



2016 Mathematics Standards of Learning

Kindergarten

Overview of Revisions - 2009 to 2016

Referenced documents available at [VDOE Mathematics 2016](#)





Purpose

- Overview of the 2016 *Mathematics Standards of Learning* and the *Curriculum Framework*
- Highlight information included in the Essential Knowledge and Skills and the Understanding the Standard sections of the *Curriculum Framework*





Agenda

- Implementation Timeline
- Resources Currently Available
 - Crosswalk (Summary of Revisions)
 - Standards and Curriculum Frameworks
- Comparison of 2009 to 2016 Standards
 - Number and Number Sense
 - Computation and Estimation
 - Measurement and Geometry
 - Probability and Statistics
 - Patterns, Functions, and Algebra





Implementation Timeline

2016-2017 School Year – Curriculum Development

VDOE staff provides a summary of the revisions to assist school divisions in incorporating the new standards into local written curricula for inclusion in the taught curricula during the 2017-2018 school year.

2017-2018 School Year – Crossover Year

2009 Mathematics Standards of Learning and 2016 Mathematics Standards of Learning are included in the written and taught curricula. Spring 2018 Standards of Learning assessments measure the 2009 Mathematics Standards of Learning and include field test items measuring the 2016 Mathematics Standards of Learning.

2018-2019 School Year – Full-Implementation Year

Written and taught curricula reflect the 2016 Mathematics Standards of Learning. Standards of Learning assessments measure the 2016 Mathematics Standards of Learning.





2016 SOL Revisions –

- Improve the vertical progression of mathematics content
- Ensure developmental appropriateness of student expectations
- Increase support for teachers in mathematics content (including definitions, explanations, examples, and instructional connections)
- Clarify expectations for teaching and learning
- Improve precision and consistency in mathematical vocabulary and format
- Ensure proficiency of elementary students in computational skills





Changes to the Curriculum Framework

- Reduction of columns from 3 to 2
 - Understanding the Standard (US) – information that supports mathematics content knowledge
 - Essential Knowledge and Skills (EKS) – information that provides expectations for student learning
- Indicators of SOL sub-bullet added to each bullet within the Essential Knowledge and Skills





- K.11 The student will**
- a) collect, organize, and represent data; and
 - b) read and interpret data in object graphs, picture graphs, and tables.

Understanding the Standard	Essential Knowledge and Skills
<ul style="list-style-type: none"> • <u>Data are pieces of information collected about people or things.</u> The primary purpose of collecting data is to answer questions. The primary purpose of interpreting data is to inform decisions (e.g., which type of clothing to pack for a vacation based on a weather graph or which type of lunch to serve based upon class favorites). • Methods for organizing data could include five or ten frames, surveys, checklists, or various methods of grouping concrete materials. • <u>At this level, data gathered and displayed by students should be limited to 16 or fewer data points for no more than four categories.</u> • Students should have opportunities to interpret graphs, created with the assistance of the teacher, that contain data points where their entire class is represented (e.g., tables that show who brought their lunch and who will buy their lunch for any given day, a picture graph showing how students traveled to school – bus, car, walk). • When data are presented in an organized manner, students can interpret and discuss the results and implications of their investigation (e.g., identifying parts of the data that have special characteristics, including categories with the greatest, the least, or the same number of responses). • In the process of collecting data, students make decisions about what is relevant to their investigation (e.g., when collecting data on their classmates' favorite pets, deciding to limit the categories to common pets). • When students begin to collect data, they recognize the need to categorize, which helps develop the understanding of "things that go together." Categorical data are used when constructing picture graphs and bar graphs. • Different types of representations emphasize different things about the same data. • Object graphs are graphs that use concrete materials to represent the categorical data that are collected (e.g., cubes stacked by the month, with one cube representing the birthday month of each student). • <u>Picture graphs are graphs that use pictures to represent and compare information.</u> At this level, each picture should represent one data point. 	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <ul style="list-style-type: none"> • Collect data on categories identified by the teacher and/or student (e.g., number of siblings, types/numbers of pets, types of flowers in the garden). Data points, collected by students, should be limited to 16 or fewer for no more than four categories. (a) • Represent data by arranging concrete objects into organized groups to form a simple object graph. (a) • Represent gathered data, using pictures to form a simple picture graph (e.g., a picture graph of the weather for a month). (a) • Represent gathered data in tables (vertically or horizontally). (a) • Answer questions related to the gathered data displayed in object graphs, picture graphs, and tables: <ul style="list-style-type: none"> – Read the graph to determine the categories of data and the data as a whole (e.g., the total number of responses) and its parts (e.g., five people are wearing sneakers); and – Interpret the data that represents numerical relationships, including categories with the greatest, the least, or the same. (b)





Overview of Changes in Kindergarten

2009		2016	
Strand	# of Standards	# of Standards	Strand
Number and Number Sense	5	5	Number and Number Sense
Computation and Estimation	1	1	Computation and Estimation
Measurement	4	4	Measurement and Geometry
Geometry	2		
Probability and Statistics	2	1	Probability and Statistics
Patterns, Functions, and Algebra	2	2	Patterns, Functions, and Algebra
Total	16	13	Total

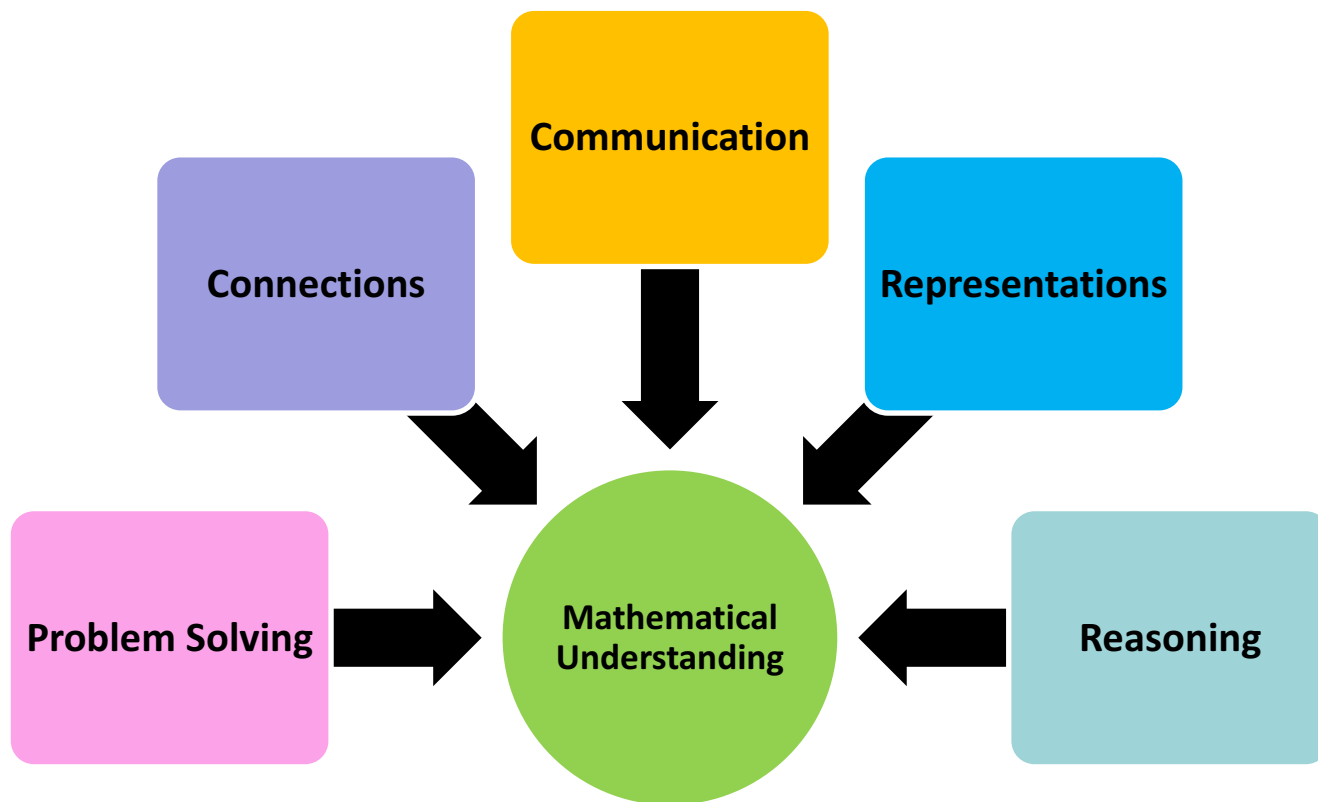




Mathematics Process Goals for Students

“The content of the mathematics standards is intended to support the five process goals for students”

- 2009 and 2016 *Mathematics Standards of Learning*





Standards of Learning Curriculum Frameworks

Introduction includes:

- Mathematical Process Goals for Students
- **Instructional Technology**
- **Computational Fluency**
- **Algebra Readiness**
- **Equity**





Kindergarten – Crosswalk (Summary of Revisions): 2016 *Mathematics Standards of Learning and Curriculum Framework*

Additions (2016 SOL)	Deletions from Kindergarten (2009 SOL)
<ul style="list-style-type: none"> • K.2b – Order up to three sets from least to greatest and greatest to least • K.3c – Identify the number after, without counting, when given any number between 0 and 100; identify the number before, without counting, when given any number between 1 and 10 • K.4 – Recognize and describe with fluency part-whole relationships for numbers up to 5; investigate and describe part-whole relationships for numbers to 10 • K.8 – Investigate the passage of time by reading and interpreting a calendar (months of the year, days of the week, etc.) [Moved from 1.11] • K.9 – Compare volume of two containers (more, less) and compare amount of time spent on two events (longer, shorter) 	<ul style="list-style-type: none"> • K.3 – Indicate ordinal position of objects [Moved to 1.3] • K.4c – Count by fives [Included in 1.1] • K.7 – Value of a collection of pennies or nickels [Included in 1.8] • K.8 – Identify measurement instruments [Each instrument moved to the standard where content is first taught (i.e., ruler – 2.8 EKS; scale – 1.10 EKS; clock – 1.9 EKS; thermometer – 2.11 EKS)] • K.9 – Tell time to the hour [Included in 1.9a] • K.10 – Use of non-standard units to measure [Included in 1.10] • K.13 – Tally to collect data [Included in 1.11]
Parameter Changes/Clarifications (2016 SOL)	Moves within Kindergarten (2009 SOL to 2016 SOL)
<ul style="list-style-type: none"> • K.1a – Tell how many are in a given set increased from 15 to 20 • K.1b – Read, write, and represent numbers increased from 15 to 20 • K.2 EKS – Compare and order three or fewer sets, each set containing 10 or fewer concrete objects, from least to greatest and greatest to least • K.3 EKS – Count forward orally by tens, starting at 0, to determine the total number of objects to 100 • K.5 – Investigate fractions by representing and solving practical problems involving with two sharers • K.6 – Model and solve single-step story and picture problems with sums to 10 and differences within 10, using concrete objects • K.11 EKS – Data points collected by students should be limited to 16 or fewer with no more than four categories represented • K.12 EKS – Identify attributes of an object such as color, size, shape, thickness [Moved from US] • K.13 – Transfer a repeating pattern from one representation to another 	<ul style="list-style-type: none"> • K.1 – [Moved to K.2] • K.2 – [Moved to K.1] • K.4 – [Moved to K.3] • K.10 – [Moved to K.9] • K.11ab – [Moved to K.10ab] • K.12 – [Moved to K.10c] • K.13 – [Moved to K.11a] • K.14 – [Moved to K.11b] • K.15 – [Moved to K.12] • K.16 – [Moved to K.13]

2009

2016

EKS = Essential Knowledge and Skills, referring to the column on the right side of the Curriculum Framework
 US = Understanding the Standard, referring to the column on the left side of the Curriculum Framework





Comparison of Mathematics Standards of Learning – 2009 to 2016

2009	2016
Number and Number Sense	
	<p>K.1 The student will</p> <ul style="list-style-type: none"> a) tell how many are in a given set of 20 or fewer objects by counting orally; and b) read, write, and represent numbers from 0 through 20.
<p>K.1 The student, given two sets, each containing 10 or fewer concrete objects, will identify and describe one set as having more, fewer, or the same number of members as the other set, using the concept of one-to-one correspondence.</p>	<p>K.2 The student, given no more than three sets, each set containing 10 or fewer concrete objects, will</p> <ul style="list-style-type: none"> a) compare and describe one set as having more, fewer, or the same number of objects as the other set(s); and b) compare and order the sets from least to greatest and greatest to least.
<p>K.2 The student, given a set containing 15 or fewer concrete objects, will</p> <ul style="list-style-type: none"> a) tell how many are in the set by counting the number of objects orally; b) write the numeral to tell how many are in the set; and c) select the corresponding numeral from a given set of numerals. [Select numeral moved to EKS] <p>[Moved to K.1]</p>	
<p>K.3 The student, given an ordered set of ten objects and/or pictures, will indicate the ordinal position of each object, first through tenth, and the ordered position of each object. [Moved to 1.3]</p>	
<p>K.4 The student will</p> <ul style="list-style-type: none"> a) count forward to 100 and backward from 10; b) identify one more than a number and one less than a number; and c) count by fives and tens to 100. [Count by fives included in 1.2] 	<p>K.3 The student will</p> <ul style="list-style-type: none"> a) count forward orally by ones from 0 to 100; b) count backward orally by ones when given any number between 1 and 10; c) identify the number after, without counting, when given any number between 0 and 100 and identify the number before, without counting, when given any number between 1 and 10; and d) count forward by tens to determine the total number of objects to 100.
	<p>K.4 The student will</p> <ul style="list-style-type: none"> a) recognize and describe with fluency part-whole relationships for numbers up to 5; and b) investigate and describe part-whole relationships for numbers up to 10.





NUMBER AND NUMBER SENSE



2009 SOL	2016 SOL
<p>K.2 The student, given a set containing 15 or fewer concrete objects, will</p> <p>a) tell how many are in the set by counting the number of objects orally;</p> <p>b) write the numeral to tell how many are in the set; and</p> <p>c) select the corresponding numeral from a given set of numerals. [Select corresponding numeral was moved to EKS] [K.2ab Moved to K.1ab]</p>	<p>K.1 The student will</p> <p>a) tell how many are in a given set of 20 or fewer objects by counting orally; and</p> <p>b) read, write, and represent numbers from 0 through 20.</p>

Revisions:

- K.1a – Tell how many are in a given set of objects increased from 15 to 20
- K.1b – Read, write, and represent numbers increased from 15 to 20
- K.1b EKS – Clarification provided – construct a set corresponding to a given number, identify numerals in random order, and identify the numeral that corresponds to a given set



2009 SOL	2016 SOL
<p>K.1 The student, given two sets, each containing 10 or fewer concrete objects, will identify and describe one set as having more, fewer, or the same number of members as the other set, using the concept of one-to-one correspondence.</p>	<p>K.2 The student, given no more than three sets, each set containing 10 or fewer concrete objects, will</p> <ul style="list-style-type: none">a) compare and describe one set as having more, fewer, or the same number of objects as the other set(s); andb) compare and order the sets from least to greatest and greatest to least.

Revisions:

- **K.2** – Number of sets increased from two to no more than three
- **K.2b** – Order up to three sets from least to greatest and greatest to least



2009 SOL	2016 SOL
K.3 The student, given an ordered set of ten objects and/or pictures, will indicate the ordinal position of each object, first through tenth, and the ordered position of each object. [Moved to 1.3]	

Revisions:

- K.3 – Indicate ordinal position of objects moved to 1.3




2009 SOL	2016 SOL
<p>K.4 The student will</p> <ul style="list-style-type: none">a) count forward to 100 and backward from 10;b) identify one more than a number and one less than a number; andc) count by fives and tens to 100. [Count by fives included in 1.1]	<p>K.3 The student will</p> <ul style="list-style-type: none">a) count forward orally by ones from 0 to 100;b) count backward orally by ones when given any number between 1 and 10;c) identify the number after, without counting, when given any number between 0 and 100 and identify the number before, without counting, when given any number between 1 and 10; andd) count forward by tens to determine the total number of objects to 100.

Revisions:

- Count by fives deleted; remains in grade one
- K.3a – Counting forward *orally* by ones from 0 to 100
- K.3b new – Count backward *orally when given any number between 1 and 10*
- K.3c – Identify the number after, without counting, when given any number between 0 and 100; Identify number before, without counting, when given any number between 1 and 10
- K.3d EKS – Clarifies counting by tens should be done in conjunction with determining the total number of objects up to 100





2009 SOL	2016 SOL
	<p>K.4 The student will</p> <ul style="list-style-type: none">a) recognize and describe with fluency part-whole relationships for numbers up to 5; andb) investigate and describe part-whole relationships for numbers up to 10.

Revisions:

- K.4a – Recognize and describe with fluency part-whole relationships for numbers up to five in a variety of configurations
- K.4b – Investigate and describe part-whole relationships for numbers up to 10 using a variety of configurations





2009 SOL	2016 SOL
K.5 The student will identify the parts of a set and/or region that represent fractions for halves and fourths.	K.5 The student will investigate fractions by representing and solving practical problems involving equal sharing with two sharers.

Revisions:

- Greater emphasis on representing and solving practical problems that involve sharing with two sharers
- Represent fair shares concretely
- Describe fair shares as equal pieces or parts of a whole



COMPUTATION AND ESTIMATION



2009 SOL	2016 SOL
K.6 The student will model adding and subtracting whole numbers, using up to 10 concrete objects.	K.6 The student will model and solve single-step story and picture problems with sums to 10 and differences within 10, using concrete objects.

Revisions:

- Solve various types of story and picture problems using 10 or fewer concrete objects
- See Understanding the Standard section in Curriculum Framework for additional information and examples of problem types



MEASUREMENT AND GEOMETRY



2009 SOL	2016 SOL
<p>K.7 The student will recognize a penny, nickel, dime, and quarter and will determine the value of a collection of pennies and/or nickels whose total value is 10 cents or less. [Value of a collection included in 1.8]</p>	<p>K.7 The student will recognize the attributes of a penny, nickel, dime, and quarter and identify the number of pennies equivalent to a nickel, a dime, and a quarter.</p>

Revisions:

- Deleted determining the value of a collection of pennies and/or nickels
- EKS – Equivalencies now included in standard



2009 SOL	2016 SOL
<p>K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer). [Moved each measurement instrument to the grade and standard where the content is first taught (i.e., ruler and scale – 2.8 EKS; clock – 1.9 EKS; thermometer – 2.11 EKS)]</p>	<p>K.8 The student will investigate the passage of time by reading and interpreting a calendar. [Moved from 1.11]</p>

Revisions:

- Identification of measurement instruments moved to grade level where the use of the instrument first occurs:
 - ruler and scale moved to 2.8 EKS
 - clock moved to 1.9 EKS
 - thermometer moved to 2.11 EKS
- Calendar (identification of days and months) remains in K.8
- Seasons are included in science curriculum





2009 SOL	2016 SOL
<p>K.9 The student will tell time to the hour, using analog and digital clocks. [Time to hour included in 1.9a]</p>	

Revisions:

- Telling time to the hour deleted from Kindergarten



2009 SOL	2016 SOL
<p>K.10 The student will compare two objects or events, using direct comparisons or nonstandard units of measure, according to one or more of the following attributes: length (longer, shorter), height (taller, shorter), weight (heavier, lighter), temperature (hotter, colder). Examples of nonstandard units include foot length, hand span, new pencil, paper clip, and block. [Use of non-standard units included in 1.10]</p>	<p>K.9 The student will compare two objects or events, using direct comparisons, according to one or more of the following attributes: length (longer, shorter), height (taller, shorter), weight (heavier, lighter), temperature (hotter, colder), volume (more, less), and time (longer, shorter).</p>

Revisions:

- Direct comparisons of volume and time are additions to expectations in measurement
- Non-standard units deleted in Kindergarten; remain a part of grade one



2009 SOL	2016 SOL
<p>K.11 The student will</p> <ul style="list-style-type: none">a) identify, describe, and trace plane geometric figures (circle, triangle, square, and rectangle); andb) compare the size (larger, smaller) and shape of plane geometric figures (circle, triangle, square, and rectangle). <p>[Moved to K.10ab]</p> <p>K.12 The student will describe the location of one object relative to another (above, below, next to) and identify representations of plane geometric figures (circle, triangle, square, and rectangle) regardless of their positions and orientations in space. [Moved to K.10c]</p>	<p>K.10 The student will</p> <ul style="list-style-type: none">a) identify and describe plane figures (circle, triangle, square, and rectangle);b) compare the size (smaller, larger) and shape of plane figures (circle, triangle, square, and rectangle); andc) describe the location of one object relative to another (above, below, next to) and identify representations of plane figures (circle, triangle, square, and rectangle) regardless of their positions and orientations in space.

Revisions:

- K.11 and K.12 became new K.10
- Deleted tracing of figures in Kindergarten



PROBABILITY AND STATISTICS





2009 SOL	2016 SOL
<p>K.13 The student will gather data by counting and tallying. [Tallying included in 1.14a]</p> <p>K.14 The student will display gathered data in object graphs, picture graphs, and tables, and will answer questions related to the data. [Moved to K.11b]</p>	<p>K.11 The student will</p> <p>a) collect, organize, and represent data; and</p> <p>b) read and interpret data in object graphs, picture graphs, and tables. [Moved from K.14]</p>

Revisions:

- Deleted tallying to collect data; content remains in grade one
- K.11b – EKS bullets provide additional clarification – data points collected by students limited 16 or fewer with no more than four categories represented



PATTERNS, FUNCTIONS, AND ALGEBRA





2009 SOL	2016 SOL
K.15 The student will sort and classify objects according to attributes.	K.12 The student will sort and classify objects according to one attribute.

Revisions:

- **Sorting and classifying limited to one attribute in Kindergarten**



2009 SOL	2016 SOL
K.16 The student will identify, describe, and extend repeating patterns.	K.13 The student will identify, describe, extend, create, and transfer repeating patterns.

Revisions:

- Create and transfer added to SOL - creating repeating patterns was included in the 2009 EKS
- New – transfer a repeating pattern from one representation to another added to the EKS



Questions?
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