Zion Lutheran School
Mathematics Curriculum

Attitudes

- Christians strive to give glory to God
- Faithfulness…complete the entire assignment
- Perseverance when meeting challenges
- Thoroughness…check and double check
- Responsibility for making up work when absent
- Worth not based on ability in math

Skills

- Organization
- Ability to follow directions
- Work completed neatly with pencil
- Show work…often vertically is the best…prefer work right next to problem
- Mastery of basic facts
- Variety of problem solving approaches / strategies
- Mental math ability
- "Does this make sense" reasoning ability
- Test preparation

Goals

A graduate of Zion Lutheran School will be

1. an effective Christian steward who:
    - 1.1 manages the treasures that God has entrusted to him or her
    - 1.2 uses mathematical skills in service to God, family and society
    - 1.3 relates mathematical learning to the orderliness of creation

2. an effective communicator who:
    - 2.1 communicates mathematical concepts in written form
    - 2.2 communicates mathematical concepts in spoken form
    - 2.3 creates and interprets graphical data
    - 2.4 reads and comprehends the mathematical language of a consumer

3. a life-long learner who solves problems by:
    - 3.1 assessing mathematical solutions
    - 3.2 researching alternatives and solutions
    - 3.3 predicting outcomes and implications
    - 3.4 computing accurately
    - 3.5 evaluating results

4. a competent individual who:
    - 4.1 demonstrates mastery of computational skills
    - 4.2 uses estimation to legitimize results

5. a faithful worker who:
    - 5.1 consistently completes quality work in class
    - 5.2 participates and contributes to group work
    - 5.3 manages time in a productive manner
    - 5.4 assumes responsibility to prepare for assessment

Zion Lutheran School

Mathematics Curriculum

In order to make every thought captive to the Word of Christ, mathematics is taught at Zion Ev. Lutheran School in the light of God's Word. Mathematics is a spiraling subject, which means that skill and knowledge gained in math builds upon itself. To help students' math retention, we teach new skills each week while reviewing old ones. This curriculum guide is separated according to state and national standards. Inside each standard are benchmarks from each of our grade levels. These benchmarks are goals that we would like our students to meet by the time they leave each classroom. Of course, we know that not all students learn at the same pace. Some students may move faster and others slower according to their own God-given abilities. This is why it is important to note that skills are constantly reviewed in all grades. So even though long division may be a benchmark for 3rd graders, that skill will be reviewed in subsequent grades until a child graduates from Zion. In this way, we believe that each child in our school will succeed in math at a high level.

Standard 1: Mathematical Processes
Our students will:

Kindergarten

1.1 use thinking skills to:
- 1.1.1 order one and two-digit numbers.
- 1.1.2 identify greatest and least.
- 1.1.3 identify more, same, and less.
- 1.1.4 identify and count pennies, nickels, and dimes.
- 1.1.5 identify a missing piece in a matrix.

1.2 use reasoning skills to:
- 1.2.1 identify equivalent sets.
- 1.2.2 compare sets of objects.
- 1.2.3 divide a set of objects into equal groups.
- 1.2.4 match sets and numbers.
- 1.2.5 identify one half.
- 1.2.6 divide a shape in half.

1.3 use strategies to:
- 1.3.1 act out addition and subtraction problems.
- 1.3.2 find addition and subtraction answers using pictures.

1.4 develop the skill to recognize and use math skills in other subjects.

Primary Grades (1-2)

1.1 identify and solve problems using patterns.
1.2 solve problems using fact families.
1.3 connect math to everyday life.
1.4 identify important and unimportant information.
1.5 draw a table or chart.
1.6 explain how they solved a problem.
1.7 determine which strategy to use to solve a problem.

Intermediate Grades (3-4)

1.1 be able to perceive patterns in numbers and objects.

1.2 identify relationships between numbers.
1.3 become familiar with and use a variety of problem solving strategies.
    1.3.1 make predictions.
    1.3.2 identify important and unimportant information.
    1.3.3 act out a problem or make a model.
    1.3.4 draw a picture or make a table or chart.
    1.3.5 make guesses, check and revise ideas as needed.
    1.3.6 classify and sort.
1.4 determine which strategy will work and realize that sometimes there can be more than one right way to find an answer.
1.5 write and solve math sentences in order to show their work.
1.6 connect and use math in other subject areas and their personal life.
1.7 explain how they solved a problem to their peers and to
    1.7.1 be able to use logical reasoning in problem solving.
    1.7.2 question and respond.
    1.7.3 work with partners in groups.

Middle Grades (5-6)

1.l review using reasoning abilities to
    1.1.1 evaluate information.
    1.1.2 perceive patterns.
    1.1.3 identify relationships.
    1.1.4 formulate questions for further exploration.
    1.1.5 evaluate and justify strategies.
    1.1.6 test reasonableness of results.
1.2 review communicating mathematical ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models.
1.3 review the connection of mathematical learning with other subjects, personal experiences, current events, and personal interests.
1.4 be introduced to seeing relationships between various kinds of problems and actual events.
1.5 be introduced to using mathematics as a way to understand other areas of the curriculum. (measurement in science, map skills in social studies)
1.6 review using appropriate mathematical vocabulary, symbols, and notation with understanding based on prior conceptual work.
1.7 be introduced to Explaining solutions to problems clearly and logically in oral and written work and support solutions with evidence.
1.8 be introduced to developing effective oral and written presentations that include
    1.8.1 appropriate use of technology.
    1.8.2 mathematical language and terminology. (e.g., symbols, definitions, labeled drawings)
    1.8.3 clear organization of ideas and procedures.
    1.8.4 understanding of purpose and audience.

Upper Grades (7-8)

1.1 use reasoning abilities to
    1.1.1 evaluate information.
    1.1.2 break a problem into simpler parts.
    1.1.3 perceive patterns.
    1.1.4 identify relationships and sort information.
    1.1.5 solve algebraic and spatial reasoning in various mathematical problems.

1.1.6 formulate questions for further exploration.
1.1.7 evaluate strategies for accuracy.
1.1.8 justify statements and solutions.
1.1.9 test the reasonableness of results.
1.1.10 defend their work.

1.2 use helps such as pictures, key words, charts, graphs, lists, algorithms, and working backwards when problem solving.
1.3 use strategies such as logical reasoning, working backwards, and trial and error when problem solving.
1.4 find missing information when problem solving.
1.5 communicate logical arguments clearly to show why a result makes sense by using
1.5.1 appropriate technology.
1.5.2 mathematical language and terminology.
1.5.3 clear organization of ideas or procedures.
1.6 analyze non-routine problems by
1.6.1 modeling.
1.6.2 illustrating.
1.6.3 guessing.
1.6.4 simplifying.
1.6.5 generalizing.
1.6.6 shifting to another point of view.
1.7 explain mathematical concepts, procedures, and ideas to others who may not be familiar with them.
1.8 read and understand mathematical texts that will help them in recognizing mathematical ideas that appear in other contexts and subject areas.
1.9 translate verbal expressions into mathematical expressions and vice versa.
1.10 recognize and use the commutative and associative properties when simplifying expressions.

Standard 2: Number Operations and Relationships
Our students will:

Kindergarten
2.1 write money amounts using cent symbol.
2.2 write whole numbers to 30.
2.3 count by 1's, 2's, 5's, and 10's.
2.4 count backwards from 20.
2.5 count forward and backward on a number line.
2.6 identify, read, and write numbers to 30.
2.7 identify numbers before, between, and after.
2.8 identify even and odd numbers.
2.9 identify and count using ordinal numbers.
2.10 identify one more and one less than a number.
2.11 compare numbers to 20.
2.12 estimate and count collections of objects.
2.13 sort a group of objects according to certain attributes.

Primary Grades (1-2)
2.1 reinforce counting by 1's, 2's, 5's, and 10's.
2.2 introduce counting by 6's, 25's, and 100's.

2.3 introduce counting backwards from 100.
2.4 introduce reading and writing whole numbers to 1000.
2.5 introduce rounding numbers to nearest ten and hundred.
2.6 introduce identify place value up to 1000.
2.7 reinforce identifying even and odd numbers.
2.8 introduce identifying addend, sum, and difference.
2.9 introduce adding and subtracting using whole numbers.
2.10 introduce writing addition and subtraction fact families.
2.11 introduce writing multiplication sentences.
2.12 introduce how to estimate a sum or difference.
2.13 introduce adding and subtracting three-digit numbers.
2.14 introduce multiplying by 1's, 2's, 5's, 10's.
2.15 introduce adding and subtracting money.
2.16 reinforce how to identify and count pennies, nickels, dimes, quarters, half-dollars, and dollars.
2.17 introduce how to make change.

Intermediate Grades (3-4)

2.1 perform the 4 operations of addition, subtraction, multiplication, and division.
2.2 understand place value and write numbers to the millions place.
2.3 be able to read and write whole numbers using word form, short word form, standard form, and expanded form.
2.4 round numbers to the nearest ten, hundred, and thousands place in order to estimate.
2.5 quickly and accurately recall the basic facts of addition, subtraction, multiplication, and division.
2.6 read and write simple fractions and
  2.6.1 understands a fractional part of a whole.
  2.6.2 identify equivalent fractions.
  2.6.3 compare and order fractions.
  2.6.4 represent and write mixed numbers.
2.7 add and subtract fractions with like denominators.
2.8 use a calculator in order to check their work.
2.9 identify multiples and factors of a number.
2.10 be introduced to prime and composite numbers.
2.11 continue to identify the different parts of a math sentence: addend, sum, difference, along with factors, product, quotient, dividend and divisor.
2.12 understand and perform regrouping in a math sentence.
2.13 use pictures to model and solve addition, subtraction, multiplication and division problems.
2.14 write and solve multiplication and division fact families.
2.15 identify and use the commutative and associative properties of addition and multiplication along with identifying the properties of 0 or 1 in multiplication and division problems.
2.16 estimate products and quotients.
2.17 add and subtract 2, 3, or 4-digit numbers with or without regrouping.
2.18 use estimation to check the reasonableness of calculated results.
2.19 check subtraction using addition and vice versa; check multiplication using division and vice versa.
2.20 multiply a 2- and 3-digit number by a 1or 2-digit number.
2.21 divide a 2-, 3- and 4-digit number by a 1-digit number.

2.22 write decimals to the tenths or hundredths place.
2.23 add, subtract, multiply and divide money amounts
2.24 quickly and accurately identify and count pennies, nickels, dimes, quarters, and half-dollars.
2.25 select coins for a given amount.
2.26 make change from $1.00, $5.00, $10.00, and $20.00.
2.27 compare and order 1, 2, 3, or 4-digit whole numbers.

Middle Grades (5-6)

2.1 become proficient in performing addition, subtraction, multiplication, and division of whole numbers, fractions, decimals, and amounts of money.
2.2 review the comparing and ordering of whole numbers, fractions, and decimals.
2.3 expand the understanding of place value to the billions and thousandths places
2.4 become proficient in rounding whole numbers, decimals, and fractions.
2.5 become proficient in quickly and accurately recalling the basic facts of addition, subtraction, multiplication, and division.
2.6 review constructing number lines.
2.7 review the concepts of mental math in addition, subtraction, multiplication, and division.
2.8 be introduced to the terminology of dividend, divisor, and quotient in division problems.
2.9 Review identifying factors and multiples of numbers.
2.10 be introduced to identifying the greatest common factor and least common multiple of a set of numbers.
2.11 be introduced to developing an understanding of the breaking down of larger numbers using a factor tree (prime factorization).
2.12 be introduced to the understanding of exponents
    2.12.1 as powers as repeated multiplication.
    2.12.2 by identifying the base and exponent.
2.13 review the concepts of word form, short form, standard form, expanded form, and decimal notation and converting numbers from one form to another.
2.14 review and reinforce the associative property, commutative property, zero property of multiplication, and identity element of math.
2.15 review reading and writing whole numbers, decimals, fractions and percents.
2.16 be introduced to the relationship between decimals, fractions and percents and be able to convert them into the other forms.
2.17 be introduced to percent equivalents to “nice fractions.”
2.18 be introduced to percentage of increase and decrease to determine sale prices or mark ups.
2.19 be introduced to calculating simple interest.
2.20 be introduced to percent of increase or decrease and percents greater than 100.
2.21 be introduced to rates / ratios
    2.21.1 by using proportions to evaluate ratios.
    2.21.2 by identifying appropriate occasions to use proportions.
    2.21.3 by using different strategies to find equivalent rates / ratios such as equal multiplication, proportions, and setting up an equation.
    2.21.4 by finding unit rates.
    2.21.5 solving ratio and rate word problems.
2.22 be introduced to adding exponents, division bars, and parentheses to their knowledge of order of operations.
2.23 be introduced to calculating the absolute value of a number.

2.24 be introduced to knowing the opposite of a number.

Upper Grades (7-8)

2.1 implement mental addition, subtraction, multiplication, and division strategies.
2.2 identify dividend, divisor, and quotient in division problems.
2.3 exploring various techniques to identify the greatest common factor and least common multiple.
2.4 Mastering the use of a breaking down larger numbers using a factor tree (prime factorization).
2.5 reinforce the understanding of exponents
- 2.5.1 as powers as repeated multiplication.
- 2.5.2 by identifying the base and exponent.
- 2.5.3 by variable bases and powers of variable bases.
- 2.5.4 by understanding zero and negative exponents.
- 2.5.5 by converting between negative exponents and fractions with positive exponents.

2.6 Reinforce the understanding of standard, expanded, and decimal notation and be able to convert numbers from one form to another.
2.7 reinforce the use of the associative property of math to rename expressions with exponents to simplest forms.
2.8 identify the relationship between decimals, fractions and percents and be able to convert them into the other forms.
2.9 memorize percent equivalents to "nice fractions."
2.10 estimate by changing difficult fractions into "nice" fractions and then to percents.
2.11 use percents, decimals, and fractions to determine sale prices or mark ups.
2.12 reinforce determining simple interest.
2.13 reinforce identify and determine percent of increase or decrease and percents greater than 100.
2.14 determine rate of change.
2.15 reinforce equivalent rates / ratios
- 2.15.1 by using proportions to evaluate ratios.
- 2.15.2 by identifying appropriate occasions to use proportions.
- 2.15.3 by using different strategies to find equivalent rates / ratios such as equal multiplication, proportions, and setting up an equation.
- 2.15.4 by finding unit rates.
- 2.15.5 solving ratio and rate word problems.
- 2.15.6 understand that tangent means the ratio of an opposite angle and an adjacent angle of a triangle.
- 2.15.7 use tangent to determine the missing side length of a triangle.
- 2.15.8 Introduce and reinforce square roots
- 2.15.9 identifying perfect squares, and memorizing the perfect squares up to 12.
- 2.15.10 by estimating square roots.

2.16 add square roots to their knowledge of order of operation and reinforce exponents, square roots, division bars, and parenthesis.
2.17 multiply and divide numbers with exponents.
2.18 calculate compound interest using exponents.

Standard 3: Geometry

Our students will:

Kindergarten

3.1 make and cover designs using pattern blocks.
3.2 make and copy lines and designs on a geoboard.
3.3 make and cover designs using tangrams.
3.4 create similar shapes and designs.
3.5 identify and name geometric shapes.
3.5 identify similar shapes.
3.6 identify a line of symmetry.
3.7 use positional words and phrases.
3.8 identify right and left.

Primary Grades (1-2)

3.1 reinforce how to name, identify, and construct plane shapes.
3.2 reinforce how to name, identify, and construct solid shapes.
3.3 introduce how to create, identify, and/or draw congruent shapes.
3.4 introduce identifying angles and sides.
3.5 introduce identifying horizontal and vertical lines.
3.6 introduce identifying parallel lines.
3.7 reinforce how to identify symmetrical designs.

Intermediate Grades (3-4)

3.1 create, identify and name line segments.
3.2 identify, describe, sort and compare geometric shapes.
3.3 describe and classify polygons.
3.4 understand and draw parallel and perpendicular lines.
3.5 name triangles by angle size.
3.6 sort, compare, identify and describe geometric solids.
3.7 identify faces, vertices and edges of a geometric solid.
3.8 draw lines of symmetry.
3.9 find perimeter, area, and volume of geometric figures.

Middle Grades (5-6)

3.1 review two-and three-dimensional figures (circles, polygons, trapezoids, prisms, spheres) by
- 3.1.1 naming them.
- 3.1.2 comparing, sorting, and classifying the figures.
- 3.1.3 drawing and constructing physical models to specifications.
- 3.1.4 identifying their properties. (number of sides or faces, two- or three-dimensionality, equal sides, number of right angles)
- 3.1.5 explaining how these figures are related to objects in the environment.
- 3.1.6 predicting the results of combining or subdividing two-dimensional figures.

3.2 review the identification of points, segments, rays, lines, angles, and planes.
3.3 review the identification of types of lines (parallel and perpendicular) and angles.
3.4 review the identification of types of triangles.
3.5 review the calculation of the perimeter and area of triangles and quadrilaterals.
3.6 review the use of physical materials and motion geometry (such as slides, flips, and turns) to identify:
- 3.6.1 line symmetry and rotational symmetry.
- 3.6.2 congruence.
- 3.6.3 simi1arity.

3.7 be introduced to the identification and usage of relationships among figures, including but not limited to:

- 3.7.1 location. (between, adjacent to, interior of)
- 3.7.2 position. (parallel, perpendicular)
- 3.7.3 intersection of two-dimensional figures.

3.8 be introduced to simple two—dimensional coordinate systems to find locations on maps and to represent points and simple figures.

Upper Grades (7-8)

3.1 differentiate between parallel, perpendicular, and intersecting lines.
3.2 determine if angles are acute, obtuse, right, or straight.
3.3 identify complementary and supplementary angles.
3.4 identify angle relationships when a transversal crosses two parallel lines, such as

- 3.4.1 interior and exterior angles.
- 3.4.2 alternate interior and exterior angles.
- 3.4.3 corresponding angles.
- 3.4.4 vertical angles.
- 3.4.5 using proofs to determine the measurement of unknown angles.

3.5 describe, classify, and draw various polygons.
3.6 differentiate between regular and irregular polygons.
3.7 identify edges, faces, and vertices of polygons and three-dimensional figures.
3.8 use logical reasoning to manipulate three-dimensional figures.
3.9 calculate the perimeter, area, and volume of complex two-dimensional and three-dimensional shapes.
3.10 determine the similarity and congruence of different figures.
3.11 label acute, obtuse, and right triangles.
3.12 differentiate between equilateral, isosceles, and scalene triangles.
3.13 differentiating and labeling many types of quadrilaterals such as a parallelogram, rhombus, rectangle, or square.
3.14 understand the sum of the interior angles of a triangle is always 180 degrees, and a quadrilateral is always 360 degrees.
3.15 determine the unknown side length of a triangle using the Pythagorean Theorem.
3.16 determine the slant height of a pyramid using the Pythagorean Theorem.
3.17 master finding the area and perimeter of simple two-dimensional shapes such as rectangles, triangles, and circles (circumference).
3.18 find the area of a trapezoid.
3.19 find the volume of a cone or pyramid.
3.20 bisecting a chord on a circle
3.21 re-creating a circle using a chord.
3.22 creating triangles using a compass.
3.23 bisecting triangle segments to create a Sierpinski Triangle.
3.24 understand line symmetry and rotational symmetry.

Standard 4: Measurement

Our students will:

Kindergarten

4.1 identify today's date.
4.2 identify yesterday, today, and tomorrow.
4.3 identify days of the week and months of the year.

4.4 identify which of 2 events takes more or less time.
4.5 tell and show time to the hour.
4.6 compare and order objects by length.
4.7 compare and order objects by height.
4.8 compare and order objects by size.
4.9 weigh objects using nonstandard units.
4.10 estimate and measure objects using nonstandard units.
4.11 compare the capacity of containers.
4.12 be introduced to a one-cup measuring cup.
4.13 be introduced to a quart container.

Primary Grades (1-2)

4.1 introduce measurement to nearest foot and inch.
4.2 introduce measuring using pounds.
4.3 introduce liquid measurement.
4.4 introduce telling time to nearest five minutes.
4.5 introduce how to find elapsed time.
4.6 introduce how to read a calendar, ruler, clock, and thermometer.
4.7 introduce how to write the date using digits.
4.8 introduce finding perimeter.

Intermediate Grades (3-4)

4.1 recognize and work with customary units of measurement and metric units of measurement. (inch, foot, yard, mile; millimeter, centimeter, decimeter, meter, and kilometer)
4.2 be able to convert units of measurement from large to small and small to large.
4.3 determine a reasonable unit of measurement.
4.4 read and interpret measuring instruments…rulers, clocks, thermometers, etc…
4.5 measure accurately to the nearest inch, half-inch, and quarter inch.
4.6 use the correct formula to determine perimeter, area, and volume and label the answer correctly.

Middle Grades (5-6)

4.1 review the identification of U.S. customary measurements of length, capacity, and weight.
4.2 review the identification of metric measurements of length, capacity, and mass.
4.3 review the identification of the Fahrenheit and Celsius scale of temperature.
4.4 expand upon the calculation of time in seconds, minutes, and hours, days, months, years, decades, centuries and millennia.
4.5 review the writing of time of day and dates.
4.6 review the calculation of calculate perimeter.
4.7 review the calculation of area with square units.
4.8 review the calculation of volume with cubic units.
4.9 be introduced to the calculation of angle size.
4.10 review measurement with accuracy to the nearest inch, half-inch, quarter and eighth inch.
4.11 be introduced to:
- 4.11.1 measurement to the nearest millimeter.
- 4.11.2 measurement to the nearest ounce or nearest gram.
- 4.11.3 measurement to the nearest degree of temperature.
- 4.11.4 measurement to the nearest second.

4.11.5 monetary value to dollars and cents.
4.11.6 liquid capacity to the nearest fluid ounce or ml.
4.11.7 angles to the nearest degree.

4.12 review the conversion between measurements of the U.S. Customary system.
4.13 review the conversion between measurements of the metric system.
4.14 review the conversion between measurements of both systems.
4.15 be introduced to the ability to judge the reasonableness and degree of accuracy of an obtained measurement as it relates to prior experience.
4.16 review the measurement of length, time, capacity, mass/weight, and angles
4.17 become proficient with a ruler, protractor, thermometer, and measuring cup.
4.18 review estimating the measures of length, mass, and capacity.
4.19 review the reading and interpreting of measuring instruments. (rulers, clocks, thermometers)
4.20 be introduced to the use of geometric formulas to derive lengths, areas, volumes of common figures (perimeter, circumference, surface area)

Upper Grades (7-8)

4.1 develop their own units of measurement called benchmarks, and relate that knowledge to necessity of concrete units of measurement such as the U.S. customary system and metric system.
4.2 understand and use U.S. customary measurements of length: inch, foot, yard, and mile.
4.3 understand and use U.S. customary measurements of weight: ounce, pound, and ton.
4.4 understand U.S. customary measurements of capacity and how they are related: tablespoon, cup, pint, quart, and gallon.
4.5 understand the following metric prefixes: milli-, centi-, deci-, deka-, hetor-, kilo-.
4.6 understand and the standard metric measurements of length (meter), capacity (liter), and mass (kilogram) and how they are related.
4.7 know and use the abbreviations for standard measurements.
4.8 convert measurements within and between the U.S. customary and metric systems.
4.9 read a Fahrenheit and Celsius scale.
4.10 convert between temperature scales.
4.11 estimate measures of length, mass, and capacity.
4.12 master the use of a U.S. customary and metric ruler, a protractor, a compass, and a thermometer.
4.13 measure with accuracy
4.13.1 length to the nearest millimeter or 1/16 of an inch.
4.13.2 weight or mass to the nearest .1 g or .5 ounce.
4.13.3 capacity to the nearest milliliter.
4.13.4 angles to the nearest degree.
4.13.5 temperature to the nearest C or F degree.
4.13.6 elapsed time to the nearest second.

Standard 5: Statistics and Probability

Our students will:

Kindergarten

5.1 sort objects and identify a sorting rule.
5.2 graph a picture on a pictograph.
5.3 make a real graph.

5.4 identify the most, fewest, and same on a graph.
5.5 record data on a chart or graph.
5.6 identify range and mode on a graph.
5.7 describe which event is most likely to happen.

Primary Grades (1-2)

Be introduced to:

5.1 tally.
5.2 using data to make a graph.
5.3 reading graphs.
5.4 solving problems based on graphs.
5.5 drawing and reading a pictograph, bar graph, and line graph.
5.6 creating and reading a Venn diagram.
5.7 writing observations about a graph.

Intermediate Grades (3-4)

5.1 determine the average/mean of a group of numbers.
5.2 conduct a survey and record data.
5.3 create and read a Venn diagram.
5.4 write observations about a graph.

Middle Grades (5-6)

5.1 continue to work with data in the context of real-world situations by
- 5.1.1 formulating questions that lead to data collection and analysis.
- 5.1.2 determining what data to collect and when and how to collect them.
- 5.1.3 collecting, organizing, and displaying data.
- 5.1.4 drawing reasonable conclusions based on data.
- 5.1.5 tallying information.
- 5.1.6 conducting a survey and recording data.

5.2 be introduced to organizing and analyzing data.
5.3 be introduced to finding the mean, median, mode and range of a set of data.
5.4 be introduced to representing data with bar graphs, histograms, line graphs, pie graphs, pictographs, line plots, stem and leaf plots, and review Venn diagrams.
5.5 be introduced to extracting, interpreting, and analyzing information from organized and displayed data by using.
- 5.5.1 frequency and distribution, including mode and range.
- 5.5.2 central tendencies of data such as mean and median.
- 5.5.3 outliers.

5.6 review the reading, extracting, and usage of information presented in graphs, tables, or charts.
5.7 be introduced to writing observations about a graph.
5.8 be introduced to describing the likelihood of an event.
5.9 be introduced to conducting a probability experiment and predicting the outcome (more, less, or equally likely, impossible, or certain to occur).
5.10 be introduced to working with data in the context of real-world situations by using technology to generate displays, summary statistics, and presentations.
5.11 review the organizing and displaying of data from statistical investigations using appropriate tables, graphs, and or charts. (circle, bar, or line for multiple sets of data)

Upper Grades (7-8)

5.1 work with data in the context of real-world situations by

5.1.1 formulating questions that lead to data collection and analysis.
5.1.2 designing and conducting a statistical investigation.
5.1.3 collect and interpret data using tallies and surveys.

5.2 organize and display data from statistical investigations using
5.2.1 appropriate tables, graphs, and/or charts such as bar graphs, histograms, and circle graphs.
5.2.2 appropriate plots such as line, stem-and-leaf, box and whisker, or scatter plots with fitted lines.

5.3 extract, interpret, and analyze information from organized and displayed data by using
5.3.1 frequency and distribution, including mode and range.
5.3.2 central tendencies of data such as mean and median.
5.3.3 outliers.

5.4 use the results of data analysis to
5.4.1 make predictions.
5.4.2 develop convincing arguments.
5.4.3 draw conclusions.

5.5 determine the likelihood of occurrence of simple events by
5.5.1 using a variety of strategies to identify possible outcomes such as tree diagrams, lists, tables, and geometric probability.
5.5.2 conducting an *experiment* to determine probability.
5.5.3 designing and conducting simulations.
5.5.4 applying *theoretical* notions of probability.

5.6 express simple probability of events using tree diagrams, permutations, combinations, and geometric probability.

5.7 determine the probability of dependent and independent events.

5.8 using sample groups to determine probabilities regarding the population.

Standard 6: Algebraic Relationships

Our students will:

Kindergarten

6.1 identify, read and extend color patterns.
6.2 identify, read, and extend shape patterns.
6.3 identify the missing shape in a matrix.
6.4 identify the missing number in a sequence.

Primary Grades (1-2)

6.1 reinforce how to identify the missing shape or design in a repeating pattern.
6.2 be introduced to grids and find points on them.
6.3 introduce using comparison symbols. (<, >, =)
6.4 introduce how to write and solve a number sentence for a problem involving addition or subtraction.

Intermediate Grades (3-4)

6.1 use letters, boxes, or other symbols to stand for any number.
6.2 read and complete a variety of patterns.
6.3 be familiar with the commutative and associative properties when adding and multiplying.

6.4 simplify expressions containing addition, subtraction, multiplication, division, in parentheses.
6.5 understand the order operations must be performed.
6.6 be able to solve one or two variable equations when given what the variable equals.
6.7 use a function rule to complete a table.
6.8 determine what the variable equals and check by plugging the answer back in.
6.9 recognize and use inverse operations.
6.10 add positive and negative numbers.

Middle Grades (5-6)

6.1 be introduced to recognizing the difference between equations and expressions.
6.2 be introduced to writing an equation for a given word problem and writing a word problem for a given equation.
6.3 be introduced to using equations and inequalities in a variety of ways to:
    6.3.1 represent problem situations.
    6.3.2 solve them by different strategies.
6.4 be introduced to solving problems for an unknown.
6.5 be introduced to solving multi-step problems.
6.6 review identify a missing number as a variable and use symbols to represent the variable.
6.7 review the use of comparison symbols. (<, > and =)
6.8 be introduced to using order of operations to evaluate real number expressions.
6.9 be introduced to evaluating expressions through number substitution.
6.10 be introduced to generating equivalent expressions.
6.11 be introduced to reading and completing numeric, geometric, and story problem patterns.
6.12 review identify the missing number in a sequence.
6.13 review reading and completing arithmetic, geometric, pictorial, and Fibonacci sequences.
6.14 review identify the associative property of addition and multiplication.
6.15 review identifing the commutative property of addition and multiplication.
6.16 review identify the identity property of addition and multiplication.
6.17 be introduced to analyzing the distributive property.
6.18 review identify the zero property of multiplication.
6.19 be introduced to determining the absolute value of a number.
6.20 review adding and subtracting of positive and negative numbers and be introduced to multiplying, and dividing them.
6.21 be introduced to identifying rational and irrational numbers.

Upper Grades (7-8)

6.1 understand and work with variables, symbols of inclusion, negative signs, coefficients, polynomials and simplifying.
6.2 use order of operations to evaluate real number expressions.
6.3 simplify and factor algebraic terms.
6.4 identify rational and irrational numbers.
6.5 combine like terms.
6.6 evaluate expressions by replacing numbers with variables.
6.7 master solving for simple equations.
6.8 reinforce solving for multi-step equations.
6.9 show that two expressions are equal.
6.10 add and subtract expressions.

6.11 write equations to solve word problems.
6.12 practice creating algebraic word problems.
6.13 represent linear and nonlinear patterns with tables, graphs, algebraic expressions, equations, and inequalities.
6.14 solve inequalities by using multiplication and division and graph on a number line.
6.15 describe and interpret their graphical representations and use them as models of real world events.
6.16 solve and graph simple and multi-step inequalities.
6.17 simplify multiplication expressions using the distributive, commutative, and associative properties.
6.18 determine if equations are functions.
6.19 graph simple functions.
6.20 work with lines on a four quadrant grid and equations
- 6.20.1 to find slope.
- 6.20.2 to write the equation of a line in $y = mx + b$ form.
- 6.20.3 to differentiate between linear and non-linear lines.
- 6.20.4 to determine where the line will cross the y or x axis.
- 6.20.5 to predict the slope and path of a line.
- 6.20.6 to label and match coordinates.
- 6.20.7 to graph and interpret correlation on a scatter plot.
- 6.20.8 to fit a line on a scatter plot.

6.21 simplify equations with multiple variables on each side
- 6.21.1 simplify equations to determine if they are quadratic.

Additionally, Pre-Algebra students will:

Polynomials
- express numbers in scientific and standard notation
- find products and quotients of numbers expressed in scientific notation
- use manipulatives to model polynomials
- arrange the terms of a polynomial so that the powers of a variable are in ascending or descending order
- use manipulatives to add and subtract polynomials
- add and subtract polynomials
- use manipulatives to model the product of simple polynomials
- multiply a polynomial by a monomial
- simplify expressions involving polynomials
- use manipulatives 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
- 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
- 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

- find the coordinates of a quadratic function's vertex
- find the equation of the axis of symmetry and the coordinates of the vertex of a parabola
- graph quadratic functions
- 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
- graph exponential functions
- determine if a set of data displays exponential behavior
- divide polynomials by monomials
- divide polynomials by binomials
- simplify radical expressions
- simplify and approximate values of expressions containing radicals
- simplify radical expressions involving addition, subtraction, and multiplication.
- solve radical equations