Grace Lutheran School Math Curriculum

Rationale based on Scripture

God is the Creator of all things, including Math. Our school is committed to providing students with a quality education in math so they can function effectively as Christians in their church, community, and country. A quality education in Math will help students succeed in high school, in the work place, and help them witness to friends, neighbors, and co-workers about our Savior.

Exit goals for graduation

Students will demonstrate proficiency, understanding, and/or commitment to the following set of exit goals upon graduation. The level of proficiency of these exit goals will be dependent upon the individual gifts and effort of the student and at what grade the student started attending Grace.

- Demonstrate a positive attitude toward Math.
- Able to do mental multiplication.
- Compute fractions in all four math operations.
- Solve ratios and proportions.
- Evaluate variable expressions and polynomials.
- Evaluate exponents.
- Know basic geometry formulas.
- Solve simple probability and statistics problems.
- Graph and locate points on coordinate planes.
- Factor prime and composite numbers.
- Solve percent computation problems.
- Perform operations on positive and negative integers.
- Know and practice order of operations.
- Understand points, lines, planes, and geometric figures.

Grade specific measureable objectives

At the end of each school year, students will demonstrate proficiency, understanding, and/or commitment to the following set of grade specific measureable objectives in these classifications: knowledge, skills, and attitudes.

The level of proficiency of these measureable objectives will be dependent upon the individual gifts and effort of the student and at what time of year the student started attending Grace.

Performance Objectives- Kindergarten

Numbers and Operations

By the end of **kindergarten,** students are expected to:

- count by 1's, 2's, 5's, and 10's
- count backwards
- match sets and numbers
- identify, read, and write numbers to 30
- order one-and two-digit numbers
- identify equivalent sets
- compare sets of objects
- compare numbers through 20
- identify greatest and least
- identify more, same, and less
- identify numbers on a hundred number chart
- identify numbers before, after, and between
- estimate and count collections of objects to 100
- identify even and odd numbers
- identify ordinal position
- act out addition and subtraction story problems
- find addition and subtraction answers using pictures
- combine sets by counting on
- count forward and backward on a number line
- identify one more than a number
- identify one less than a number
- identify doubles
- divide a set of objects into equal groups
- identify one half and one fourth
- divide a shape in half
- identify and count pennies
- identify and count dimes
- identify and count nickels
- identify quarters
- identify one-dollar bills
- write money amounts using cent symbol
- select coins for a given amount

Measurement

By the end of **kindergarten,** students are expected to:

- identify today's date
- identify yesterday, today, and tomorrow
- identify days of the week and months of the year
- identify seasons
- identify morning, afternoon, evening, and night
- tell and show time to the hour

- identify which of two events takes more or less time
- identify hot and cold objects
- compare and order objects by length
- estimate and measure length using nonstandard units
- estimate and measure distance using nonstandard units
- measure length using standard units (inches)
- order objects by height
- use indirect comparisons to compare the height or length of objects
- compare and order objects by weight
- weigh objects using nonstandard units
- compare the capacity of containers
- measure capacity using nonstandard units
- identify and use a one-cup measuring cup
- identify quarts
- follow a recipe and measures
- compare and order objects by size

Geometry

By the end kindergarten**,** students are expected to:

- identify, sort, and compare geometric shapes
- identify, sort, and compare common geometric solids
- make and cover designs using pattern blocks
- make and copy design on a geoboard
- make and cover design using tangrams
- explore slides, turns, and flips (transformations)
- create congruent shapes and designs
- identify similar shapes
- identify a line of symmetry and create symmetrical designs
- use positional words and phrases
- identify right and left
- solve spatial problems

Algebra

By the end of **kindergarten,** students are expected to:

- identify, read, and extend color patterns
- identify, read, and extend shape patterns
- identify the missing shape in a matrix

- identify, extend, and create sound a movement patterns
- identify the missing number in a sequence
- know that a symbol can be used to stand for a missing number in a sequence

Statistics

By the end of **kindergarten,** students are expected to:

- sort objects and identify a sorting rule
- graph a picture on a pictograph
- make a real graph
- identify most, fewest, and same on a graph
- record data on a chart
- determine questions for a survey
- identify range and mode on a graph
- describe the likelihood of an event

Performance Objectives- Grade 1

Numbers and Operations

By the end of **grade one,** students are expected to:

- count by 1's, 2's, 5's, 10's, 100's
- count backwards
- match sets and numbers
- be able to count and group numbers in 10's and 1's
- use expanded form to represent numbers
- be able to write digits 0 through 9
- read and write whole numbers to 100
- identify numbers on hundred number chart
- identify numbers before, after, and between
- compare 1- and/or 2- digit whole numbers
- put in order 1- and/or 2- digit whole numbers
- write numbers using words
- identify place value for each digit in numbers to 100 and 1000
- represent 2 digit whole numbers using concrete materials and/or pictures
- estimate and count collections of objects
- identify equivalent sets
- represent equivalent forms of the same number
- rename numbers using regrouping

- compare sets of objects and identifies sets with more, less and the same
- identify sets with the greatest and least number of objects
- identify even and odd numbers
- understand dozen and half dozen
- identify pairs
- identify ordinal position
- identify rational numbers from pictures and draw pictures to show rational numbers
- locate rational numbers on a number line
- show the meaning of addition
- use manipulatives to model and solve addition problems
- use pictures to model and solve addition problems
- write number sentences to show addition
- identify the addends and sums
- identify and use the commutative and associative properties of addition
- show the meaning of subtraction
- use manipulatives to model and solve subtraction problems
- use pictures to model and solve subtraction problems
- write number sentences to show subtraction
- show the meaning of multiplication
- use manipulatives to model and solve multiplication problems
- use pictures to model and solve multiplication problems
- use manipulatives to model and solve division problems
- use concrete objects or pictures to add single digit numbers
- masters addition facts to 18
- identify missing addends
- identify one more than a number
- identify ten more than a number
- estimate a sum
- add using mental computation
- add three or more single-digit numbers
- add 2-digit numbers without regrouping
- add two 2- or 3- digit numbers
- use concrete objects or pictures to subtract single-digit numbers
- master subtraction facts with minends to 10
- master subtraction facts with minends to 11 to 18
- identify one less than a number
- identify ten less than a number
- subtract 2-digit numbers without regrouping
- check subtraction answers using addition
- identify one half and/or one fourth of a whole
- identify a fractional part of a whole
- write a fraction to show a part of a whole
- find half of a set of objects
- identify a fractional part of a set
- identify and count pennies
- identify and count dimes

- identify and count nickels
- identify and/or count quarters
- identify one-dollar bills
- find the value of a set of coins
- select coins for a given amount
- read and write money amounts to $1.00

Measurement

By the end of **grade one,** students are expected to:

- identify today's date
- identify yesterday, today and tomorrow
- understands morning, afternoon, evening, and night
- identify days of the week and/or months of the year
- identify dates on a calendar
- identify seasons
- tell and show time to the hour
- tell and show time to the half hour
- identify which of two events takes more or less time
- order events by time
- identify cold, cool, warm, and/or hot
- read a Fahrenheit thermometer
- estimate length or distance
- compare the length or height of objects
- order objects by length or height
- measure length or distance using nonstandard units
- measure length using customary units (inch, foot, and yard)
- draw line segments using customary units (inch)
- measure length using metric units (centimeter, millimeter, and meter)
- draw line segments using metric units (centimeter, and millimeter)
- compare and order objects by weight (mass)
- estimate weight (mass)
- weigh objects using nonstandard units
- estimate capacity
- identify and uses measuring cups
- compare and/or order containers by capacity
- identify customary and/or metric units of capacity
- measure capacity
- follow a recipe and measure

Geometry

By the end of **grade one,** students are expected to:

- identify right and left
- use positional words and phrases
- identify first, last, between, and middle
- make and cover designs with pattern blocks or tangrams
- make and copy designs on a geoboard
- create, identify and/or draw congruent shapes, designs and/or line segments
- identify, describe, sort and/or compare geometric shapes
- identify angles and sides
- identify, describe, sort, compare and/or construct geometric solids

Patterns, Algebra and Functions

By the end of **grade one,** students are expected to:

- identify, read, and extend patterns
- identify the missing shape, or design in a repeating pattern
- identify the missing number in a sequence
- use comparison symbols (<, > and =)
- represent an unknown using a symbol
- write and solve a number sentence for a problem involving addition or subtraction
- create problems for addition and subtraction number sentences

Statistics, Data Analysis and Probability

By the end of **grade one,** students are expected to:

- sort and classify objects
- identify a sorting rule
- tally
- make a real graph
- graph a picture on a pictograph
- identify most, fewest and/or same on a graph
- draw and read a bar graph
- write observations about a graph
- describe the likelihood of an event
- predict the outcome of a probability experiment
- conduct a probability experiment

Problem Solving

By the end of **grade one,** students are expected to:

- classify and categorize
- look for a pattern
- identify important and unimportant information
- act out a problem or make a model
- draw a picture
- make guesses, check and revise ideas
- be able to use logical reasoning in problem solving
- write a number sentence

Communication

By the end of **grade one,** students are expected to:

- question and respond
- work with partners or in groups
- write about math

Mathematical Reasoning

By the end of **grade one,** students are expected to:

- recognize patterns
- classify and sort
- solve spatial problems
- estimate
- explain an answer

Connections

By the end of **grade one,** students are expected to:

- connect math to everyday life
- connect math to science

Performance Objectives- Grade 2

Numbers and Operations

By the end of **grade two,** students are expected to:

- count by 1's, 2's, 3's, 5's, 10's, 25's, 100's
- count backwards
- be able to count and group numbers in 10's and 1's
- use expanded form to represent numbers
- read and write whole numbers to 30
- read and write whole numbers to 100 (2-digit numbers above 30)
- read and write whole numbers to 1000 (3-digit numbers)
- identify numbers on a hundred number chart
- compare 1- and/or 2- digit whole numbers
- compare 3-digit or larger whole numbers
- put in order 1- and/or 2- digit whole numbers
- put in order 3-digit or larger whole numbers
- round numbers to the nearest 10
- identify place value for each digit in numbers to 100 and 1000
- represent 2-digit whole numbers using concrete materials and/or pictures
- represent 3-digit whole numbers using concrete materials and/or pictures
- estimate and count collections of objects
- represent equivalent forms of the same number
- rename numbers using regrouping
- compare sets of objects and identifies sets with more, less and the same
- identify sets with the greatest and least number of objects
- identify even and odd numbers
- identify dozen and half dozen
- identify pairs
- identify ordinal position
- identify multiples of a number
- identify factors of a number
- identify rational numbers from pictures and draw pictures to show rational numbers
- locate rational numbers on a number line
- show the meaning of addition
- use manipulatives to model and solve addition problems
- use pictures to model and solve addition problems
- write number sentences to show addition
- identify the addends and sums
- identify and use the commutative and associative properties of addition
- show the meaning of subtraction
- use pictures to model and solve subtraction problems
- write number sentences to show subtraction
- write addition and subtraction fact families
- show the meaning of multiplication
- use manipulatives to model and solve multiplication problems
- use pictures to model and solve multiplication problems
- write number sentences to show multiplication

- identify factors and products
- make, label, and write number sentences for an array
- show the meaning of division
- use manipulatives to model and solve division problems
- write number sentence to show division
- identify the properties of zero or one in multiplication and/or division
- masters addition facts to 18
- identify missing addends
- identify one more than a number
- identify ten more than a number
- estimate a sum
- add using mental computation
- add three or more single-digit numbers
- add 2-digit numbers without regrouping
- add two 2- or 3- digit numbers
- add three or more multi-digit numbers
- use estimation to check the reasonableness of calculated results
- master subtraction facts with minuends to 10
- master subtraction facts with minuends to 11 to 18
- identify one less than a number
- identify ten less than a number
- estimate a difference
- subtract using mental computation
- subtract 2- or 3- digit numbers
- check subtraction answers using addition
- master multiplying by 0, 1, 2, 3, 4, and 5
- multiplies by 10, 100, 1000 and/or 10,000
- identify one half and/or one fourth of a whole
- identify a fractional part of a whole
- write a fraction to show a part of a whole
- find half of a set of objects
- identify a fractional part of a set
- write a fraction to show a part of a set
- identify equivalent fractions
- compare fractions
- represent and write mixed numbers
- add money amounts (decimals)
- subtract money amounts (decimals)
- identify and count pennies
- identify and count dimes
- identify and count nickels
- identify and/or count quarters
- find the value of a set of coins
- select coins for a given amount
- make change from $1.00, $5.00, and/or $10.00
- read and write money amounts to $1.00

- read and write money amounts to $10.00

Measurement

By the end of **grade two,** students are expected to:

- identify today's date
- write the date using digits
- identify yesterday, today and tomorrow
- understands morning, afternoon, evening, and night
- identify a.m., p.m., noon and midnight
- identify days of the week and/or months of the year
- identify weekdays, and days of the weekend
- identify dates on a calendar
- tell and show time to the hour
- tell and show time to the half hour
- tell and show time to the five minute interval and/or minute
- tell and show time to the quarter hour
- identify equivalent units of time
- find elapsed time
- identify cold, cool, warm, and/or hot
- read a Fahrenheit thermometer
- identify common temperatures
- estimate length or distance
- compare the length or height of objects
- order objects by length or height
- measure length or distance using nonstandard units
- measure length using customary units (inch, foot, and yard)
- draw line segments using customary units (inch)
- measure length using metric units (centimeter, millimeter, and meter)
- draw line segments using metric units (centimeter, and millimeter)
- compare and order objects by weight (mass)
- estimate weight (mass)
- weigh objects using nonstandard units
- identify units of mass
- weigh objects using customary or metric units
- estimate capacity
- identify and uses measuring cups
- compare and/or order containers by capacity
- identify customary and/or metric units of capacity
- measure capacity
- follow a recipe and measure
- compare and order objects by size (area)

- find area using nonstandard units
- estimate area
- find area of a rectangle
- find perimeter of a polygon

Geometry

By the end of **grade two,** are expected to:

- identify right and left
- use positional words and phrases
- identify first, last, between, and middle
- make and cover designs with pattern blocks or tangrams
- make and copy designs on a geoboard
- create, identify and/or draw congruent shapes, designs and/or line segments
- identify and/or create similar shapes
- identify, describe, sort and/or compare geometric shapes
- identify angles and sides
- identify, describe, and classify polygons
- identify horizontal, vertical, and oblique line segments
- identify parallel lines and line segments
- identify intersecting and perpendicular lines and line segments
- identify right angles
- identify, describe, sort, compare and/or construct geometric solids
- identify and draw a line of symmetry and/or create symmetrical designs
- explores, identifies, and/or shows transformations: translations, rotations, and reflections

Patterns, Algebra and Functions

By the end of **grade two,** students are expected to:

- identify, read, and extend patterns
- identify the missing shape, or design in a repeating pattern
- identify the missing number in a sequence
- construct a number line and/or locate points on a number line
- locate and graph points on a coordinate graph
- use comparison symbols (<, > and =)
- represent an unknown using a symbol
- write and solve a number sentence for a problem involving addition or subtraction
- create problems for addition and subtraction number sentences
- write and solve a number sentence for a problem involving multiplication or division

Statistics, Data Analysis and Probability

By the end of **grade two,** students are expected to:

- sort and classify objects
- identify a sorting rule
- tally
- determine questions for a survey
- conduct a survey and/or records data
- graph a picture on a pictograph
- identify most, fewest and/or same on a graph
- draw and read a pictograph
- draw and read a bar graph
- draw and read a bar graph with a scale greater than one
- draw and read a line graph
- create and read a Venn diagram
- write observations about a graph
- describe the likelihood of an event
- predict the outcome of a probability experiment

Problem Solving

By the end of **grade two,** students are expected to:

- classify and categorize
- look for a pattern
- make predictions
- identify important and unimportant information
- act out a problem or make a model
- draw a picture
- make guesses, check and revise ideas
- be able to use logical reasoning in problem solving
- write a number sentence
- substitute simpler numbers

Communication

By the end of **grade two,** students are expected to:

- question and respond
- work with partners or in groups
- write about math

Mathematical Reasoning

By the end of **grade two,** students are expected to:

- recognize patterns
- classify and sort
- solve spatial problems
- estimate
- explain an answer

Connections

By the end of **grade two,** students are expected to:

- connect math to everyday life
- connect math to science

Performance Objectives- Grade 3

Numbers and Operations

By the end of **grade three,** students are expected to:

- read and write numbers through the millions' place
- understand place value through the millions' place
- construct number lines
- understand expanded notation
- count forwards and backwards by 1's-12's, 25's, 100's, 1000's, ½'s, and ¼'s
- group numbers by tens
- write numbers using words
- identify numbers on a hundred number chart
- compare and order 1, 2 or 3-digit whole numbers
- round numbers to the nearest ten, hundred or thousand

- represents 2 and 3-digit whole numbers using concrete materials and/or pictures
- represent equivalent forms of the same number
- compare sets of objects and identifies sets with more, less and the same
- identify sets with the greatest and least number of objects
- identify even and odd numbers
- understand dozen and half dozen
- group pairs
- identify ordinal position
- identify multiples and factors of a number
- understand prime and composite numbers
- identify perfect squares
- find square roots of perfect squares
- identify rational numbers from pictures and draw pictures to show rational numbers
- locate rational numbers on a number line
- read and write Roman numerals
- estimate and count collections of objects
- identify the addends, sums, factors and products
- identify quotients, dividends and/or divisors
- add, subtract, multiply and divide whole numbers
- understand regrouping
- use pictures to model and solve addition, subtraction, multiplication and division problems
- write number sentences to show addition, subtraction, multiplication and division
- identify and use the commutative and associative properties of addition and multiplication
- write addition, subtraction, multiplication and division fact families
- use manipulatives to model and solve multiplication and division problems
- make, label and write number sentences for an array
- identify the properties of 0 or 1 in multiplication and/or division problems
- master addition facts to 18
- identify missing addends
- identify one more/less and ten more/less than a number
- estimate a sum and difference
- add three or more single-digit numbers
- add, subtract and multiply using mental computation
- add and subtract 2-digit numbers without regrouping
- add and subtract 2- or 3-digit numbers
- use estimation to check the reasonableness of calculated results
- add three of more multi-digit numbers
- master subtraction facts with minuends of 10 to 18
- check subtraction answers using addition
- master multiplying by 0-10, 100, 1000 and/or 10,000
- multiply by multiples of 10, 100, 1000 and/or 10,000
- multiply a 2- and 3-digit number by a 1-digit number
- master division facts
- divide by 10
- divide a 2-, 3- and 4-digit number by a 1-digit number
- check division answers using multiplication

- understands a fractional part of a whole
- find half of a set of objects
- identify and write a fractional part of a set
- identify equivalent fractions
- compare and order fractions
- represent and write mixed numbers
- add and subtract fractions
- write tenths or hundredths using common and decimal fractions
- add, subtract, multiply and divide money amounts
- identify and count pennies, dimes, nickels and quarters
- find and compare the value of a set of coins
- select coins for a given amount
- make change from $1.00, $5.00, and $10.00
- read and write money amounts to $99,999.99
- write checks

Measurement

By the end of **grade three,** students are expected to:

- identify U.S. Customary measurements of capacity (cup, pint, quart, gallon)
- identify yesterday, today and tomorrow
- write dates using digits
- identify today's date
- understands morning (AM), noon, afternoon (PM), evening, night and midnight
- identify days of the week and months
- identify weekdays and days of the weekend
- tell and show time
- find elapsed time
- identify equivalent units of time
- read a Fahrenheit and Celsius thermometer
- estimate temperatures
- estimate length or distance
- compare the length or height of objects
- order objects by length or height
- measure and draw length or distance using customary units (inch, foot, yard, centimeter, millimeter and meter)
- measure length or distance using nonstandard units
- use a scale to find distance on a map
- compare and order objects by weight (mass) and size (area)
- estimate weight and capacity
- weigh objects using customary or metric units
- identify units of mass

- follow a recipe and use measuring cups
- compare and order containers by capacity
- measure capacity
- identify equivalent units of capacity
- find area using nonstandard units
- estimate area
- find area of a rectangle, perimeter of a polygon and volume of a rectangular prism and cube

Geometry

By the end of **grade three,** students are expected to:

- make and cover designs with pattern blocks or tangrams
- make and copy designs on a geoboard
- create, identify and draw congruent shapes, designs and line segments
- identify, describe, sort and compare geometric shapes
- identify angles and sides
- describe and classify polygons
- name line segments
- identify horizontal, vertical and oblique line segments
- understand parallel and perpendicular lines
- identify right, acute, and obtuse angles
- name triangles by angle size
- sort, compare, identify and describe geometric solids
- identify faces, vertices and edges of a geometric solid
- draw lines of symmetry and create symmetrical designs
- explore, identify and show translations, rotations and reflections

Patterns, Algebra and Functions

By the end of **grade three,** students are expected to:

- read and complete patterns
- identify the missing number in a sequence
- identify the missing shape or number in a matrix
- construct a number line and locate points on a number line
- locate and graph points on a coordinate graph
- show addition, subtraction and multiplication on a number line
- simplify expressions containing addition, subtraction, multiplication, division, parentheses and exponents
- understand the order of operations
- add positive and negative numbers
- use comparison symbols (<, > and =)

- represent an unknown using a symbol
- identify and write a function rule
- use a function rule to complete a table
- write and solve a number sentence for a problem involving addition, subtraction, multiplication and division
- create problems for addition and subtraction number sentences

Statistics, Data Analysis and Probability

By the end of **grade three,** students are expected to:

- tally
- conduct a survey and record data
- graph a picture on a pictograph
- identify most, fewest and same on a graph
- draw and read a pictograph, bar graph and line graph
- create and read a Venn diagram
- write observations about a graph
- describe the likelihood of an event
- predict the outcome of a probability experiment
- conduct a probability experiment

Problem Solving

By the end of **grade three,** students are expected to:

- classify and categorize
- look for a pattern
- make predictions
- identify important and unimportant information
- act out a problem or make a model
- draw a picture or make a table or chart
- make guesses, check and revise ideas
- make an organized list
- be able to use logical reasoning in problem solving
- write a number sentence

Communication

By the end of **grade three,** students are expected to:

- question and respond

- work with partners in groups
- write about math

Mathematical Reasoning

By the end of **grade three,** students are expected to:

- recognize patterns
- classify and sort
- solve spatial problems
- estimate
- explain an answer

Connections

By the end of **grade three,** students are expected to:

- connect math to everyday life
- connect math to science and social studies

Performance Objectives- Grade 4

Numbers and Operations

By the end of **grade four,** students are expected to:

- read and write numbers through the billions' place
- understand place value through the billions' place
- construct number lines
- understand expanded notation
- count forwards by 1's-12's, 100's, 1000's, ½'s, and ¼'s
- group numbers by tens
- write numbers using words
- compare and order 1, 2 or 3-digit whole numbers
- round numbers to the nearest ten, hundred or thousand
- represents 2 and 3-digit whole numbers using concrete materials and/or pictures
- represent equivalent forms of the same number
- compare sets of objects and identifies sets with more, less and the same

- identify sets with the greatest and least number of objects
- identify even and odd numbers
- identify ordinal position
- identify multiples and factors of a number
- understand prime and composite numbers
- identify perfect squares
- find square roots of perfect squares
- approximate square roots
- identify cube roots of perfect squares
- identify rational numbers from pictures and draw pictures to show rational numbers
- locate rational numbers on a number line
- identify the approximate value of pie
- read and write Roman numerals
- estimate and count collections of objects
- identify the addends, sums, factors and products
- identify quotients, dividends and/or divisors
- add, subtract, multiply and divide whole numbers
- understand regrouping
- use pictures to model and solve addition, subtraction, multiplication and division problems
- write number sentences to show addition, subtraction, multiplication and division
- identify and use the commutative and associative properties of addition and multiplication
- use manipulatives to model and solve addition, subtraction, multiplication and division problems
- make, label and write number sentences for an array
- identify the properties of 0 or 1 in multiplication and/or division problems
- master addition facts to 18
- identify missing addends
- estimate a sum and difference
- add three or more single-digit numbers
- add, subtract and multiply using mental computation
- add and subtract 2-, 3- or 4-digit numbers
- use estimation to check the reasonableness of calculated results
- add three of more multi-digit numbers
- master subtraction facts with minuends of 10 to 18
- check subtraction answers using addition
- master multiplying by 0-10, 100, 1000 and/or 10,000
- multiply by multiples of 10, 100, 1000 and/or 10,000
- multiply a 2- and 3-digit number by a 1-digit number
- multiply a 2-digit or larger number by a 2-digit number
- master division facts
- divide by 10
- divide a 2-, 3- and 4-digit number by a 1-digit number
- check division answers using multiplication
- understands a fractional part of a whole
- find half of a set of objects
- identify and write a fractional part of a set

- identify equivalent fractions
- compare and order fractions
- represent and write mixed numbers
- add and subtract fractions
- write tenths or hundredths using common and decimal fractions
- add, subtract, multiply and divide money amounts
- identify and count pennies, dimes, nickels and quarters
- find and compare the value of a set of coins
- select coins for a given amount
- make change from $1.00, $5.00, and $10.00
- read and write money amounts to $99,999.99
- write checks
- balance a checkbook register
- complete a catalog order form
- estimate and find amount of sales tax

Measurement

By the end of **grade four,** students are expected to:

- identify U.S. Customary measurements of capacity (cup, pint, quart, gallon)
- write dates using digits
- identify today's date
- understands morning (AM), noon, afternoon (PM), evening, night and midnight
- identify days of the week, months and seasons
- tell and show time
- tell and show time to the second
- find elapsed time
- identify United States time zones
- identify equivalent units of time
- read a Fahrenheit and Celsius thermometer
- estimate temperatures
- estimate length or distance
- compare the length or height of objects
- measure and draw length or distance using customary units (inch, foot, yard, centimeter, millimeter and meter)
- use a scale to find distance on a map
- compare and order objects by weight (mass) and size (area)
- estimate weight and capacity
- weigh objects using customary or metric units
- identify units of mass
- follow a recipe and use measuring cups
- compare and order containers by capacity
- measure capacity

- identify equivalent units of capacity
- find area using nonstandard units
- estimate area
- find area of a rectangle, perimeter of a polygon and volume of a rectangular prism and cube
- estimate and measure circumference

Geometry

By the end of **grade four,** students are expected to:

- make and cover designs with pattern blocks or tangrams
- make and copy designs on a geoboard
- create, identify and draw congruent shapes, designs and line segments
- identify, describe, sort and compare geometric shapes
- identify angles and sides
- describe and classify polygons
- name line segments
- identify horizontal, vertical and oblique line segments
- understand parallel and perpendicular lines
- identify right, acute, and obtuse angles
- name triangles by angle size
- sort, compare, identify and describe geometric solids
- identify faces, vertices and edges of a geometric solid
- draw lines of symmetry and create symmetrical designs
- explore, identify and show translations, rotations and reflections

Patterns, Algebra and Functions

By the end of **grade four,** students are expected to:

- read and complete patterns
- identify the missing number in a sequence
- construct a number line and locate points on a number line
- locate and graph points on a coordinate graph
- show addition, subtraction and multiplication on a number line
- simplify expressions containing addition, subtraction, multiplication, division, parentheses and exponents
- understand the order of operations

- add positive and negative numbers
- use comparison symbols (<, > and =)
- represent an unknown using a symbol
- identify and write a function rule
- use a function rule to complete a table
- write and solve a number sentence for a problem involving addition, subtraction, multiplication and division
- create problems for addition, subtraction, multiplication and division number sentences

Statistics, Data Analysis and Probability

By the end of **grade four,** students are expected to:

- tally
- conduct a survey and record data
- find the mean (average) and median of a set of data
- graph a picture on a pictograph
- draw and read a pictograph, bar graph and line graph
- create and read a Venn diagram
- write observations about a graph
- describe the likelihood of an event
- predict the outcome of a probability experiment
- conduct a probability experiment

Problem Solving

By the end of **grade four,** students are expected to:

- classify and categorize
- look for a pattern
- make predictions
- act out a problem or make a model
- draw a picture or make a table or chart
- make guesses, check and revise ideas
- make an organized list
- use logical reasoning
- write a number sentence
- substitute simpler numbers

Communication

By the end of **grade four,** students are expected to:

- question and respond
- work with partners in groups
- write about math

Mathematical Reasoning

By the end of **grade four,** students are expected to:

- question and respond
- classify and sort
- solve spatial problems
- estimate
- explain an answer

Connections

By the end of **grade four,** students are expected to:

- connect math to everyday life
- connect math to science and social studies

Performance Objectives-Grade 5

Numbers and Operations

By the end of **grade five,** students are expected to:

- read and write numbers through the billions' place
- understand place value through the billions' place
- construct number lines
- understand expanded notation
- understand regrouping in addition, subtraction, multiplication, and division
- identify the addends and sums
- identify the difference, subtrahend, and minuend
- identify factors and products
- identify quotients, dividends, divisors, and division notations
- add, subtract, multiply, and divide whole numbers
- add, subtract, multiply, and divide decimals
- add, subtract, multiply, and divide fractions and mixed numbers

- construct a multiplication table
- develop mental addition strategies
- develop mental subtraction strategies
- develop mental multiplication strategies
- develop mental division strategies
- see powers as repeated multiplication
- identify the base and the exponent
- calculate the powers of whole numbers
- calculate zero exponents
- observe the relationship of place value to powers of 10
- calculate square roots
- perform order of operations with roots
- understand inverse operations with roots
- understand a fractional part of a whole
- identify and write a fractional part of a set
- identify equivalent fractions
- compare and order fractions
- reduce fractions
- calculate with improper fractions
- change improper fractions to mixed numbers
- find the least common denominator for fractions
- convert fractions to decimals and percents
- determine reciprocals of numbers
- read and write Roman numerals
- be able to read and write decimals
- compare and order decimals
- convert decimals to fractions and percents
- identify repeating, non-repeating, and terminating decimals
- read and write percents
- identify and understand percent of a whole, group, or number
- convert percents to decimals and fractions
- identify ratios and proportions
- be able to round whole numbers, decimals, and mixed numbers
- estimate sums, differences, products, and quotients
- use estimating to verify answers
- recognize fact families
- recognize even and odd numbers
- recognize prime and composite numbers
- distinguish the greatest common factor
- distinguish the least common multiple
- perform divisibility tests on problems
- count natural numbers, whole numbers, decimal numbers, and negative numbers

Measurement

By the end of **grade five,** students are expected to:

- identify U.S. Customary measurements of length, capacity, and weight
- identify metric measurements of length, capacity, and mass
- identify the Fahrenheit and Celsius scale of temperature
- calculate with time in seconds, minutes, and hours
- calculate with time in days, months, and years
- calculate with time in decades, centuries and millennia
- write time of day and dates
- calculate area with square units
- calculate volume with cubic units
- convert between measurements of the U.S. Customary system
- convert between measurements of the metric system
- convert between measurements of both systems
- measure length, time, capacity, mass/weight, and angles
- be proficient with a ruler, protractor, thermometer, and measuring cup
- estimate measures

Geometry

By the end of **grade five,** students are expected to:

- identify points, segments, rays, lines, angles, and planes
- identify types of lines
- identify types of angles
- describe and classify polygons
- calculate the perimeter of triangles and quadrilaterals
- calculate the area of triangles and quadrilaterals
- distinguish between similarity and congruence in polygons
- identify types of triangles
- identify line symmetry and rotational symmetry

Patterns, Algebra and Functions

By the end of **grade five,** students are expected to:

- read and complete numeric, geometric, and story problem patterns
- identify the missing number in a sequence
- read and complete arithmetic, geometric, pictorial, and Fibonacci sequences
- identify a missing number as a variable

- identify symbols of inclusion
- solve problems for an unknown
- solve multi-step problems
- write a word problem for a given equation
- write an equation for a given word problem
- identify the associative property of addition and multiplication
- identify the commutative property of addition and multiplication
- identify the identity property of addition and multiplication
- analyze the distributive property
- identify the zero property of multiplication
- graph numbers on a number line
- graph numbers on a coordinate plane

Statistics, Data Analysis and Probability

By the end of **grade five,** students are expected to:

- collect data using multiple methods
- tally information
- conduct a survey and record data
- organize and analyze data
- find the mean, median, mode and range of a set of data
- represent data with bar graphs, histograms, line graphs, pie graphs, pictographs, line plots, stem and leaf plots, Venn diagrams
- write observations about a graph
- describe the likelihood of an event
- predict the outcome of a probability experiment
- conduct a probability experiment

Problem Solving

By the end of **grade five,** students are expected to:

- classify and categorize
- break problems into smaller parts
- draw diagrams and pictures to solve problems
- use logical reasoning in solving problems
- make charts, graphs, or lists to solve problems
- make guesses, check and revise ideas

Communication

By the end of **grade five,** students are expected to:

- question and respond
- work with partners in groups
- write about math
- talk about math
- justify the work and solutions

Mathematical Reasoning

By the end of **grade five,** students are expected to:

- question and respond
- classify and sort
- solve spatial problems
- estimate
- explain an answer

Connections

By the end of **grade five,** students are expected to:

- connect math to everyday life
- use integers to describe real life situations
- identify everyday situations algebraically
- identify everyday situations with graphs
- find symmetry in art, architecture, and nature

Performance Objectives-Grade 6

Numbers and Operations

By the end of **grade six,** students are expected to:

- understand place value and digits
- read and write numbers through the billions' place

- understand place value through the billions' place
- construct number lines
- understand expanded notation
- understand regrouping in addition, subtraction, multiplication, and division
- identify the addends and sums
- identify the difference, subtrahend, and minuend
- identify factors, products, and multiplication notations
- identify quotients, dividends, divisors, and division notations
- add, subtract, multiply, and divide whole numbers
- add, subtract, multiply, and divide decimals
- add, subtract, multiply, and divide fractions and mixed numbers
- add, subtract, multiply, and divide signed numbers
- construct a multiplication table
- discover cross multiplying
- develop mental addition strategies
- develop mental subtraction strategies
- develop mental multiplication strategies
- develop mental division strategies
- see powers as repeated multiplication
- identify the base and the exponent
- calculate the powers of whole numbers, decimals, and fractions
- observe the relationship of place value to powers of 10
- discover scientific notation
- calculate square roots
- perform order of operations with roots
- understand inverse operations with roots
- use a calculator to find roots
- be able to approximate roots
- understand a fractional part of a whole
- read and write a fractional part of a set
- identify the numerator and denominator
- identify equivalent fractions
- compare and order fractions
- reduce fractions
- calculate with improper fractions
- change improper fractions to mixed numbers
- find the least common denominator for fractions
- convert fractions to decimals and percents
- determine reciprocals of numbers
- read and write Roman numerals
- be able to read and write decimals
- compare and order decimals
- convert decimals to fractions and percents
- read and write percents
- identify and understand percent of a whole, group, or number
- convert percents to decimals and fractions

- operate with percents greater than 100
- identify ratios and proportions
- perform ratio word problems
- be able to round whole numbers, decimals, and mixed numbers
- estimate sums, differences, products, quotients, and roots
- use estimating to verify answers
- recognize fact families
- recognize even and odd numbers
- recognize prime and composite numbers
- calculate the prime factorization of a number
- distinguish the greatest common factor
- distinguish the least common multiple
- perform divisibility tests on problems
- count natural numbers, whole numbers, decimal numbers, and negative numbers

Measurement

By the end of **grade six,** students are expected to:

- identify U.S. Customary measurements of length, capacity, and weight
- identify metric measurements of length, capacity, and mass
- identify the Fahrenheit and Celsius scale of temperature
- calculate with time in seconds, minutes, and hours
- write time of day
- calculate area with square units
- calculate volume with cubic units
- identify unit multipliers
- convert between measurements of the U.S. Customary system
- convert between measurements of the metric system
- convert between measurements of both systems
- measure length, time, capacity, mass/weight, and angles
- be proficient with a ruler, protractor, thermometer, and measuring cup
- estimate measures

Geometry

By the end of **grade six,** students are expected to:

- identify points, segments, rays, lines, angles, and planes
- identify types of lines
- identify types of angles
- name interior and exterior angles
- describe and classify polygons
- calculate the perimeter of complex figures, triangles, quadrilaterals, and circles
- calculate the area of complex figures, triangles, quadrilaterals, and circles
- distinguish between similarity and congruence in polygons
- identify types of triangles
- calculate surface area of polygons
- identify line symmetry and rotational symmetry

Patterns, Algebra and Functions

By the end of **grade six,** students are expected to:

- read and complete numeric, geometric, and story problem patterns
- identify the missing number in a sequence
- read and complete arithmetic, geometric, pictorial, and Fibonacci sequences
- identify a missing number as a variable
- add, subtract, multiply, and divide integers and signed numbers
- identify symbols of inclusion
- solve problems for an unknown
- solve multi-step problems
- write a word problem for a given equation
- write an equation for a given word problem
- identify the associative property of addition and multiplication
- identify the commutative property of addition and multiplication
- identify the identity property of addition and multiplication
- analyze the distributive property
- identify the zero property of multiplication
- graph numbers on a number line
- graph numbers on a coordinate plane
- graph lines on a coordinate plane

Statistics, Data Analysis and Probability

By the end of **grade six,** students are expected to:

- collect data using multiple methods

- tally information
- conduct a survey and record data
- organize and analyze data
- find the mean, median, mode and range of a set of data
- represent data with bar graphs, histograms, line graphs, pie graphs, pictographs, line plots, stem and leaf plots, Venn diagrams
- write observations about a graph
- describe the likelihood of an event
- predict the outcome of a probability experiment
- conduct a probability experiment

Problem Solving

By the end of **grade six,** students are expected to:

- classify and categorize
- break problems into smaller parts
- draw diagrams and pictures to solve problems
- use logical reasoning in solving problems
- make charts, graphs, or lists to solve problems
- make guesses, check and revise ideas

Communication

By the end of **grade six,** students are expected to:

- question and respond
- work with partners in groups
- write about math
- talk about math
- justify the work and solutions

Mathematical Reasoning

By the end of **grade six,** students are expected to:

- question and respond
- classify and sort

- solve spatial problems
- estimate
- explain an answer

Connections

By the end of **grade six,** students are expected to:

- connect math to everyday life
- use integers to describe real life situations
- identify everyday situations algebraically
- identify everyday situations with graphs
- find symmetry in art, architecture, and nature

Performance Objectives- Grade 7

Numbers and Operations

By the end of **grade seven,** students are expected to :

- master basic math facts
- read and write whole numbers, fractions, decimals, and percents
- understand place value through the trillions' place
- construct number lines
- understand expanded notation
- identify the addends and sum in an addition problem
- add, subtract, multiply, and divide whole numbers
- understand regrouping
- add, subtract, multiply, and divide decimal numbers
- add, subtract, multiply, and divide fractions and mixed numbers
- add, subtract, multiply, and divide signed numbers
- understand mental addition, subtraction, multiplication, and division strategies
- identify the difference, subtrahend, and minuend in a subtraction problem
- understand multiplication as repeated addition
- identify the factors and product in a multiplication problem
- understand multiplication notations: a x b, a · b, and a(b)
- perform cross multiplication
- identify the dividend, divisor, and quotient
- interpret remainders
- understand division notations: division box, division sign, and division bar

- understand powers as repeated multiplication
- identify a base and exponent
- read, write, and compute powers of whole numbers, fractions, and signed numbers

- understand zero and negative exponents
- understand the product rule of exponents
- understand scientific notation
- understand variable bases and powers of variable bases
- realize the relationship of place value to powers of 10
- understand square roots and cube roots
- be able to use a calculator to find roots
- be able to approximate roots
- understand order of operations
- understand inverse operations
- identify the numerator and denominator in a fraction
- understand the fractional part of a whole, group, set, or number
- compare and order fractions
- understand equivalent fractions
- reduce fractions
- identify improper fractions and convert them into mixed numbers
- identify the least common denominator
- convert fractions to decimals and percents
- understand reciprocals
- find percent of a whole, group, set, or number
- convert percents to fractions and decimals
- identify percents greater than 100%
- understand percent of change
- understand rates
- solve ration and rate word problems
- understand ratios and proportions
- understand an implied ratio
- round whole numbers, decimals, and mixed numbers
- estimate sums, differences, products, quotients, and roots
- use estimation to determine if an answer is reasonable
- understand opposites
- identify even and odd numbers
- determine factors, multiples, and divisibility
- understand prime and composite numbers
- identify greatest common factor (GCF)
- identify least common factor (LCM)
- perform divisibility tests
- use prime factorization
- understand the number systems: counting numbers, whole numbers, decimals, negative numbers, integers, rational numbers, irrational numbers, real numbers, set notation, subsets, and roman numerals

Measurement

By the end of **grade seven,** students are expected to:

- understand U.S. customary measurements of length: inch, foot, yard, and mile
- understand U.S. customary measurements of capacity: cup, pint, quart, and gallon
- understand U.S. customary measurements of weight: ounce, pound, and ton
- understand the following metric prefixes: milli-, centi-, deci-, deka-, hector-, kilo-
- understand the standard metric measurements of length (meter), capacity (liter), and mass (kilogram)
- convert measurements within and between the U.S. customary and metric systems
- read a Fahrenheit, Celsius, and Kelvin scale
- work with seconds, minutes, and hours
- interpret square and cubic units
- know the abbreviations of standard measurements
- convert units of area and volume
- simplify mixed measures
- work with unit multipliers
- convert between temperature scales
- understand the measurements of angles
- estimate measures
- participate in measurement activities
- learn how to select appropriate units of measurement
- use the metric system to reinforce decimal concepts
- determine whether measures are reasonable
- determine the precision of a measuring tool
- work with two-dimensional scale drawings and three-dimensional scale models
- understand how to work with a U.S. customary and metric ruler, protractor, and thermometer

Geometry

By the end of **grade seven,** students are expected to:

- know the basic geometric terms: point, segment, ray, line, angle, and plane
- differentiate between parallel, perpendicular, and intersecting lines
- differentiate between horizontal, vertical, and oblique lines
- calculate the slope of a line
- interpret an angle as acute, obtuse, right, or straight
- identify complementary and supplementary angles
- calculate to find unknown angle measures
- identify vertical and adjacent angles
- describe and classify polygons

- draw various polygons
- identify sides and vertices of polygons
- calculate the perimeter and area of polygons
- differentiate between regular and irregular polygons
- understand similarity and congruence
- identify complex figures
- identify interior and exterior angles
- calculate the sum of angle measures
- identify diagonals found in polygons
- calculate the perimeter and area of a triangle
- identify acute, obtuse, and right triangles
- differentiate between equilateral, isosceles, and scalene triangles
- understand proportional triangles
- use the Pythagorean theorem
- label quadrilaterals as parallelograms, squares, rhombuses, rectangles, trapezoids, and trapeziums
- locate the center of a circle
- find the radius, diameter, circumference, and area of a circle
- know pi
- identify chords, arcs, central angles, inscribed angles, and sectors of a circle
- identify a semicircle
- describe and classify solids
- identify the faces, edges, and vertices of solids
- draw solids
- calculate the volume and surface area of solids
- identify polyhedrons
- calculate the perimeter of polygons, circles, and complex figures
- calculate the area of triangles, rectangles, parallelograms, trapezoids, circles, and semicircles
- calculate the volume of prisms, cylinders, pyramids, cones, and spheres
- name and graph ordered pairs
- create straight line drawings
- understand line symmetry
- construct congruent segments, angles, and triangles

Algebra

By the end of **grade seven,** students are expected to:

- understand numeric, geometric, and story-problem patterns
- identify a palindrome
- identify terms within a sequence
- identify arithmetic, geometric, and Fibonacci sequences
- add, subtract, multiply, and divide integers/signed numbers
- calculate the absolute value of a number

- understand the following algebraic concepts: variables, symbols of inclusion, symbols of negation, substitution, constants, coefficients, polynomials, and simplifying
- be able to simplify and factor algebraic terms
- combine like terms
- solve for an unknown part of an equation
- solve multi-step equations
- write an equation for a given word problem
- write a word problem for a given equation
- transform equations using the addition and multiplication rule
- work with nonlinear and literal equations
- solve simple quadratic equations
- solve inequalities
- graph inequalities on a number line and coordinate plane
- work with functions
- use associative and commutative properties of addition and multiplication
- use the identity property of addition and multiplication
- use distributive property
- use zero property of multiplication
- graph points and lines on number lines and coordinate planes

Statistics, Data Analysis, and Probability

By the end of **grade seven,** students are expected to:

- collect and record data using tallies and surveys
- organize and analyze data using tables, mean, median, mode, and range
- represent data using legends, bar graphs, line graphs, circle graphs, pictographs
- express simple probability of events
- determine probability of independent and dependent events
- use sample spaces when determining probability
- use tree diagrams, permutations, and combinations

Problem Solving

By the end of **grade seven,** students are expected to:

- break a problem into simpler parts
- use logical reasoning, diagrams, pictures, patterns, key words, working backward, charts, graphs, lists, algorithms, and trial and error to solve word problems
- find missing information in word problems

Mathematical Reasoning

By the end of **grade seven,** students are expected to:

- use algebraic and spatial reasoning in various mathematical problems
- use reasoning to justify solutions
- use reasoning to classify and sort information

Connections

By the end of **grade seven,** students are expected to:

- connect mathematical concepts when determining unit price, price discounts, price markups, gratuity, tax, commission and profits, interest, debt
- use integers to describe real-world situations
- represent everyday situations algebraically
- connect history of mathematics to present day

Performance Objectives- Grade 8

Numbers and Operations

By the end of **grade eight,** students are expected to:

- master basic math facts
- read and write whole numbers, fractions, decimals, and percents
- understand place value through the trillions' place
- construct number lines
- understand expanded notation
- identify the addends and sum in an addition problem
- add, subtract, multiply, and divide whole numbers
- understand regrouping
- add, subtract, multiply, and divide decimal numbers
- add, subtract, multiply, and divide fractions and mixed numbers
- add, subtract, multiply, and divide signed numbers
- understand mental addition, subtraction, multiplication, and division strategies
- identify the difference, subtrahend, and minuend in a subtraction problem
- understand multiplication as repeated addition

- identify the factors and product in a multiplication problem
- understand multiplication notations: a x b, a · b, and a(b)
- perform cross multiplication
- identify the dividend, divisor, and quotient
- interpret remainders
- understand division notations: division box, division sign, and division bar
- understand powers as repeated multiplication
- identify a base and exponent
- read, write, and compute powers of whole numbers, fractions, and signed numbers

- understand zero and negative exponents
- understand the product rule of exponents
- understand scientific notation
- understand variable bases and powers of variable bases
- realize the relationship of place value to powers of 10
- understand square roots and cube roots
- be able to use a calculator to find roots
- be able to approximate roots
- understand order of operations
- understand inverse operations
- identify the numerator and denominator in a fraction
- understand the fractional part of a whole, group, set, or number
- understand equivalent fractions
- reduce fractions
- identify improper fractions and convert them into mixed numbers
- identify the least common denominator
- convert fractions to decimals and percents
- understand reciprocals
- find percent of a whole, group, set, or number
- convert percents to fractions and decimals
- identify percents greater than 100%
- understand percent of change
- understand rates
- solve ration and rate word problems
- understand ratios and proportions
- understand an implied ratio
- round whole numbers, decimals, and mixed numbers
- estimate differences, products, and roots
- use estimation to determine if an answer is reasonable
- understand opposites
- identify even and odd numbers
- determine factors, multiples, and divisibility
- understand prime and composite numbers
- identify greatest common factor (GCF)
- identify least common factor (LCM)

- perform divisibility tests
- use prime factorization
- understand the number systems: counting numbers, whole numbers, decimals, negative numbers, integers, rational numbers, irrational numbers, real numbers, set notation, subsets, and roman numerals

Measurement

By the end of **grade eight,** students are expected to:

- understand U.S. customary measurements of length: inch, foot, yard, and mile
- understand U.S. customary measurements of capacity: cup, pint, quart, and gallon
- understand U.S. customary measurements of weight: ounce, pound, and ton
- understand the following metric prefixes: milli-, centi-, deci-, deka-, hector-, kilo-
- understand the standard metric measurements of length (meter), capacity (liter), and mass (kilogram)
- convert measurements within and between the U.S. customary and metric systems
- work with seconds, minutes, and hours
- interpret square and cubic units
- know the abbreviations of standard measurements
- convert units of area and volume
- work with unit multipliers
- understand the measurements of angles
- estimate measures
- participate in measurement activities
- determine the precision of a measuring tool
- understand how to work with a protractor and U.S. customary/metric ruler

Geometry

By the end of **grade eight,** students are expected to:

- know the basic geometric terms: point, segment, ray, line, angle, plane, and curve
- differentiate between parallel, perpendicular, and intersecting lines
- calculate the slope of a line
- interpret an angle as acute, obtuse, right, or straight
- identify complementary and supplementary angles
- calculate to find unknown angle measures

- identify adjacent angles
- describe and classify polygons
- identify sides and vertices of polygons
- calculate the perimeter and area of polygons
- differentiate between regular and irregular polygons
- understand similarity and congruence
- identify complex figures
- identify interior and exterior angles
- calculate the sum of angle measures
- identify diagonals found in polygons
- calculate the perimeter and area of a triangle
- identify acute, obtuse, and right triangles
- differentiate between equilateral, isosceles, and scalene triangles
- understand proportional triangles
- use the Pythagorean theorem
- label quadrilaterals as parallelograms, squares, rhombuses, rectangles, trapezoids, and trapeziums
- locate the center of a circle
- find the radius, diameter, circumference, and area of a circle
- know pi
- identify chords, arcs, central angles, inscribed angles, and sectors of a circle
- identify a semicircle
- describe and classify solids
- identify the faces, edges, and vertices of solids
- draw solids
- calculate the volume and surface area of solids
- identify polyhedrons
- calculate the perimeter of polygons, circles, and complex figures
- calculate the area of triangles, rectangles, parallelograms, trapezoids, circles, semicircles, sectors, and complex figures
- calculate the volume of prisms, cylinders, pyramids, cones, and spheres
- name and graph ordered pairs
- find the intercept and slope of a line
- create straight line drawings
- understand line symmetry
- construct congruent segments, angles, and triangles
- understand geometric rotation, reflection, and translation
- graph transformations on the coordinate plane

Algebra

By the end of **grade eight,** students are expected to:

- understand numeric, geometric, and story-problem patterns

- add, subtract, multiply, and divide integers/signed numbers
- calculate the absolute value of a number
- understand the following algebraic concepts: variables, symbols of inclusion, symbols of negation, substitution, constants, coefficients, polynomials, and simplifying
- be able to simplify and factor algebraic terms
- combine like terms
- solve for an unknown part of an equation
- solve multi-step equations
- write an equation for a given word problem
- write a word problem for a given equation
- transform equations using the addition and multiplication rule
- work with nonlinear, equivalent, conditional, and literal equations
- be introduced to the trichotomy axiom
- solve simple quadratic equations
- solve inequalities
- graph inequalities on a number line and coordinate plane
- work with functions
- use associative and commutative properties of addition and multiplication
- use the identity property of addition and multiplication
- use distributive property
- use zero property of multiplication
- graph points and lines on number lines and coordinate planes

Statistics, Data Analysis, and Probability

By the end of **grade eight,** students are expected to:

- organize and analyze data using mean, median, mode, and range
- represent data using legends, bar graphs, line graphs, circle graphs, pictographs
- choose an appropriate graph to represent data
- express simple probability of events
- determine probability of independent and dependent events
- use sample spaces when determining probability
- use tree diagrams and permutations

Problem Solving

By the end of **grade eight,** students are expected to:

- break a problem into simpler parts
- use logical reasoning, diagrams, pictures, patterns, key words, working backward, charts, graphs, lists, algorithms, and trial and error when problem solving
- learn to find patterns when problem solving

- find missing information when problem solving

Mathematical Reasoning

By the end of **grade eight,** students are expected to:

- use algebraic and spatial reasoning in various mathematical problems
- use reasoning to justify solutions
- use reasoning to classify and sort information

Connections

By the end of **grade eight,** students are expected to:

- connect mathematical concepts when determining unit price, price discounts, price markups, gratuity, tax, commission and profits, and simple and compound interest
- connect geometric symmetry to symmetry in nature, art, and architecture
- represent everyday situations algebraically and with graphs

Performance Objectives- Algebra I

Expressions, Equations, and Functions

By the end of **Algebra I,** students are expected to:

- translate verbal expressions into mathematical expressions and vice versa
- solve problems by looking for a pattern
- use the order of operations to evaluate real number expressions
- display and interpret data on a stem-and-leaf plot
- solve open sentences by performing arithmetic operations
- recognize and use the properties of identity and equality
- determine the multiplicative inverse of a number
- model the distributive property
- use the distributive property to simplify expressions
- recognize and use the commutative and associative properties when simplifying expressions
- interpret graphs in real-world settings
- sketch graphs for given functions

Rational Numbers

By the end of **Algebra I**, students are expected to:

- state the coordinate of a point on a number line
- graph integers on a number line
- add integers by using a number line
- interpret numerical data from a table
- display and interpret statistical data on a line plot
- use counters to add and subtract integers
- find the absolute value of a number
- add and subtract integers
- compare and order rational numbers
- find a number between two rational numbers
- add and subtract rational numbers
- simplify expressions that contain rational numbers
- use counters to multiply integers
- multiply rational numbers
- divide rational numbers
- use base-ten tiles to model square roots
- find square roots. Classify numbers
- graph solutions of inequalities on number lines
- explore problem situations and translate verbal sentences and problems into equations or formulas and vice versa

Solving Linear Equations

By the end of **Algebra I**, students are expected to:

- solve equations by using cups and counters to model variables and integers
- solve equations by using addition and subtraction
- solve equations by using multiplication and division
- solve equations by using cups and counters to model variable and integers
- solve equations involving more than one operation
- solve problems by working backward
- find the complement and supplement of an angle
- find the measure of the third angle of a triangle given the measure of the other two angles
- solve equations with the variable on both sides
- solve equations containing grouping symbols
- solve equations and formulas for a specified variable

- find and interpret the mean, median, and mode of a set of data

Use Proportional Reasoning

By the end of **Algebra I,** students are expected to:

- collect data to determine ratios
- solve proportions
- find the unknown measures of the sides of two similar triangles
- use trigonometric ratios to solve right triangles
- solve percent problems
- solve problems involving simple interest
- solve problems involving percent of increase or decrease
- solve problems involving discounts or sales tax
- find the probability of a simple event
- find the odds of a simple event
- solve mixture problems
- solve problems involving uniform motion
- solve problems involving direct and inverse variation

Graph Relations and Functions

By the end of **Algebra I**, students are expected to:

- graph ordered pairs on a coordinate plane
- solve problems by making a table
- use a graphing calculator to graph relations
- identify the domain, range, and inverse of a relation
- show relations as sets of ordered pairs, tables, mappings, and graphs
- use a graphing calculator to investigate relations and determine the ranges when the domains are given
- determine the range for a given domain
- graph the solution set for the given domain
- use a graphing calculator to graph linear relations and functions.
- graph linear equations
- determine whether a given relation is a function
- find the value of a function for a given element of the domain
- write equations to represent relations, given some of the solutions for the equation
- use a graphing calculator to calculate measure of variation
- calculate and interpret the range, quartiles, and interquartile range of sets of data

Analyzing Linear Equations

By the end of **Algebra I,** students are expected to:

- use a geoboard to model a line segment and calculate its slope
- find the slope of a line, given the coordinate of two points on the line
- write linear equations in point-slope form
- write linear equations in standard form
- graph and interpret points on a scatter plot
- draw and write equations for best-fit lines, and make predictions by using those equations
- solve problems by using models
- determine the x- and y-intercepts of linear graphs from their equations and write equations in slope-intercept form
- write and solve direct variation equations
- use a graphing calculator to determine whether a group of graphs forms a family
- graph a line given any linear equation
- determine if two lines are parallel or perpendicular by their slopes
- write equations of lines that pass through a given point, parallel or perpendicular to the graph of a given equation
- find the coordinate of the midpoint of a line segment in the coordinate plane

Solving Linear Inequalities

By the end of **Algebra I,** students are expected to:

- solve inequalities by using addition and subtraction
- use cups and counters to solve inequalities
- solve inequalities by using multiplication and division
- solve linear inequalities involving more than one operation
- find the solution set for a linear inequality when replacement values are given for the variables
- solve problems by making a diagram
- solve compound inequalities and graph their solution sets
- solve problems that involve compound inequalities
- find the probability of a compound event
- solve open sentences involving absolute value and graph the solutions
- display and interpret data on box-and-whisker plots
- use a graphing calculator to compare two sets of data by using a double box-and-whisker plot
- use the “shade” command on a graphing calculator to graph inequalities in two variables
- graph inequalities in the coordinate plane

Graphing Systems of Linear Equations and Inequalities

By the end of **Algebra I,** students are expected to:

- use a graphing calculator to solve systems of equations
- solve systems of equations by graphing
- determine by graphing whether a system of equations has one solution, no solutions, or infinitely many solutions
- solve systems of equations by the substitution method
- organize data to solve problems
- solve systems of equations by the elimination method using addition or subtraction
- solve systems of equations by the elimination method using multiplication and addition
- solve systems of inequalities by graphing

Polynomials

By the end of **Algebra I,** students are expected to:

- multiply monomials
- simplify expressions involving powers of monomials
- solve problems by looking for a pattern
- simplify expressions involving quotients of monomials
- simplify expressions containing negative exponents
- express numbers in scientific and standard notation
- find products and quotients of numbers expressed in scientific notation
- use algebra tiles to model polynomials
- find the degree of a polynomial
- arrange the terms of a polynomial so that the powers of a variable are in ascending or descending order
- use algebra tiles to add and subtract polynomials
- add and subtract polynomials
- use algebra tiles to model the product of simple polynomials
- multiply a polynomial by a monomial
- simplify expressions involving polynomials
- use algebra tiles to find the product of binomials
- use the FOIL method to multiply two binomials
- multiply any two polynomials by using the distributive property.
- use pattern to find $(a + b)^2$, $(a – b)^2$, and $(a + b)(a – b)$

Factoring

By the end of **Algebra I,** students are expected to:

- find prime factorizations of integers
- find greatest common factors (GCF) for sets of monomials
- use algebra tiles to factor binomials
- use the GCF and the distributive property to factor polynomials

- use grouping techniques to factor polynomials with four or more terms.
- use algebra tiles to factor simple trinomials
- solve problems by using guess and check
- factor quadratic trinomials
- identify and factor binomials that are the differences of squares
- identify and factor perfect square trinomials
- use the zero product property to solve equations

Quadratic and Exponential Functions

By the end of **Algebra I,** students are expected to:

- use a graphing calculator to graph a quadratic function and find the coordinates of its vertex
- find the equation of the axis of symmetry and the coordinates of the vertex of a parabola
- graph quadratic functions
- use a graphing calculator to study the characteristics of families of parabolas
- use estimation to find roots of quadratic equations
- find roots of quadratic equations by graphing
- solve quadratic equations by using the quadratic formula
- use a graphing calculator to graph exponential functions
- graph exponential functions
- determine if a set of data displays exponential behavior
- solve exponential equations
- solve problems involving growth and decay

Graph Relations and Functions

By the end of **Algebra I,** students are expected to:

- simplify rational expressions
- identify values excluded from the domain of a rational expression
- use a graphing calculator to check the simplification of rational expressions
- multiply rational expressions
- divide rational expressions
- divide polynomials by monomials
- divide polynomials by binomials
- add and subtract rational expressions with like denominators
- add and subtract rational expressions with unlike denominators
- make an organized list of possibilities to solve problems
- simplify mixed expressions and complex fractions
- solve rational equations
- use a geoboard to find areas by using the Pythagorean theorem
- use the Pythagorean theorem to solve problems

- simplify square roots
- simplify radical expressions
- use a graphing calculator to simplify and approximate values of expressions containing radicals
- simplify radical expressions involving addition, subtraction, and multiplication.
- solve radical equations
- find the distance between two points in the coordinate plane
- use algebra tiles as a model for completing the square
- solve problems by identifying subgoals

Evidence of continuity from grade to grade

The curriculum is constructed using skill-based measurable objectives so that the knowledge, attitudes, and skills learned in each grade form building blocks for what is taught in the succeeding grades.

	Counting and Cardinality	Operations and Algebraic Thinking	Number and Operations in Base Ten	Measurement and Data	Geometry	Number and Operations – Fractions	Ratios and Proportional Relationships	The Number System	Expressions and Equations	Statistics and Probability	Functions
K	X	X	X	X	X						
1st	X	X	X	X	X						
2nd	X	X	X	X	X						
3rd	X	X	X	X	X	X					
4th	X	X	X	X	X	X					
5th	X	X	X	X	X	X					
6th	X	X	X	X	X	X	X	X	X	X	
7th	X	X	X	X	X	X	X	X	X	X	
8th	X	X	X	X	X	X	X	X	X	X	X

Assessment of the academic growth and achievement of each student

Each individual teacher will assess the academic growth of their students on a regular basis. Teachers assess students in a variety of ways (e.g. worksheets, class discussions, projects, quizzes, and tests). The length and level of the assessment is dependent on the grade level being taught.

Students in grades K-8 participate in MAP Growth mathematics testing three times each year. This data is another important tool the faculty of Grace Lutheran School can use to assess the academic growth and achievement of each student.