

**The Covenant School Mathematics Standards
Developed for Use Beginning 2006-07**

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INTRODUCTION

“The five Content Standards explicitly describe the five strands of content that students should learn. The five Process Standards highlight ways of acquiring and applying knowledge.”

~NCTM Executive Summary: Principles and Standards for School Mathematics

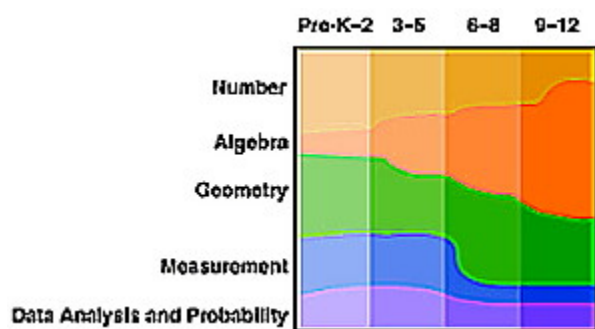
The Content Standards that follow were taken from the National Council of Teachers of Mathematics (NCTM) publication *Principles and Standards for School Mathematics* (2000). This publication organizes the standards into grade-bands e.g. Prekindergarten-Second grade. In contrast, this document is organized by individual grade-level. In order to break down the broad grade-bands into more specific individual grade-levels, each of the individual standards within a grade-band was analyzed using these four categories Introduced (I), Developed (D), Mastered (M), and Reviewed (R). For example, the following standard comes from the Prekindergarten-Second grade grade-band.

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) *Sort, classify, and order objects by size, number, and other properties*

This standard is introduced in Prekindergarten, developed in Kindergarten, mastered in First Grade, and reviewed in Second Grade.

These Content Standards can be described as the “what” in the mathematics curriculum. In other words, what are children learning during mathematics instruction in schools. This figure



is from the NCTM 2000 publication. It is a visual representation of the shifting emphasis with each grade band. Just as this figure shows a developmental sequence of content standards,

the following sections are have been organized into a developmental sequence of content beginning with Prekindergarten and ending with Sixth Grade.

If the Content Standards presented above are the “what” of student learning in mathematics, then the Process Standards that follow are the “How.” In other words, how do students both acquire and use the mathematical content knowledge described above? It is important to recognize that these process standards dictate the experiences student have with the Content Standards. These five Process Standards should be central to the daily instruction that takes place in the classroom.

In contrast to the Content Standards, the Process Standards have not been organized into a developmental sequence. Unlike content that changes as the students mature in their understanding of mathematical concepts, these processes of acquisition and application remain the same throughout the grade levels. Students who have mastered the content standards at their level should explore the process standards more deeply.

CONTENT STANDARDS

Pre-Kindergarten Content Standards (Grade Band: Prekindergarten-Second)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

(A) Count with understanding and recognize “how many” in sets of objects (I)

(B) Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections (I)
-Introduce and Develop an understanding of numbers 0-20
-Introduce Ordinal Numbers 1st, 2nd, and 3rd

(C) Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing and decomposing numbers (I)

(D) Understand and represent commonly used fractions such as $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ (I)
-Introduce and develop an understanding of $\frac{1}{2}$ only

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

(A) Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations (I)

(B) Understand the effects of adding and subtracting whole numbers (I)
-Facts to 12 (no more than 6 per addend)

(C) Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally (I)

1.3 Compute fluently and make reasonable estimates. Students should be able to:

(A) Develop and use strategies for whole-number computations, with a focus on addition and subtraction (I)

(B) Use a variety of methods and tools to compute, including objects, mental computations, estimation, paper and pencil and calculators (I)

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) *Sort, classify, and order objects by size, number, and other properties (I)*

(B) *Recognize, describe, and extend patterns such as sequence of sounds and shapes or simple numeric patterns and translate from one representation to another (I)*

(C) *Analyze how both repeating and growing patterns are generated (I)*

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

(A) *Use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations (I)*

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

(A) *Model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols (I)*
-Students should be required to solve word problems.

2.4 Analyze change in various contexts. Students should be able to:

(A) *Describe qualitative change, such as a student's growing taller (I)*

(B) *Describe quantitative change, such as a student's growing two inches in one year (I)*

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

(A) *Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (I)*

*-Two Dimensional Shapes: triangle, square, circle, rectangle, oval,
rhombus*

-Three Dimensional Shapes: cone, sphere, cube, pyramid

(B) *Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (I)*

(C) *Investigate and predict the results of putting together and taking apart two- and three-dimensional shapes (I)*

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

(A) *Describe, name, interpret relative positions in space and apply ideas about relative position (I)*

-Introduce: up/down, on/off, left/right, inside/outside, under/on top off

(B) *Describe, name, and interpret direction and distance in navigating space and apply ideas about direction and distance (I)*

(C) *Find and name locations with simple relationships such as “near to” and in coordinates systems such as maps (I)*

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

(A) *Recognize and apply slides, flips, and turns (I)*

(B) *Recognize and create shapes that have symmetry (I)*

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) *Create mental images of geometric shapes using spatial memory and spatial visualization. (I)*

(B) *Recognize and represent shapes from different perspectives (I)*

(C) *Recognize geometric shapes and structures in the environment and specify their location (I)*

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) *recognize the attributes of length, volume, weight, area, and time (I)*

(B) *compare and order objects according to these attributes (I)*

(C) *understand how to measure using nonstandard and standard units (I)*
-Nonstandard Units only in Prekindergarten

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

(A) *measure with multiple copies of units of the same size, such as paper clips laid end to end (I)*

(B) *use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick (I)*

(C) *use tools to measure (I)*

-Introduce the use of:

-Digital Clocks to measure time

-Thermometers to measure temperature

-Scales to measure weight

-Balances to measure mass

-Rulers to measure length

-Measuring Cups to measure volume

(D) *develop common referents for measures to make comparisons and estimates (I)*

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

(A) *pose questions and gather data about themselves and their surroundings (I)*

(B) *sort and classify objects according to their attributes and organize data about the objects (I)*

(C) *represent data using concrete objects, pictures, and graphs (I)*

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

(A) *describe parts of the data and the set of data as a whole to determine what the data show (I)*

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) *discuss events related to students' experiences as likely or unlikely (I)*

Kindergarten Content Standards
(Grade Band: Prekindergarten-Second)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

(A) *Count with understanding and recognize “how many” in sets of objects (D)*

(B) *Use multiple models to develop initial understandings of place value and the base-ten number system (I)*

-Master Ones place and Tens place

(C) *Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections (D)*

-Master Numbers up to 99

(D) *Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing and decomposing numbers (D) (pK-2)*

(E) *Connect number words and numerals to the quantities they represent, using various physical models and representations (I)*

(F) *Understand and represent commonly used fractions such as $1/4$, $1/3$, and $1/2$ (D)*

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

(A) *Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations (D)*

(B) *Understand the effects of adding and subtracting whole numbers (D)*
-Develop Addition/Subtraction facts to 18

(C) *Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally (D)*

1.3 Compute fluently and make reasonable estimates. Students should be able to:

(A) *Develop and use strategies for whole-number computations, with a focus on addition and subtraction (D)*

(B) *Develop fluency with basic number combinations for addition and subtraction (I)*

(C) *Use a variety of methods and tools to compute, including objects, mental computations, estimation, paper and pencil and calculators (D)*

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) *Sort, classify, and order objects by size, number, and other properties (D)*

(B) *Recognize, describe, and extend patterns such as sequence of sounds and shapes or simple numeric patterns and translate from one representation to another (D)*

(C) *Analyze how both repeating and growing patterns are generated (D)*

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

(A) *Illustrate general principles and properties of operations, such as commutativity, using specific numbers (I)*

(B) *Use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations (D)*

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

(A) *Model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols (D)*
-Students should be required to solve word problems.

2.4 Analyze change in various contexts. Students should be able to:

(A) *Describe qualitative change, such as a student's growing taller (D)*

(B) *Describe quantitative change, such as a student's growing two inches in one year (D)*

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

(A) *Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (D)*

-Two Dimensional Shapes: triangle, square, circle, rectangle, oval, rhombus

-Three Dimensional Shapes: cone, sphere, cube, pyramid

(B) Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (D)

(C) Investigate and predict the results of putting together and taking apart two- and three-dimensional shapes (D)

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

(A) Describe, name, interpret relative positions in space and apply ideas about relative position (D)

Develop: up/down, on/off, left/right, inside/outside, under/on top off

(B) Describe, name, and interpret direction and distance in navigating space and apply ideas about direction and distance (D)

(C) Find and name locations with simple relationships such as “near to” and in coordinates systems such as maps (D)

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

(A) Recognize and apply slides, flips, and turns (D)

(B) Recognize and create shapes that have symmetry (D)

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) Create mental images of geometric shapes using spatial memory and spatial visualization. (D)

(B) Recognize and represent shapes from different perspectives (D)

(C) Relate ideas in geometry to ideas in number and measurement (I)

(D) Recognize geometric shapes and structures in the environment and specify their location (D)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) recognize the attributes of length, volume, weight, area, and time (D)

(B) compare and order objects according to these attributes (D)

(C) understand how to measure using nonstandard and standard units (D)

(D) select an appropriate unit and tool for the attribute being measured. (I)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

(A) measure with multiple copies of units of the same size, such as paper clips laid end to end (D)

(B) use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick (D)

(C) use tools to measure (D)

-Develop the use of:

-Digital Clocks to measure time

-Thermometers to measure temperature

-Scales to measure weight

-Balances to measure mass

-Rulers to measure length

-Measuring Cups to measure volume

(D) develop common referents for measures to make comparisons and estimates (D)

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

(A) pose questions and gather data about themselves and their surroundings (D)

(B) sort and classify objects according to their attributes and organize data about the objects (D)

(C) represent data using concrete objects, pictures, and graphs (D)

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

(A) describe parts of the data and the set of data as a whole to determine what the data show. (D)

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) discuss events related to students' experiences as likely or unlikely (D)

First Grade Content Standards
(Grade Band: Prekindergarten-Second)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

(A) *Count with understanding and recognize “how many” in sets of objects (M)*

(B) *Use multiple models to develop initial understandings of place value and the base-ten number system (D)*

-Review One Place and Tens Place

-Master Hundreds Place

(C) *Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections (D)*

-Master Numbers up to 999

(D) *Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing and decomposing numbers (D)*

(E) *Connect number words and numerals to the quantities they represent, using various physical models and representations (D)*

(F) *Understand and represent commonly used fractions such as $1/4$, $1/3$, and $1/2$ (M)*

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

(A) *Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations (D)*

(B) *Understand the effects of adding and subtracting whole numbers (D)*

(C) *Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally (D)*

1.3 Compute fluently and make reasonable estimates. Students should be able to:

(A) *Develop and use strategies for whole-number computations, with a focus on addition and subtraction (D)*

-Master single digit addition and subtraction facts (sums to 18)

-Introduce Double-Digit Addition and Subtraction

(B) *Develop fluency with basic number combinations for addition and subtraction (M)*

-Students should be able to complete 100 single-digit addition and subtraction facts in 10 minutes by the end of first grade.

(C) *Use a variety of methods and tools to compute, including objects, mental computations, estimation, paper and pencil and calculators (D)*

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) *Sort, classify, and order objects by size, number, and other properties (M)*

(B) *Recognize, describe, and extend patterns such as sequence of sounds and shapes or simple numeric patterns and translate from one representation to another (D)*

(C) *Analyze how both repeating and growing patterns are generated (D)*

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

(A) *Illustrate general principles and properties of operations, such as commutativity, using specific numbers (D)*

(B) *Use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations (D)*

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

(A) *Model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols (M)*
-Students should be required to solve word problems

2.4 Analyze change in various contexts. Students should be able to:

(A) *Describe qualitative change, such as a student's growing taller (M)*

(B) *Describe quantitative change, such as a student's growing two inches in one year (D)*

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

(A) *Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (D)*

-Two Dimensional Shapes: triangle, square, circle, rectangle, oval, rhombus

-Three Dimensional Shapes: cone, sphere, cube, pyramid, triangular prism, rectangular prism

(B) *Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (D)*

(C) *Investigate and predict the results of putting together and taking apart two- and three-dimensional shapes (D)*

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

(A) *Describe, name, interpret relative positions in space and apply ideas about relative position (D)*

(B) *Describe, name, and interpret direction and distance in navigating space and apply ideas about direction and distance (D)*

(C) *Find and name locations with simple relationships such as “near to” and in coordinates systems such as maps (D)*

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

(A) *Recognize and apply slides, flips, and turns (D)*

(B) *Recognize and create shapes that have symmetry (M)*

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) *Create mental images of geometric shapes using spatial memory and spatial visualization. (D)*

(B) *Recognize and represent shapes from different perspectives (D)*

(C) Relate ideas in geometry to ideas in number and measurement (D)

(D) Recognize geometric shapes and structures in the environment and specify their location (D)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) recognize the attributes of length, volume, mass, weight, perimeter, area, and time (D)

(B) compare and order objects according to these attributes (D)

(C) understand how to measure using nonstandard and standard units (M)
-Standard Units: centimeter, meter, inch, foot, and yard

(D) select an appropriate unit and tool for the attribute being measured. (D)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

(A) measure with multiple copies of units of the same size, such as paper clips laid end to end (M)

(B) use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick (D)

(C) use tools to measure (D)

-Develop the use of:

-Digital Clocks to measure time

-Thermometers to measure temperature

-Scales to measure weight

-Balances to measure mass

-Rulers to measure length

-Measuring Cups to measure volume

-Introduce Analog Clocks to measure time

-Introduce measures of volume: cup, pint, quart, gallon

(D) develop common referents for measures to make comparisons and estimates (D)

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

(A) pose questions and gather data about themselves and their surroundings (M)

(B) sort and classify objects according to their attributes and organize data about the objects (M)

(C) represent data using concrete objects, pictures, and graphs (D)

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

(A) describe parts of the data and the set of data as a whole to determine what the data show. (D)

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) discuss events related to students' experiences as likely or unlikely (D)

Second Grade Content Standards
(Grade Band: Prekindergarten-Second)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

(A) Count with understanding and recognize “how many” in sets of objects (R)

(B) Use multiple models to develop initial understandings of place value and the base-ten number system (M)

(C) Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections (M)
--Master Numbers up to 9999

(D) Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing and decomposing numbers (M)

(E) Connect number words and numerals to the quantities they represent, using various physical models and representations (M)

(F) Understand and represent commonly used fractions such as $1/4$, $1/3$, and $1/2$ (D)

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

(A) Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations (M)

(B) Understand the effects of adding and subtracting whole numbers (M)

(C) Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally (M)
--Pictorially

1.3 Compute fluently and make reasonable estimates. Students should be able to:

(A) Develop and use strategies for whole-number computations, with a focus on addition and subtraction (M)
-- Review single digit addition and subtraction facts (sums to 18)
--Master double digit addition and subtraction facts

(B) Develop fluency with basic number combinations for addition and subtraction (R)

(C) Use a variety of methods and tools to compute, including objects, mental computations, estimation, paper and pencil and calculator skills (M)

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) Sort, classify, and order objects by size, number, and other properties (R)

(B) Recognize, describe, and extend patterns such as sequence of sounds and shapes or simple numeric patterns and translate from one representation to another (M)

(C) Analyze how both repeating and growing patterns are generated (M)

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

(A) Illustrate general principles and properties of operations, such as commutativity, using specific numbers (M)
--Vocabulary: Commutative Property

(B) Use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations (M)

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

(A) Model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols (M)

2.4 Analyze change in various contexts. Students should be able to:

(A) Describe qualitative change, such as a student's growing taller (R)

(B) Describe quantitative change, such as a student's growing two inches in one year (M)

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

(A) Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (M)

(B) Recognize, name, build, draw, compare, and sort two- and three-dimensional shapes (M)

(C) Investigate and predict the results of putting together and taking apart two- and three-dimensional shapes (M)

-- Nets and Combinations of 3D shapes including cube, cylinder, cones, rectangles

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

(A) Describe, name, interpret relative positions in space and apply ideas about relative position (M)

(B) Describe, name, and interpret direction and distance in navigating space and apply ideas about direction and distance (M)

(C) Find and name locations with simple relationships such as “near to” and in coordinates systems such as maps (M)

-- Coordinate Grids

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

(A) Recognize and apply slides, flips, and turns (M)

(B) Recognize and create shapes that have symmetry (R)

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) Create mental images of geometric shapes using spatial memory and spatial visualization. (M)

(B) Recognize and represent shapes from different perspectives (M)

(C) Relate ideas in geometry to ideas in number and measurement (M)

(D) Recognize geometric shapes and structures in the environment and specify their location (M)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) recognize the attributes of length, volume, weight, area, and time (M)

(B) compare and order objects according to these attributes (M)

(C) understand how to measure using nonstandard and standard units (R)

(D) select an appropriate unit and tool for the attribute being measured. (M)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

(A) measure with multiple copies of units of the same size, such as paper clips laid end to end (R)

(B) use repetition of a single unit to measure something larger than the unit, for instance, measuring the length of a room with a single meterstick (M)

(C) use tools to measure (M)

(D) develop common referents for measures to make comparisons and estimates (M)

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

(A) pose questions and gather data about themselves and their surroundings (R)

(B) sort and classify objects according to their attributes and organize data about the objects (R)

(C) represent data using concrete objects, pictures, and graphs (M)

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

(A) describe parts of the data and the set of data as a whole to determine what the data show. (M)

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) discuss events related to students' experiences as likely or unlikely (M)

Third Grade Content Standards
(Grade Band: Third-Fifth)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

- (A) *understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals (I)*
- (B) *recognize equivalent representations for the same number and generate them by decomposing and composing numbers (I)*
- (C) *develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers (I)*
- (D) *use models, benchmarks, and equivalent forms to judge the size of fractions (I)*
- (E) *recognize and generate equivalent forms of commonly used fractions, decimals, and percents (I)*
- (F) *explore numbers less than 0 by extending the number line and through familiar applications (I)*
- (G) *describe classes of numbers according to characteristics such as the nature of their factors (I)*

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

- (A) *understand various meanings of multiplication and division (I)*
- (B) *understand the effects of multiplying and dividing whole numbers (I)*
- (C) *identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems (I)*
- (D) *understand and use properties of operations, such as the distributivity of multiplication over addition. (I)*

1.3 Compute fluently and make reasonable estimates. Students should be able to:

- (A) *develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30×50 (I)*

(B) develop fluency in adding, subtracting, multiplying, and dividing whole numbers (I)

(C) develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results (I)

(D) develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience (I)

(E) use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals (I)

(F) select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools (I)

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) describe, extend, and make generalizations about geometric and numeric patterns (I)

(B) represent and analyze patterns and functions, using words, tables, and graphs (I)

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

(A) identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers (I)
--Vocabulary Review: Comutative Property

(B) represent the idea of a variable as an unknown quantity using a letter or a symbol (I)

(C) express mathematical relationships using equations (I)

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

(A) model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions (I)

2.4 Analyze change in various contexts. Students should be able to:

(A) investigate how a change in one variable relates to a change in a second variable (I)

(B) identify and describe situations with constant or varying rates of change and compare them (I)

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

(A) identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes (I)

(B) classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids (I)

(C) investigate, describe, and reason about the results of subdividing, combining, and transforming shapes (I)

-- Nets and Combining 3D shapes

--Cube, cylinder, cone, rectangular prism, quadrilateral pyramid

(D) explore congruence and similarity (I)

(E) make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions (I)

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

(A) describe location and movement using common language and geometric vocabulary (I)

(B) make and use coordinate systems to specify locations and to describe paths (I)

(C) find the distance between points along horizontal and vertical lines of a coordinate system (I)

--Coordinate Grids

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

(A) predict and describe the results of sliding, flipping, and turning two-dimensional shapes (I)

(B) describe a motion or a series of motions that will show that two shapes are congruent (I)

(C) identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs (I)

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) build and draw geometric objects (I)

(B) create and describe mental images of objects, patterns, and paths (I)

(C) identify and build a three-dimensional object from two-dimensional representations of that object (I)

(D) identify and draw a two-dimensional representation of a three-dimensional object (I)

(E) use geometric models to solve problems in other areas of mathematics, such as number and measurement (I)

(F) recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life (I)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) understand such attributes as length, perimeter, area, mass, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute (I)

(B) understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems (D)

(C) carry out simple unit conversions, such as from centimeters to meters, within a system of measurement (I)

(D) understand that measurements are approximations and how differences in units affect precision (I)

(E) explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way (I)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

- (A) develop strategies for estimating the perimeters, areas, and volumes of irregular shapes (I)*
- (B) select and apply appropriate standard units and tools to measure length, area, volume, weight, time(to the minute), temperature, and the size of angles (I)*
- (C) select and use benchmarks to estimate measurements (I)*
- (D) develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms (I)*
- (E) develop strategies to determine the surface areas and volumes of rectangular solids (I)*

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

- (A) design investigations to address a question and consider how data-collection methods affect the nature of the data set (I)*
- (B) collect data using observations, surveys, and experiments (I)*
- (C) represent data using tables and graphs such as line plots, bar graphs, and line graphs (I)*
- (D) recognize the differences in representing categorical and numerical data (I)*

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

- (A) describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed (I)*
- (B) use measures of center, focusing on the median, and understand what each does and does not indicate about the data set (I)*
- (C) compare different representations of the same data and evaluate how well each representation shows important aspects of the data (I)*

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

- (A) propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions (I)*

5.4 Understand and apply basic concepts of probability

(A) describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible (I)

(B) predict the probability of outcomes of simple experiments and test the predictions (I)

(C) understand that the measure of the likelihood of an event can be represented by a number from 0 to 1 (I)

Fourth Grade Content Standards
(Grade Band: Third-Fifth)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

- (A) *understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals (D)*
- (B) *recognize equivalent representations for the same number and generate them by decomposing and composing numbers (D)*
- (C) *develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers (D)*
- (D) *use models, benchmarks, and equivalent forms to judge the size of fractions (D)*
- (E) *recognize and generate equivalent forms of commonly used fractions, decimals, and percents (D)*
- (F) *explore numbers less than 0 by extending the number line and through familiar applications (D)*
- (G) *describe classes of numbers according to characteristics such as the nature of their factors (D)*

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

- (A) *understand various meanings of multiplication and division (D)*
- (B) *understand the effects of multiplying and dividing whole numbers (D)*
- (C) *identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems (D)*
- (D) *understand and use properties of operations, such as the distributivity of multiplication over addition. (D)*

1.3 Compute fluently and make reasonable estimates. Students should be able to:

- (A) *develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30×50 (D)*
- (B) *develop fluency in adding, subtracting, multiplying, and dividing whole numbers (D) (3-5)*
- (C) *develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results (D)*
- (D) *develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience (D)*
- (E) *use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals (D)*
- (F) *select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools (D)*

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

- (A) *describe, extend, and make generalizations about geometric and numeric patterns (D)*
- (B) *represent and analyze patterns and functions, using words, tables, and graphs (D)*

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

- (A) *identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers (D)*
-- Vocabulary Review: Commutative Property
- (B) *represent the idea of a variable as an unknown quantity using a letter or a symbol (D)*
- (C) *express mathematical relationships using equations (D)*

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

- (A) *model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions (D)*

2.4 Analyze change in various contexts. Students should be able to:

- (A) *investigate how a change in one variable relates to a change in a second variable (D)*
- (B) *identify and describe situations with constant or varying rates of change and compare them (D)*

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

- (A) *identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes (D)*
- (B) *classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids (D)*
- (C) *investigate, describe, and reason about the results of subdividing, combining, and transforming shapes (D)*
 - Nets and Combinations of 3D shapes
 - cube, cylinder, rectangular prism, cone, quadrilateral, pyramid
- (D) *explore congruence and similarity (D)*
- (E) *make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions (D)*

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

- (A) *describe location and movement using common language and geometric vocabulary (D)*
- (B) *make and use coordinate systems to specify locations and to describe paths (D)*
- (C) *find the distance between points along horizontal and vertical lines of a coordinate system (D)*
 - Coordinate Grids

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

- (A) *predict and describe the results of sliding, flipping, and turning two-dimensional shapes (D)*

(B) describe a motion or a series of motions that will show that two shapes are congruent (D)

(C) identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs (D)

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) build and draw geometric objects (D)

(B) create and describe mental images of objects, patterns, and paths (D)

(C) identify and build a three-dimensional object from two-dimensional representations of that object (D)

(D) identify and draw a two-dimensional representation of a three-dimensional object (D)

(E) use geometric models to solve problems in other areas of mathematics, such as number and measurement (D)

(F) recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life (D)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute (D)

(B) understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems (M)

(C) carry out simple unit conversions, such as from centimeters to meters, within a system of measurement (D)

(D) understand that measurements are approximations and how differences in units affect precision (D)

(E) explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way (D)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

- (A) develop strategies for estimating the perimeters, areas, and volumes of irregular shapes (D)*
- (B) select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles (D)*
- (C) select and use benchmarks to estimate measurements (D)*
- (D) develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms (D)*
- (E) develop strategies to determine the surface areas and volumes of rectangular solids (D)*

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

- (A) design investigations to address a question and consider how data-collection methods affect the nature of the data set (D)*
- (B) collect data using observations, surveys, and experiments (D)*
- (C) represent data using tables and graphs such as line plots, bar graphs, and line graphs (D)*
- (D) recognize the differences in representing categorical and numerical data (D)*

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

- (A) describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed (D)*
- (B) use measures of center, focusing on the median, and understand what each does and does not indicate about the data set (D)*
- (C) compare different representations of the same data and evaluate how well each representation shows important aspects of the data (D)*

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions (D)

5.4 Understand and apply basic concepts of probability

(A) describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible (D)

(B) predict the probability of outcomes of simple experiments and test the predictions (D)

(C) understand that the measure of the likelihood of an event can be represented by a number from 0 to 1 (D)

Fifth Grade Content Standards
(Grade Band: Third-Fifth)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

(A) *understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals (M)*

(B) *recognize equivalent representations for the same number and generate them by decomposing and composing numbers (M)*

(C) *develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers (M)*

(D) *use models, benchmarks, and equivalent forms to judge the size of fractions (M)*

(E) *recognize and generate equivalent forms of commonly used fractions, decimals, and percents (M)*

(F) *explore numbers less than 0 by extending the number line and through familiar applications (M)*

(G) *describe classes of numbers according to characteristics such as the nature of their factors (M)*

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

(A) *understand various meanings of multiplication and division (M)*

(B) *understand the effects of multiplying and dividing whole numbers (M)*

(C) *identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems (M)*

(D) *understand and use properties of operations, such as the distributivity of multiplication over addition. (M)*

1.3 Compute fluently and make reasonable estimates. Students should be able to:

- (A) *develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30×50 (M)*
- (B) *develop fluency in adding, subtracting, multiplying, and dividing whole numbers (M)*
- (C) *develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results (M)*
- (D) *develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience (M)*
- (E) *use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals (M)*
- (F) *select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools (M)*

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

- (A) *describe, extend, and make generalizations about geometric and numeric patterns (M)*
- (B) *represent and analyze patterns and functions, using words, tables, and graphs (M)*

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

- (A) *identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers (M)*
- (B) *represent the idea of a variable as an unknown quantity using a letter or a symbol (M)*
- (C) *express mathematical relationships using equations (M)*

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

- (A) *model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions (M)*

2.4 Analyze change in various contexts. Students should be able to:

- (A) *investigate how a change in one variable relates to a change in a second variable (M)*
- (B) *identify and describe situations with constant or varying rates of change and compare them (M)*

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

- (A) *identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes (M)*
- (B) *classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids (M)*
- (C) *investigate, describe, and reason about the results of subdividing, combining, and transforming shapes (M)*
- (D) *explore congruence and similarity (M)*
- (E) *make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions (M)*

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

- (A) *describe location and movement using common language and geometric vocabulary (M)*
- (B) *make and use coordinate systems to specify locations and to describe paths (M)*
- (C) *find the distance between points along horizontal and vertical lines of a coordinate system (M)*

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

- (A) *predict and describe the results of sliding, flipping, and turning two-dimensional shapes (M)*

(B) describe a motion or a series of motions that will show that two shapes are congruent (M)

(C) identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs (M)

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) build and draw geometric objects (M)

(B) create and describe mental images of objects, patterns, and paths (M)

(C) identify and build a three-dimensional object from two-dimensional representations of that object (M)

(D) identify and draw a two-dimensional representation of a three-dimensional object (M)

(E) use geometric models to solve problems in other areas of mathematics, such as number and measurement (M)

(F) recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life (M)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute (M)

(B) understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems (R)

(C) carry out simple unit conversions, such as from centimeters to meters, within a system of measurement (M)

(D) understand that measurements are approximations and how differences in units affect precision (M)

(E) explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way (M)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

- (A) develop strategies for estimating the perimeters, areas, and volumes of irregular shapes (M)*
- (B) select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles (M)*
- (C) select and use benchmarks to estimate measurements (M)*
- (D) develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms (M)*
- (E) develop strategies to determine the surface areas and volumes of rectangular solids (M)*

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

- (A) design investigations to address a question and consider how data-collection methods affect the nature of the data set (M)*
- (B) collect data using observations, surveys, and experiments (M)*
- (C) represent data using tables and graphs such as line plots, bar graphs, and line graphs (M)*
- (D) recognize the differences in representing categorical and numerical data (M)*

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

- (A) describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed (M)*
- (B) use measures of center, focusing on the median, and understand what each does and does not indicate about the data set (M)*
- (C) compare different representations of the same data and evaluate how well each representation shows important aspects of the data (M)*

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions (M)

5.4 Understand and apply basic concepts of probability

(A) describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible (M)

(B) predict the probability of outcomes of simple experiments and test the predictions (D)

(C) understand that the measure of the likelihood of an event can be represented by a number from 0 to 1 (M)

Sixth Grade Content Standards
(Grade Band Sixth-Eighth)

(1) Number and Operation

1.1 Understand numbers, ways of representing numbers, relationships among numbers, and number systems. Students should be able to:

- (A) work flexibly with fractions, decimals, and percents to solve problems (I)*
- (B) compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line (I)*
- (C) develop meaning for percents greater than 100 and less than 1 (I)*
- (D) understand and use ratios and proportions to represent quantitative relationships (I)*
- (E) develop an understanding of large numbers and recognize and appropriately use exponential, scientific, and calculator notation (I)*
- (F) use factors, multiples, prime factorization, and relatively prime numbers to solve problems (I)*
- (G) develop meaning for integers and represent and compare quantities with them (I)*

1.2 Understand meanings of operations and how they relate to one another. Students should be able to:

- (A) understand the meaning and effects of arithmetic operations with fractions, decimals, and integers (I)*
- (B) use the associative and commutative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals (I)*
- (C) understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems (I)*

1.3 Compute fluently and make reasonable estimates. Students should be able to:

- (A) select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods (I)*

(B) develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use (I)

(C) develop and use strategies to estimate the results of rational-number computations and judge the reasonableness of the results (I)

(D) develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios (I)

(2) Algebra

2.1 Understand patterns, relations, and functions. Students should be able to:

(A) represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules (I)

(B) relate and compare different forms of representation for a relationship (I)

(C) identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations (I)

2.2 Represent and analyze mathematical situations and structures using algebraic symbols. Students should be able to:

(A) develop an initial conceptual understanding of different uses of variables (I)

(B) explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope (I)

(C) use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships (I)

(D) recognize and generate equivalent forms for simple algebraic expressions and solve linear equations (I)

2.3 Use mathematical models to represent and understand quantitative relationships. Students should be able to:

(A) model and solve contextualized problems using various representations, such as graphs, tables, and equations (I)

2.4 Analyze change in various contexts. Students should be able to:

(A) use graphs to analyze the nature of changes in quantities in linear relationships (I)

(3) Geometry

3.1 Analyze characteristics and properties of two- and three- dimensional geometric shapes and develop mathematical arguments about geometric relationships. Students should be able to:

(A) *precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties (I)*

(B) *understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects (I)*

(C) *create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship (I)*

3.2 Specify locations and describe spatial relationships using coordinate geometry and other representational systems. Students should be able to:

(A) *use coordinate geometry to represent and examine the properties of geometric shapes (I)*

(B) *use coordinate geometry to examine special geometric shapes, such as regular polygons or those with pairs of parallel or perpendicular sides (I)*

3.3 Apply transformations and use symmetry to analyze mathematical situations. Students should be able to:

(A) *describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling (I)*

(B) *examine the congruence, similarity, and line or rotational symmetry of objects using transformations (I)*

3.4 Use visualization, spatial reasoning, and geometric modeling to solve problems. Students should be able to:

(A) *draw geometric objects with specified properties, such as side lengths or angle measures (I)*

(B) *use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume (I)*

(C) *use visual tools such as networks to represent and solve problems (I)*

(D) *use geometric models to represent and explain numerical and algebraic relationships (I)*

(E) recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life (I)

(4) Measurement

4.1 Understand measurable attributes of objects and the units, systems, and processes of measurement. Students should be able to:

(A) understand both metric and customary systems of measurement (I)

(B) understand relationships among units and convert from one unit to another within the same system (I)

(C) understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume (I)

4.2 Apply appropriate techniques, tools, and formulas to determine measurements. Students should be able to:

(A) use common benchmarks to select appropriate methods for estimating measurements (I)

(B) select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision (I)

(C) develop and use formulas to determine the circumference of circles and the area of triangles, parallelograms, trapezoids, and circles and develop strategies to find the area of more-complex shapes (I)

(D) develop strategies to determine the surface area and volume of selected prisms, pyramids, and cylinders (I)

(E) solve problems involving scale factors, using ratio and proportion (I)

(F) solve simple problems involving rates and derived measurements for such attributes as velocity and density (I)

(5) Data Analysis and Probability

5.1 Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them. Students should be able to:

(A) formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population (I)

(B) select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatterplots (I)

5.2 Select and use appropriate statistical methods to analyze data. Students should be able to:

(A) find, use, and interpret measures of center and spread, including mean and interquartile range (I)

(B) discuss and understand the correspondence between data sets and their graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatterplots (I)

5.3 Develop and evaluate inferences and predictions that are based on data. Students should be able to:

(A) use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken (I)

(B) make conjectures about possible relationships between two characteristics of a sample on the basis of scatterplots of the data and approximate lines of fit (I)

(C) use conjectures to formulate new questions and plan new studies to answer them (I)

5.4 Understand and apply basic concepts of probability

(A) understand and use appropriate terminology to describe complementary and mutually exclusive events (I)

(B) use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations (I)

(C) compute probabilities for simple compound events, using such methods as organized lists, tree diagrams, and area models (I)

PROCESS STANDARDS

(6) Problem Solving

Instructional programs from prekindergarten through grade 6 should enable all students to:

- (A) build new mathematical knowledge through problem solving;*
- (B) solve problems that arise in mathematics and in other contexts;*
- (C) apply and adapt a variety of appropriate strategies to solve problems;*
- (D) monitor and reflect on the process of mathematical problem solving.*

(7) Reasoning and Proof

Instructional programs from prekindergarten through grade 6 should enable all students to:

- (A) recognize reasoning and proof as fundamental aspects of mathematics;*
- (B) make and investigate mathematical conjectures*
- (C) develop and evaluate mathematical arguments and proofs;*
- (D) select and use various types of reasoning and methods of proof.*

(8) Communication

Instructional programs from prekindergarten through grade 6 should enable all students to:

- (A) organize and consolidate their mathematical thinking through communication;*
- (B) communicate their mathematical thinking coherently and clearly to peers, teachers, and others;*
- (C) analyze and evaluate the mathematical thinking and strategies of others;*
- (D) use the language of mathematics to express mathematical ideas precisely.*

(9) Connections

Instructional programs from prekindergarten through grade 6 should enable all students to:

- (A) recognize and use connections among mathematical ideas;*
- (B) understand how mathematical ideas interconnect and build on one another to produce a coherent whole;*
- (C) recognize and apply mathematics in contexts outside of mathematics.*

(10) Representation

Instructional programs from prekindergarten through grade 6 should enable all students to:

- (A) create and use representations to organize, record, and communicate mathematical ideas;*
- (B) select, apply, and translate among mathematical representations to solve problems;*
- (C) use representations to model and interpret physical, social, and mathematical phenomena.*

The Covenant School Math Curriculum Expectations

I=Introduce D=Develop M=Master

Number and Operation- PreK-2	PreK	K	1st	2nd	Grades 3-5	3rd	4th	5th
1.1 Count with understanding and recognize “how many” in sets of objects					1.1 Understand the place-value structure of the base-ten number system			
1.2 Use multiple models to develop initial understandings of place value and the base-ten number system					1.2 Recognize equivalent representations for the same number and generate them by decomposing and composing numbers			
1.3 Develop understanding of the relative position and magnitude of whole numbers and of ordinal and cardinal numbers and their connections					1.3			
1.4 Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing and decomposing numbers					1.4			
1.5 Connect number words and numerals to the quantities they represent, using various physical models and representations					1.5			
1.6 Understand and represent commonly used fractions such as $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$					1.6			
1.7 Understand various meanings of addition and subtraction of whole numbers and the relationship between the two operations					1.7			
1.8 Understand the effects of adding and subtracting whole numbers					1.8			
1.9 Understand situations that entail multiplication					1.9			

and division, such as equal groupings of objects and sharing equally								
1.10 Develop and use strategies for whole-number computations, with a focus on addition and subtraction					1.10			
1.11 Develop fluency with basic number combinations for addition and subtraction					1.11			
1.12 Use a variety of methods and tools to compute, including objects, mental computations, estimation, paper and pencil and calculators					1.12			

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Con't Number and Operations Grades 3-5	3rd	4th	5th	Number and Operation-Grades 6	6th
1.13 Understand the place-value structure of the base-ten number system				1.1 Work flexibly with fractions, decimals, and percents to solve problems	
1.14 Recognize equivalent representations for the same number and generate them by decomposing and composing numbers				1.2 Compare and order fractions, decimals, and percents efficiently and find their approximate locations on a number line	
1.15				1.3	
1.16				1.4	
1.17				1.5	
				1.6	
				1.7	
				1.8	
				1.9	
				1.10	
				1.11	
				1.12	