational numbers. Compute with rational numbers to solve a variety of applied and mathematical problems. (*) Justify the reasonableness of an estimate of rational number computations.	This indicator somehow combines the three old expectations with an emphasis on the effect of multiplying and dividing rational numbers. It's probably closest to the third old expectation.
3. Represent the approximate location of irrational numbers on a number line	Compare and order rational and irrational numbers and find their approximate locations on a number line.	The old expectation has been divided into two indicators (#3 and #3); also, slight wording change.
4. Compare rational and irrational numbers using $\leq$ , $\geq$ , $<$ , $>$ , and $\neq$	Compare and order rational and irrational numbers and find their approximate locations on a number line.	See comment immediately above.
5. Apply the concept of absolute value.		NEW!
6. Apply strategies and procedures to approximate between two whole numbers the square roots or cube roots of numbers less than 1,000.	Approximate to the nearest tenth the square root of a number that falls between two perfect squares.	Slight rewording. Also, note the addition of cube roots as well as square roots.
7. Apply ratios, rates, and proportions.	Analyze and explain each method for solving a proportion (equivalent ratios, unit rates, and cross-multiplying). (*)	The emphasis is on apply, rather than analyze and explain. Thus, each method must be applied, rather than analyzed and explained.

## WHAT'S BEEN DELETED?

Solve real-world problems involving fractions, decimals, and percents.

Solve real-world problems involving the use of percents greater than 100 percent or less than 1 percent *[Moved to Grade 7]*.

Apply the associative, commutative, and distributive properties to simplify expressions.

>Use proportional reasoning to solve applied problems and then justify the solution. (\*) *[Moved to Measurement Strand, Indicator 8-5.5]*

Use scientific notation to write very large numbers and numbers less than one *[Moved to Grade 7]*.

## WHAT IS THE ESSENCE OF EIGHTH GRADE NUMBER AND OPERATIONS?

### Key Concepts

Integers

Rational number

Irrational number

Scientific notation

Absolute value

Square roots

Cube roots

Ratios

Rates

Proportions

### Key Skills

How to add, subtract, multiply, and divide integers

How to use number line to locate rational and irrational numbers

How to compare rational and irrational numbers

How to use scientific notation to write very large and very small numbers

How to approximate the square root of numbers that are not perfect squares

### EIGHTH GRADE ALGEBRA (Standard 8-3)

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Translate among verbal, graphic, tabular, and algebraic representations of linear functions.	Describe the merits and limitations of graphical, symbolic, and tabular representations.	This indicator focuses on understanding the relationships among different representations of linear functions; the old expectations emphasizes the merits and limitations of the various representations
2. Represent algebraic relationships with equations and inequalities.	Write or model a linear equation to solve a simple applied problem.	This indicator includes both equations and inequalities (as opposed to equations only); Also, the new indicator includes different types of algebraic relationships, not just linear equations.
3. Use commutative, associative, and distributive properties to examine the equivalence of a variety of algebraic expressions.		NEW!
4. Apply procedures to solve multi-step equations.	Using strategies that involve inverse operations, solve one- and two-step linear equations and inequalities in one variable (*)	This indicator includes a variety of procedures; the old expectation focuses on strategies that involve inverse operations.
5. Classify relationships between two variables in graphs, tables, and/or equations as either linear or nonlinear.	Examine tables, graphs, or simple equations to classify relationships as linear or nonlinear. Use one or more representations to model and to analyze the relationship in applied problems to determine if it is linear or nonlinear (*)	This indicator is basically a rewording of the first old expectation
6. Identify the coordinates of the $x$ - and $y$ -intercepts of a linear equation from a graph, equation, and/or table.		NEW!
7. Identify the slope of a linear equation from a graph, equation, and/or table.	Use tables and graphs to model and analyze linear relationships between variables.	The focus of this indicator is clearly on the slope of the linear equation, which is a more narrow focus than the old expectation.

## WHAT'S BEEN DELETED?

Evaluate simple algebraic expressions for given values of variables by using the substitution principle and the rules for order of operations (\*)  
Explain the impact of coefficients and constants on linear equations as they reflect simple applications.  
Simplify a variety of algebraic expressions using properties of real numbers and rules for order of operations (\*).

## WHAT IS THE ESSENCE OF EIGHTH GRADE ALGEBRA?

### Key Concepts

Linear relationships  
Non-linear relationships  
Equations  
Functions  
Multi-step equations  
Inequalities  
Commutative, associative, and distributive properties  
Slope  
Coordinates  
x-intercept  
y-intercept

### Key Skills

How to represent algebraic relationships with equations and inequalities  
How to use commutative, associative, and distributive properties to examine equivalence of algebraic expressions  
How to solve multi-step equations  
How to classify relationships between two variables as linear or nonlinear  
How to identify the slope of a linear equation

**EIGHTH GRADE GEOMETRY (Standard 8-4)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Apply the Pythagorean theorem.	Apply the Pythagorean relationship to determine if a triangle is a right triangle. Apply the Pythagorean relationship to find the missing length of a side of a right triangle (*)	This indicator is some combination of the two old expectations
2. Use ordered pairs, equations, intercepts, and intersections to locate points and lines in a coordinate plane.	Given the coordinates of a vertex and the length of adjacent side of a polygon, use the rectangular coordinate system to locate other vertices of a square, rectangle, or right triangle (*)	This indicator is a more general case than the old expectation, including the use of equations, intercepts, and intersections as well as ordered pairs of numbers
3. Apply a dilation to a square, rectangle, or right triangle in a coordinate plane.	Apply dilations and describe their results.	This indicator is an expansion of the first part of the old expectation, “apply dilations.” Also the focus is on squares, rectangles, and right triangles.
4. Analyze the effect of a dilation on a square, rectangle, or right triangle in a coordinate plane.	Apply dilations and describe their results	This indicator is a clarification of the second part of the old expectation, “describe their results.” Also, the focus is on squares, rectangles, and right triangles.

## WHAT'S BEEN DELETED?

Identify the necessary and sufficient properties that characterize quadrilaterals.

Describe how a change in the edge length affects the angle measures, perimeters, and areas of similar regular polygons (\*).

Given the length of three segments, determine and explain whether or not they can form a triangle.

Determine the equivalence, if any, between multiple applications of one transformation and the application of a different transformation.

>Identify the congruent and supplementary relationships of the angles formed by parallel lines and a transversal [*Moved to Grade 7*]

Use isometric drawings of three-dimensional figures to build the model with cubes.

Determine the changes in volume and surface area of three-dimensional figures that can be built with cubes when one or more measurements are changed (\*)

Construct a network to solve a problem situation.

Use an area model to analyze probability.

Identify applications of transformations such as tiling, fabric design, art, and scaling.

## WHAT IS THE ESSENCE OF EIGHTH GRADE GEOMETRY?

### Key Concepts

Pythagorean theorem

Dilation

### Key Skills

How to apply the Pythagorean theorem

How to use ordered pairs, equations, intercepts, and intersections to locate points and lines in a coordinate plane

How to apply a dilation to a square, rectangle, and right triangle

How to analyze the effect of a dilation on a square, rectangle, and right triangle

**EIGHTH GRADE MEASUREMENT (Standard 8-5)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Use proportional reasoning and the properties of similar shapes to determine the length of a missing side.	Use the properties of similar figures to determine the length of a missing side (*)	Change in wording, with the addition of proportional reasoning
2. Explain the effect on the area of two-dimensional shapes and on the volume of three-dimensional shapes when one or more of the dimensions are changed.	Use dimensional analysis to convert from one unit to another	The new indicator is broader than the old expectation and more clearly stated; Also, the emphasis in the new indicator is the effect of changing dimensions on area and volume
3. Apply strategies and formulas to determine the volume of the three-dimensional shapes cone and sphere.		NEW!
4. Apply formulas to determine the exact ( $\pi$ ) circumference and area of a circle.		NEW!
5. Apply formulas to determine the perimeters and areas of trapezoids.	Find the area of a trapezoid using the formula	Change in wording, with the addition of perimeter
6. Analyze a variety of measurement situations to determine the necessary level of accuracy and precision.		NEW!
7. Use multistep unit analysis to convert between and within U.S. Customary System and the metric system.		NEW!

## WHAT'S BEEN DELETED?

Find the area of irregular shapes (\*)

Investigate and describe the relationship between the area of the faces and the surface area of prisms, pyramids, and cylinders

Use measurements and formulas to solve real-world and mathematical problems.

## WHAT IS THE ESSENCE OF EIGHTH GRADE MEASUREMENT?

### Key Concepts

Proportional reasoning

Similar shapes

Volume

Trapezoids

Accuracy

Precision

Multistep unit analysis

### Key Skills

How to use proportional reasoning and the properties of similar shapes to determine the length of a missing side

How to determine the effect of the change in dimensions on the area of two-dimensional figures and the volume of three-dimensional objects

How to determine the volume of cones and spheres

How to determine the exact circumference and area of a circle

How to determine the perimeter and area of trapezoids

How to determine the necessary accuracy and precision in various measurement situations

How to use a multistep unit analysis to convert between and within U. S. Customary System and the metric system

**EIGHTH GRADE DATA ANALYSIS AND PROBABILITY (Standard 8-6)**

NEW INDICATORS	OLD EXPECTATIONS	MAJOR CHANGES
1. Generalize the relationship between two sets of data by using scatterplots and lines of best fit.	Use a scatterplot and its line of fit to determine if a positive relationship, a negative relationship, or no relationship exists between two sets of data and then use them to make predictions (*)	Basically a rewording, producing a more general statement
2. Organize data in matrices or scatterplots as appropriate.	Use a matrix to organize and describe data Create and use a scatterplot and estimate its line of fit	This indicator is some combination of the two old expectations
3. Use theoretical and experimental probability to make inferences and convincing arguments about an event or events.	Make inferences and convincing arguments based on analysis of theoretical or experimental probability	Basically a wording change
4. Apply procedures to calculate the probability of two dependent events.	Compute the probability of two dependent events (*)	Basically a wording change
5. Interpret the probability for two dependent events.		NEW!
6. Apply procedures to compute the odds of a given event.	Determine the odds of a given event	Basically a wording change
7. Analyze probability using area models.		NEW!
8. Interpret graphic and tabular data representations by using range and the measures of central tendency (mean, median, and mode).		NEW!

## WHAT'S BEEN DELETED?

Explain what type of graph would be appropriate for a given data set.

Determine which measure of center is the most appropriate for a given situation and explain the reasoning used.

Explain how different graphical representations of data can bias the interpretation of these data.

Formulate a hypothesis and then design and carry out an experiment to test it.

Formulate new areas of investigation based on the results of prior experiments.

## WHAT IS THE ESSENCE OF EIGHTH GRADE DATA ANALYSIS AND PROBABILITY?

### **Key Concepts**

Scatterplot

Line of best fit

Matrix (matrices)

Theoretical probability

Experimental probability

Convincing argument

Dependent events

Odds

Area model

Range

Measures of central tendency

### **Key Skills**

How to generalize the relationship between two data sets using scatterplots and lines of best fit

How to organize data in matrices and scatterplots

How to use theoretical and experimental probability to make inferences and convincing arguments about events

How to calculate the probability of two dependent events

How to interpret the probability of two dependent events

How to compute the odds of a given event

How to use area models to analyze probability

How to interpret graphs and tabular data in terms of measures of central tendency and ranges

**Note:** *This document is in draft form and should be considered as such. If errors are noted, please email [COE@fmarion.edu](mailto:COE@fmarion.edu).*