Oklahoma PASS – Mathematics
EducAide's Coverage of Grades 1–8 and High School

This document shows EducAide's coverage of Oklahoma Priority Academic Student Skills (PASS) for mathematics grades 1–8 and High School. It is current as of April 30, 2015, though subject to change. The number of items in Problem-Attic is shown to the right. For information about PASS, please visit **http://ok.gov/sde/mathematics**.

Note: asterisks (*) are used to identify standards and objectives that must be assessed by the local school district. All other skills may be assessed by the Oklahoma School Testing Program (OSTP).

Grade 1

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use a variety of problem-solving approaches to model, describe and extend patterns.

1. Describe, extend and create patterns using concrete objects (e.g., sort a bag of objects by attributes and orally communicate the pattern for each grouping). **6**

2. Describe, extend and create patterns with numbers in a variety of situations (e.g., addition charts, skip counting, calendars). **20**

3. Demonstrate number patterns by counting as many as 100 objects by 1's, 2's, 5's and 10's. **8**

4. Recognize and apply the commutative and identity properties of addition using models and manipulatives to develop computational skills (e.g., 2 + 4 = 4 + 2, 3 + 0 = 3). **10**

Standard 2: Number Sense and Operation — The student will read, write and model numbers and number relationships. The student will use models to construct basic addition and subtraction facts with whole numbers.

1. Number Sense
   a. Use concrete models of tens and ones to develop the concept of place value. **16**
   b. Compare objects by size and quantity (e.g., more than, less than, equal to). **22**
   c. Read and write numerals to 100. **6**
   d. Manipulate physical models and recognize graphical representation of fractional parts (e.g., halves, thirds, fourths). **20**

2. Number Operations
   a. Develop and apply the concepts of addition and subtraction.
      i. Use models to construct addition and subtraction facts with sums up to twenty (e.g., counters, cubes). **10**
      ii. Perform addition by joining sets of objects and subtraction by separating and by comparing sets of objects. **30**
      iii. Demonstrate fluency (i.e., memorize and apply) with basic addition facts to make a maximum sum of 10 and the associated subtraction facts (e.g., 7 + 3 = 10 and 10 − 3 = 7). **18**
   b. Write addition and subtraction number sentences for problem-solving situations. **18**

    c. Acquire strategies for making computations using tens and ones to solve two- digit addition and subtraction problems without regrouping (e.g., use estimation, number sense to judge reasonableness, counting on, use base-ten blocks).   **8**

Standard 3:   Geometry — The student will use geometric properties and relationships to recognize and describe shapes.

    1. Sort and identify congruent shapes.   **2**

    2. Identify, name, and describe two-dimensional geometric shapes (including rhombi) and objects in everyday situations (e.g., the face of a round clock is a circle, a desktop is a rectangle).   **26**

    3. Identify, name and describe three-dimensional geometric shapes (including cones) and objects in everyday situations (e.g., a can is a cylinder, a basketball is a sphere).   **4**

    4. Use language to describe relationships of objects in space (e.g., above, below, behind, between).   **10**

Standard 4:   Measurement — The student will develop and use measurement skills in a variety of situations.

    1. Linear Measurement: Measure objects with one-inch tiles and with a standard ruler to the nearest inch.

    2. Time
        a. Tell time on digital and analog clocks on the hour and half-hour.   **24**
        b. Develop the concepts of days, weeks, and months using a calendar.   **10**

    3. Money: Identify and name the value of pennies, dimes, nickels, and quarters.   **18**

Standard 5:   Data Analysis — The student will demonstrate an understanding of data collection and display.

    1. Data Analysis
        a. Organize, describe, and display data using concrete objects, pictures, or numbers.   **16**
        b. Formulate and solve problems that involve collecting and analyzing data common to children's lives (e.g., color of shoes, numbers of pets, favorite foods).   **12**

Grade 2

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use a variety of problem-solving approaches to model, describe and extend patterns.

1. Describe, extend, and create patterns using symbols, shapes, or designs (e.g., repeating and growing patterns made up of sets of shapes or designs, create patterns by combining different shapes and taking them apart). **4**

2. Formulate and record generalizations about number patterns in a variety of situations (e.g., addition and subtraction patterns, even and odd numbers, build a table showing the cost of one pencil at 10 cents, 2 pencils at 20 cents). **30**

3. Find unknown values in open number sentences with a missing addend and use to solve everyday problems.

4. Recognize and apply the associative property of addition (e.g., $3 + (2 + 1) = (3 + 2) + 1$). **14**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to acquire basic facts and will compute with whole numbers less than 100.

1. Number Sense

    a. Use concrete models of hundreds, tens, and ones to develop the concepts of place value and link the concepts to the reading and writing of numbers (e.g., base-10 blocks). **32**

    b. Represent a number in a variety of ways (e.g., write 15 as 8 + 7, write 25 as 2 tens + 5 ones or as 1 ten + 15 ones). **6**

    c. Write a number sentence to compare numbers less than 1,000 (e.g., 425 > 276, 73 < 107, page 351 comes after 350, 753 is between 700 and 800). **4**

    d. Demonstrate (using concrete objects, pictures, and numerical symbols) fractional parts including halves, thirds, fourths and common percents (25%, 50%, 75%, and 100%). **38**

2. Number Operations

    a. Demonstrate fluency (i.e., memorize and apply) with basic addition facts to make a maximum sum of 18 and the associated subtraction facts (e.g., $15 + 3 = 18$ and $18 - 3 = 15$). **42**

    b. Use strategies to estimate and solve sums and differences (e.g., compose, decompose and regroup numbers, use knowledge of 10 to estimate quantities and sums [two numbers less than 10 cannot add up to more than 20].) **14**

    c. Solve two-digit addition and subtraction problems with and without regrouping using a variety of techniques. **44**

    d. Use concrete models to develop understanding of multiplication as repeated addition and division as successive subtraction. **54**

Standard 3: Geometry — The student will use geometric properties and relationships to recognize and describe shapes.

1. Identify symmetric and congruent shapes and figures. **10**

2. Investigate and predict the results of putting together and taking apart two-dimensional shapes.

Standard 4:   Measurement — The student will use appropriate units of measure in a variety of situations.

   1.   Linear Measurement

       a.   Measure objects using standard units (e.g., measure length to the nearest foot, inch, and half inch).

       b.   Select and use appropriate units of measurement in problem-solving and everyday situations.   **14**

   2.   Time

       a.   Tell time on digital and analog clocks on the quarter-hour.   **20**

       b.   Solve problems involving number of days in a week, month, or year and problems involving weeks in a month and year.

   3.   Money

       a.   Identify and count money up to a twenty dollar bill.   **30**

       b.   Recognize and write different amounts of money using dollar and cent notation.   **14**

Standard 5:   Data Analysis — The student will demonstrate an understanding of data collection, display, and interpretation.

   1.   Data Analysis

       a.   Collect, sort, organize, and display data in charts, bar graphs, and tables (e.g., collect data on teeth lost and display results in a chart).   **8**

       b.   Summarize and interpret data in charts, bar graphs, and tables.   **14**

   1.   Extra: Use ordinal numbers first through tenth to order objects.   **14**

Grade 3

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use a variety of problem-solving approaches to extend and create patterns.

1. Describe (orally or in written form), create, extend and predict patterns in a variety of situations (e.g., 3, 6, 9, 12..., use a function machine to generate input and output values for a table, show multiplication patterns on a hundreds chart, determine a rule and generate additional pairs with the same relationship). **62**

2. Find unknowns in simple arithmetic problems by solving open sentences (equations) and other problems involving addition, subtraction, and multiplication. **20**

3. Recognize and apply the commutative and identity properties of multiplication using models and manipulative to develop computational skills (e.g., $3 \cdot 5 = 5 \cdot 3$, $7 \cdot 1 = 7$). **22**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers.

1. Number Sense

    a. Place Value

       i. Model the concept of place value through 4 digits (e.g., base-10 blocks, bundles of 10s, place value mats). **12**

       ii. Read and write whole numbers up to 4 digits (e.g., expanded form, standard form). **16**

    b. Whole Numbers and Fractions

       i. Compare and order whole numbers up to 4 digits. **36**

       ii. Create and compare physical and pictorial models of equivalent and nonequivalent fractions including halves, thirds, fourths, eighths, tenths, twelfths, and common percents (25%, 50%, 75%, 100%) (e.g., fraction circles, pictures, egg cartons, fraction strips, number lines). **56**

2. Number Operations

    a. Estimate and find the sum or difference (with and without regrouping) of 3- and 4-digit numbers using a variety of strategies to solve application problems. **60**

    b. Multiplication Concepts and Fact Families

       i. Use physical models and a variety of multiplication algorithms to find the product of multiplication problems with one-digit multipliers. **6**

       ii. Demonstrate fluency (memorize and apply) with basic multiplication facts up to 10×10 and the associated division facts (e.g., $5 \times 6 = 30$ and $30 \div 6 = 5$). **32**

       iii. Estimate the product of 2-digit by 2-digit numbers by rounding to the nearest multiple of 10 to solve application problems. **22**

Standard 3: Geometry — The student will use geometric properties and relationships to recognize and describe shapes.

1. Identify and compare attributes of two- and three- dimensional shapes and develop vocabulary to describe the attributes (e.g., count the edges and faces of a cube, the radius is half of a circle, lines of symmetry). **54**

2. Analyze the effects of combining and subdividing two- and three-dimensional figures (e.g., folding paper, tiling, nets, and rearranging pieces of solids). **8**

3. Make and use coordinate systems to specify locations and shapes on a grid with ordered pairs and to describe paths from one point to another point on a grid. **50**

Standard 4: Measurement — The student will use appropriate units of measure to solve problems.

1. Measurement

   a. Choose an appropriate measurement instrument and measure the length of objects to the nearest inch or half-inch and the weight of objects to the nearest pound or ounce. **12**

   b. *Choose an appropriate measurement instrument and measure the length of objects to the nearest meter or centimeter and the weight of objects to the nearest gram or kilogram. **10**

   c. Develop and use the concept of perimeter of different shapes to solve problems. **30**

   d. *Develop and use strategies to choose an appropriate unit and measurement instrument to estimate measurements (e.g., use parts of the body as benchmarks for measuring length). **32**

2. Time and Temperature

   a. Solve simple addition problems with time (e.g., 15 minutes added to 1:10 p.m.).

   b. Tell time on a digital and analog clock to the nearest 5 minutes. **20**

   c. Read a thermometer and solve for temperature change.

3. Money: Determine the correct amount of change when a purchase is made with a five dollar bill. **16**

Standard 5: Data Analysis — The student will demonstrate an understanding of collection, display, and interpretation of data and probability.

1. Data Analysis

   a. *Pose questions, collect, record, and interpret data to help answer questions (e.g., which was the most popular booth at our carnival?). **6**

   b. Read graphs and charts, identify the main idea, draw conclusions, and make predictions based on the data (e.g., predict how many children will bring their lunch based on a menu). **34**

   c. Construct bar graphs, frequency tables, line graphs (plots), and pictographs with labels and a title from a set of data. **30**

2. Probability: Describe the probability (more, less, or equally likely) of chance events. **30**

Grade 4

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use a variety of problem-solving approaches to create, extend, and analyze patterns.

   1.   Discover, describe, extend, and create a wide variety of patterns using tables, graphs, rules, and verbal models (e.g., determine the rule from a table or "function machine", extend visual and number patterns).   **64**

   2.   Find variables in simple arithmetic problems by solving open sentences (equations) and other problems involving addition, subtraction, multiplication, and division with whole numbers.

   3.   Recognize and apply the associative property of multiplication (e.g., $6\cdot(2\cdot3)=(6\cdot2)\cdot3$).   **4**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers and fractions.

   1.   Number Sense

      a. Place Value

         i. Apply the concept of place value through 6 digits (e.g., write numbers in expanded form).   **46**

        ii. Model, read, write and rename decimal numbers to the hundredths (e.g., money, numerals to words).   **28**

      b. Whole Number, Fraction, and Decimal

         i. Compare and order whole numbers and decimals to the hundredths place (e.g., pictures of shaded regions of two-dimensional figures, use >, <, = symbols).   **36**

        ii. Use 0, 1/2, and 1 or 0, 0.5, and 1 as benchmarks and place additional fractions, decimals, and percents on a number line (e.g., 1/3, 3/4, 0.7, 0.4, 62%, 12%).   **28**

        iii. Compare, add, or subtract fractional parts (fractions with like denominators and decimals) using physical or pictorial models. (e.g., egg cartons, fraction strips, circles, and squares).   **32**

        iv. *Explore and connect negative numbers using real world situations (e.g. owing money, temperature, measuring elevations above and below sea level).

   2.   Number Operation

      a. Estimate and find the product of up to three-digit by three-digit using a variety of strategies to solve application problems.   **46**

      b. Division Concepts and Fact Families

         i. Demonstrate fluency (memorize and apply) with basic division facts up to $144 \div 12$ and the associated multiplication facts (e.g., $144 \div 12 = 12$ and $12 \times 12 = 144$).

        ii. Estimate the quotient with one- and two-digit divisors and a two- or three-digit dividend to solve application problems.   **6**

        iii. Find the quotient (with and without remainders) with 1-digit divisors and a 2- or 3-digit dividend to solve application problems.   **54**

Standard 3: Geometry — The student will use geometric properties and relationships to analyze shapes.

1. Identify, draw, and construct models of intersecting, parallel, and perpendicular lines. **40**

2. Identify and compare angles equal to, less than, or greater than 90 degrees (e.g., use right angles to determine the approximate size of other angles). **10**

3. Identify, draw, and construct models of regular and irregular polygons including triangles, quadrilaterals, pentagons, hexagons, heptagons, and octagons to solve problems.

4. Describe the effects on two-dimensional objects when they slide (translate), flip (reflect), and turn (rotate) (e.g., tessellations). **38**

Standard 4: Measurement — The student will solve problems using appropriate units of measure in a variety of situations.

1. Measurement

   a. Estimate the measures of a variety of objects using customary units. **24**

   b. Establish benchmarks for metric units and estimate the measures of a variety of objects (e.g., mass: the mass of a raisin is about 1 gram, length: the width of a finger is about 1 centimeter). **34**

   c. Select appropriate customary and metric units of measure and measurement instruments to solve application problems involving length, weight, mass, area, and volume. **80**

   d. Develop and use the concept of area of different shapes using grids to solve problems. **24**

2. Time and Temperature

   a. Solve elapsed time problems. **28**

   b. Read thermometers using different intervals (intervals of 1, 2, or 5) and solve for temperature change. **42**

3. Money: Determine the correct amount of change when a purchase is made with a twenty dollar bill.

Standard 5: Data Analysis — The student will demonstrate an understanding of collection, display, and interpretation of data and probability.

1. Data Analysis

   a. Read and interpret data displays such as tallies, tables, charts, and graphs and use the observations to pose and answer questions (e.g., choose a table in social studies of population data and write problems). **40**

   b. Collect, organize and record data in tables and graphs (e.g., line graphs (plots), bar graphs, pictographs). **14**

2. Probability: Predict the probability of outcomes of simple experiments using words such as certain, equally likely, impossible (e.g., coins, number cubes, spinners). **16**

3. Central Tendency: Determine the median (middle), and the mode (most often) of a set of data.

Grade 5

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use algebraic methods to describe patterns and solve problems in a variety of contexts.

    1. Describe rules that produce patterns found in tables, graphs, and models, and use variables (e.g., boxes, letters, pawns, number cubes, or other symbols) to solve problems or to describe general rules in algebraic expression or equation form. **36**

    2. Use algebraic problem-solving techniques (e.g., use a balance to model an equation and show how subtracting a number from one side requires subtracting the same amount from the other side) to solve problems. **8**

    3. Recognize and apply the commutative, associative, and distributive properties to solve problems (e.g., $3 \times (2 + 4) = (3 \times 2) + (3 \times 4)$). **12**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers, fractions, and decimals.

    1. Number Sense

        a. Apply the concept of place value of whole numbers through hundred millions (9 digits) and model, read, and write decimal numbers through the thousandths. **24**

        b. Represent with models the connection between fractions and decimals, compare and order fractions and decimals, and be able to convert from one representation to the other to solve problems. (e.g., use 10×10 grids, base 10 blocks). **94**

        c. Identify and compare integers using real world situations. (e.g., owing money, temperature, or measuring elevations above and below sea level). **2**

        d. *Identify and apply factors, multiples, prime, and composite numbers in a variety of problem-solving situations (e.g., build rectangular arrays for numbers 1–100 and classify as prime or composite, use common factors to add fractions). **52**

    2. Number Operations

        a. Estimate, add, or subtract decimal numbers with same and different place values to solve problems (e.g., $3.72 + 1.4$, $\$4.56 - \$2.12$). **82**

        b. Estimate add, or subtract fractions (including mixed numbers) to solve problems using a variety of methods (e.g., use fraction strips, use area models, find a common denominator). **48**

        c. Estimate and find the quotient (with and without remainders) with two-digit divisors and a two- or three-digit dividend to solve application problems. **16**

Standard 3: Geometry — The student will apply geometric properties and relationships.

    1. Compare and contrast the basic characteristics of circle and polygons (triangles, quadrilaterals, pentagons, hexagons, heptagons, octagons).

    2. Classify angles (e.g., acute, right, obtuse, straight). **34**

Standard 4: **Measurement - The student use appropriate units of measure to solve problems in a variety of contexts.**

   1. Measurement

      a. Compare, estimate, and determine the measurement of angles. **62**

      b. Develop and use the formula for perimeter and area of a square and rectangle to solve application problems. **36**

      c. Convert basic measurements of volume, mass and distance within the same system for metric and customary units (e.g., inches to feet, hours to minutes, centimeters to meters). **158**

   2. Money: Solve a variety of problems involving money. **6**

Standard 5: **Data Analysis — The student will use data analysis, statistics and probability to interpret data in a variety of contexts.**

   1. Data Analysis

      a. Compare and translate displays of data and justify the selection of the type of table of graph (e.g., charts, tables, bar graphs, pictographs, line graphs, circle graphs, Venn diagrams). **26**

      b. *Formulate questions, design investigations, consider samples, and collect, organize, and analyze data using observation, measurement, surveys, or experiments (e.g., how far can 5th graders throw a softball based on where it first hits the ground?).

   2. Probability

      a. Determine the probability of events occurring in familiar contexts or experiments and express probabilities as fractions from zero to one (e.g., find the fractional probability of an event given a biased spinner). **56**

      b. Use the fundamental counting principle on sets with up to four items to determine the number of possible combinations (e.g. create a tree diagrams to see possible combinations). **26**

   3. Central Tendency: Determine the range (spread), mode (most often), and median (middle) of a set of data. **22**

Grade 6

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use algebraic methods to describe patterns, simplify and write algebraic expressions and equations, and solve simple equations in a variety of contexts.

1. Generalize and extend patterns and functions using tables, graphs, and number properties (e.g., number sequences, prime and composite numbers, recursive patterns like the Fibonacci numbers). — **28**

2. Write algebraic expressions and simple equations that correspond to a given situation. — **84**

3. Use substitution to simplify and evaluate algebraic expressions (e.g., if $x = 5$ evaluate $3 - 5x$). — **40**

4. Write and solve one-step equations with one variable using number sense, the properties of operations, and the properties of equality (e.g., $\frac{1}{3}x = 9$). — **14**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to solve a variety of problems. The student will estimate and compute with integers, fractions, and decimals.

1. Number Sense: Convert compare, and order decimals, fractions, and percents using a variety of methods. — **8**

2. Number Operations

   a. Multiply and divide fractions and mixed numbers to solve problems using a variety of methods. — **50**

   b. Multiply and divide decimals with one- or two-digit multipliers or divisors to solve problems. — **20**

   c. Estimate and find solutions to single and multi-step problems using whole numbers, decimals, fractions, and percents (e.g., $7/8 + 8/9$ is about 2, $3.9 + 5.3$ is about 9). — **88**

   d. Use the basic operations on integers to solve problems. — **30**

   e. Build and recognize models of multiples to develop the concept of exponents and simplify numerical expressions with exponents and parentheses using order of operations. — **26**

Standard 3: Geometry — The student will use geometric properties and relationships to recognize, describe, and analyze shapes and representations in a variety of contexts.

1. Compare and contrast the basic characteristics of three-dimensional figures (pyramids, prisms, cones, and cylinders).

2. Compare and contrast congruent and similar figures. — **24**

3. Identify the characteristics of the rectangular coordinate system and use them to locate points and describe shapes drawn in all four quadrants. — **32**

Standard 4:   Measurement — The student will use measurements within the metric and customary systems to solve problems in a variety of contexts.

1.   Use formulas to find the circumference and area of circles in terms of pi.   **24**

2.   Convert, add, or subtract measurements within the same system to solve problems (e.g., $9'\,8'' + 3'\,6''$, 150 minutes = _____ hours and _____ minutes, 6 square inches = _____ square feet).   **88**

Standard 5:   Data Analysis — The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.

1.   Data Analysis: Organize, construct displays, and interpret data to solve problems (e.g., data from student experiments, tables, diagrams, charts, graphs).   **44**

2.   Probability: Use the fundamental counting principle on sets with up to five items to determine the number of possible combinations.   **40**

3.   Central Tendency: Find the measures of central tendency (mean, median, mode, and range) of a set of data (with and without outliers) and understand why a specific measure provides the most useful information in a given context.   **34**

Grade 7

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will use number properties and algebraic reasoning to identify, simplify, and solve simple linear equations and inequalities.

1. Identify, describe, and analyze functional relationships (linear and nonlinear) between two variables (e.g., as the value of x increases on a table, do the values of y increase or decrease, identify a positive rate of change on a graph and compare it to a negative rate of change).

2. Write and solve two-step equations with one variable using number sense, the properties of operations, and the properties of equality (e.g., $-2x + 4 = -2$).   **106**

3. Inequalities: Model, write, solve, and graph one-step linear inequalities with one variable.   **4**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to solve a variety of problems.

1. Number Sense

    a. Compare and order positive and negative rational numbers.   **38**

    b. Build and recognize models of perfect squares to find their square roots and estimate the square root of other numbers (e.g., the square root of 12 is between 3 and 4).   **36**

    c. *Demonstrate the concept of ratio and proportion with models (e.g., similar geometric shapes, scale models).   **14**

2. Number Operations

    a. Solve problems using ratios and proportions.   **132**

    b. Solve percent application problems (e.g., discounts, tax, finding the missing value of percent/part/whole).   **46**

    c. Simplify numerical expressions with integers, exponents, and parentheses using order of operations.   **12**

Standard 3: Geometry — The student will apply the properties and relationships of plane geometry in a variety of contexts.

1. Classify regular and irregular geometric figures including triangles and quadrilaterals according to their sides and angles.   **66**

2. Identify and analyze the angle relationships formed by parallel lines cut by a transversal (e.g., alternate interior angles, alternate exterior angles, adjacent, and vertical angles).   **10**

3. Construct geometric figures and identify geometric transformations on the rectangular coordinate plane (e.g., rotations, translations, reflections, magnifications).   **32**

Standard 4: Measurement — The student will use measurement to solve problems in a variety of contexts.

    1.   Develop and apply the formulas for perimeter and area of triangles and quadrilaterals to solve problems.   **46**

    2.   Apply the formula for the circumference and area of a circle to solve problems.   **16**

    3.   Find the area and perimeter of composite figures to solve application problems.   **14**

Standard 5: Data Analysis — The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.

    1.   Data Analysis: Compare, translate, and interpret between displays of data (e.g., multiple sets of data on the same graph, data from subsets of the same population, combinations of diagrams, tables, charts, and graphs).   **24**

    2.   Probability: Determine the probability of an event involving "or", "and", or "not" (e.g., on a spinner with one blue, two red and two yellow sections, what is the probability of getting a red or a yellow?).   **64**

    3.   Central Tendency: Compute the mean, median, mode, and range for data sets and understand how additional data or outliers in a set may affect the measures of central tendency.   **20**

Grade 8

Standard 1: Algebraic Reasoning: Patterns and Relationships — The student will graph and solve linear equations and inequalities in problem-solving situations.

1. Equations

   a. Model, write, and solve multi-step linear equations with one variable using a variety of methods to solve application problems. **44**

   b. Graph and interpret the solution to one- and two-step linear equations on a number line with one variable and on a coordinate plane with two variables. **30**

   c. Predict the effect on the graph of a linear equation when the slope or y-intercept changes (e.g., make predictions from graphs, identify the slope or y-intercept in the equation $y = mx + b$ and relate to a graph). **16**

   d. Apply appropriate formulas to solve problems (e.g., $d = rt$, $I = prt$). **36**

2. Inequalities: Model, write, solve, and graph one- and two-step linear inequalities with one variable. **32**

Standard 2: Number Sense and Operation — The student will use numbers and number relationships to solve a variety of problems.

1. Number Sense: Represent and interpret large numbers and numbers less than one in exponential and scientific notation. **44**

2. Number Operations

   a. Use the rules of exponents, including integer exponents, to solve problems (e.g., $7^2 \cdot 7^3 = 7^5$, $3^{-10} \cdot 3^8 = 3^{-2}$). **62**

   b. Solve problems using scientific notation. **10**

   c. Simplify numerical expressions with rational numbers, exponents, and parentheses using order of operations. **26**

Standard 3: Geometry — The student will use geometric properties to solve problems in a variety of contexts.

1. Construct models, sketch (from different perspectives), and classify solid figures such as rectangular solids, prisms, cones, cylinders, pyramids, and combined forms. **22**

2. Develop the Pythagorean Theorem and apply the formula to find the length of line segments, the shortest distance between two points on a graph, and the length of an unknown side of a right triangle. **22**

Standard 4: Measurement — The student will use measurement to solve problems in a variety of contexts.

1. Develop and apply formulas to find the surface area and volume of rectangular prisms, triangular prisms, and cylinders (in terms of pi). **58**

2. Apply knowledge of ratio and proportion to solve relationships between similar geometric figures. **6**

3. Find the area of a "region of a region" for simple composite figures and the area of cross sections of regular geometric solids (e.g., area of a rectangular picture frame). **18**

Standard 5: Data Analysis — The student will use data analysis, probability, and statistics to interpret data in a variety of contexts.

1. Data Analysis: Select, analyze and apply data displays in appropriate formats to draw conclusions and solve problems. **30**

2. *Probability: Determine how samples are chosen (random, limited, biased) to draw and support conclusions about generalizing a sample to a population (e.g., is the average height of a men's college basketball team a good representative sample for height predictions?). **54**

3. Central Tendency: Find the measures of central tendency (mean, median, mode, and range) of a set of data and understand why a specific measure provides the most useful information in a given context. **34**

Algebra I

Standard 1:   Number Sense and Algebraic Operations — The student will use expressions and equations to model number relationships.

   1.   Equations and Formulas

      a. Translate word phrases and sentences into expressions and equations and vice versa. **28**

      b. Solve literal equations involving several variables for one variable in terms of the others. **8**

      c. Use the formulas from measurable attributes of geometric models (perimeter, circumference, area and volume), science, and statistics to solve problems within an algebraic context. **42**

      d. Solve two-step and three-step problems using concepts such as rules of exponents, rate, distance, ratio and proportion, and percent. **74**

   2.   Expressions

      a. Simplify and evaluate linear, absolute value, rational and radical expressions. **54**

      b. Simplify polynomials by adding, subtracting or multiplying. **22**

      c. Factor polynomial expressions. **10**

Standard 2:   Relations and Functions — The student will use relations and functions to model number relationships.

   1.   Relations and Functions

      a. Distinguish between linear and nonlinear data. **24**

      b. Distinguish between relations and functions. **40**

      c. Identify dependent and independent variables, domain and range. **42**

      d. Evaluate a function using tables, equations or graphs. **20**

   2.   Linear Equations and Graphs

      a. Solve linear equations by graphing or using properties of equality. **28**

      b. Recognize the parent graph of the functions $y = k$, $y = x$, $y = |x|$, and predict the effects of transformations on the parent graph. **24**

      c. Slope

          i. Calculate the slope of a line using a graph, an equation, two points or a set of data points. **30**

         ii. Use the slope to differentiate between lines that are parallel, perpendicular, horizontal, or vertical. **52**

       iii. Interpret the slope and intercepts within the context of everyday life (e.g., telephone charges based on base rate [y-intercept] plus rate per minute [slope]). **30**

      d. Develop the equation of a line and graph linear relationships given the following: slope and y-intercept, slope and one point on the line, two points on the line, x-intercept and y-intercept, a set of data points. **54**

      e. Match equations to a graph, table, or situation and vice versa. **14**

   3.   Linear Inequalities and Graphs

      a. Solve linear inequalities by graphing or using properties of inequalities.   **34**

      b. Match inequalities (with 1 or 2 variables) to a graph, table, or situation and vice versa.   **30**

  4. Solve a system of linear equations by graphing, substitution or elimination.   **42**

  5. *Nonlinear Functions

      a. Match exponential and quadratic functions to a table, graph or situation and vice versa.   **18**

      b. Solve quadratic equations by graphing, factoring, or using the quadratic formula.   **36**

Standard 3: Data Analysis, Probability and Statistics — The student will use data analysis, probability and statistics to formulate and justify predictions from a set of data.

  1. Data Analysis

      a. Translate from one representation of data to another and understand that the data can be represented using a variety of tables, graphs, or symbols and that different modes of representation often convey different messages.   **26**

      b. Make valid inferences, predictions, and/or arguments based on data from graphs, tables, and charts.   **24**

      c. Solve two-step and three-step problems using concepts such as probability and measures of central tendency.   **30**

  2. Collect data involving two variables and display on a scatter plot; interpret results using a linear model/equation and identify whether the model/equation is a line best fit for the data.   **16**

Geometry

Standard 1:   Logical Reasoning — The student will use deductive and inductive reasoning to solve problems.

1.   Identify and use logical reasoning skills (inductive and deductive) to make and test conjectures, formulate counter examples, and follow logical arguments.   **30**

2.   State, use, and examine the validity of the converse, inverse, and contrapositive of "if-then" statements.   **20**

3.   *Compare the properties of Euclidean geometry to non-Euclidean geometries (for example, elliptical geometry, as shown on the surface of a globe, does not uphold the parallel postulate).   **10**

Standard 2:   Properties of 2-Dimensional Figures — The student will use the properties and formulas of geometric figures to solve problems.

1.   *Use geometric tools (for example, protractor, compass, straight edge) to construct a variety of figures.   **22**

2.   Line and Angle Relationships

   a.   Use the angle relationships formed by parallel lines cut by a transversal to solve problems.   **30**

   b.   Use the angle relationships formed by two lines cut by a transversal to determine if the two lines are parallel and verify, using algebraic and deductive proofs.   **22**

   c.   Use relationships between pairs of angles (for example, adjacent, complementary, vertical) to solve problems.   **38**

3.   Polygons and Other Plane Figures

   a.   Identify, describe, and analyze polygons (for example, convex, concave, regular, pentagonal, hexagonal, n-gonal).   **26**

   b.   Apply the interior and exterior angle sum of convex polygons to solve problems, and verify using algebraic and deductive proofs.   **30**

   c.   Develop and apply the properties of quadrilaterals to solve problems (for example, rectangles, parallelograms, rhombi, trapezoids, kites).   **10**

   d.   Use properties of 2-dimensional figures and side length, perimeter or circumference, and area to determine unknown values and correctly identify the appropriate unit of measure of each.   **80**

4.   Similarity

   a.   Determine and verify the relationships of similarity of triangles, using algebraic and deductive proofs.   **16**

   b.   Use ratios of similar 2-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference, and area.   **90**

5.   Congruence

   a.   Determine and verify the relationships of congruency of triangles, using algebraic and deductive proofs.   **20**

   b.   Use the relationships of congruency of 2-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference, and area.   **18**

6. Circles

    a. Find angle measures and arc measures related to circles. **52**

    b. Find angle measures and segment lengths using the relationships among radii, chords, secants, and tangents of a circle. **32**

Standard 3: Triangles and Trigonometric Ratios — The student will use the properties of right triangles and trigonometric ratios to solve problems.

1. Use the Pythagorean Theorem and its converse to find missing side lengths and to determine acute, right, and obtuse triangles, and verify using algebraic and deductive proofs. **92**

2. Apply the 45-45-90 and 30-60-90 right triangle relationships to solve problems, and verify using algebraic and deductive proofs. **36**

3. Express the trigonometric functions as ratios and use sine, cosine, and tangent ratios to solve real-world problems. **44**

4. *Use the trigonometric ratios to find the area of a triangle. **28**

Standard 4: Properties of 3-Dimensional Figures — The student will use the properties and formulas of geometric figures to solve problems.

1. Polyhedra and Other Solids

    a. Identify, describe, and analyze polyhedra (for example, regular, decahedral). **8**

    b. Use properties of 3-dimensional figures; side lengths, perimeter or circumference, and area of a face; and volume, lateral area, and surface area to determine unknown values and correctly identify the appropriate unit of measure of each. **22**

2. Similarity: Use ratios of similar 3-dimensional figures to determine unknown values, such as angles, side lengths, perimeter or circumference of a face, area of a face, and volume. **14**

3. Create a model of a 3-dimensional figure from a 2-dimensional drawing and make a 2-dimensional representation of a 3-dimensional object (for example, nets, blueprints, perspective drawings). **18**

Standard 5: Coordinate Geometry — The student will solve problems with geometric figures in the coordinate plane.

1. Find the distance between two points; the midpoint of a segment; and calculate the slopes of parallel, perpendicular, horizontal, and vertical lines. **58**

2. Properties of Figures

    a. Given a set of points determine the type of figure formed based on its properties. **32**

    b. Use transformations (reflection, rotation, translation) on geometric figures to solve problems within coordinate geometry. **66**

Algebra II

Standard 1:   Number Systems and Algebraic Operations — The student will perform operations with rational, radical, and polynomial expressions, as well as expressions involving complex numbers.

    1.   Rational Exponents

        a. Convert expressions from radical notations to rational exponents and vice versa.   **26**

        b. Add, subtract, multiply, divide, and simplify radical expressions and expressions containing rational exponents.   **88**

    2.   Polynomial and Rational Expressions

        a. Divide polynomial expressions by lower degree polynomials.   **24**

        b. Add, subtract, multiply, divide, and simplify rational expressions, including complex fractions.   **24**

    3.   Complex Numbers

        a. *Recognize that to solve certain problems and equations, number systems need to be extended from real numbers to complex numbers.   **40**

        b. Add, subtract, multiply, divide, and simplify expressions involving complex numbers.   **24**

Standard 2:   Relations and Functions — The student will use the relationships among the solution of an equation, zero of a function, *x*-intercepts of a graph, and factors of a polynomial expression to solve problems involving relations and functions.

    1.   Functions and Function Notation

        a. Recognize the parent graphs of polynomial, exponential, radical, quadratic, and logarithmic functions and predict the effects of transformations on the parent graphs, using various methods and tools which may include graphing calculators.   **40**

        b. Add, subtract, multiply, and divide functions using function notation.   **38**

        c. Combine functions by composition.   **12**

        d. Use algebraic, interval, and set notations to specify the domain and range of functions of various types.   **22**

        e. Find and graph the inverse of a function, if it exists.   **64**

    2.   Systems of Equations

        a. Model a situation that can be described by a system of equations or inequalities and use the model to answer questions about the situation.   **18**

        b. Solve systems of linear equations and inequalities using various methods and tools which may include substitution, elimination, matrices, graphing, and graphing calculators.   **90**

        c. *Use either one quadratic equation and one linear equation or two quadratic equations to solve problems.   **46**

    3.   Quadratic Equations and Functions

        a. Solve quadratic equations by graphing, factoring, completing the square and quadratic formula.   **64**

b. Graph a quadratic function and identify the *x*- and *y*-intercepts and maximum or minimum value, using various methods and tools which may include a graphing calculator. **22**

c. Model a situation that can be described by a quadratic function and use the model to answer questions about the situation. **20**

4. Identify, graph, and write the equations of the conic sections (circle, ellipse, parabola, and hyperbola). **70**

5. Exponential and Logarithmic Functions

a. Graph exponential and logarithmic functions. **38**

b. Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another. **24**

c. Model a situation that can be described by an exponential or logarithmic function and use the model to answer questions about the situation. **26**

6. Polynomial Equations and Functions

a. Solve polynomial equations using various methods and tools which may include factoring and synthetic division. **18**

b. Sketch the graph of a polynomial function. **12**

c. Given the graph of a polynomial function, identify the *x*- and *y*-intercepts, relative maximums and relative minimums, using various methods and tools which may include a graphing calculator. **4**

d. Model a situation that can be described by a polynomial function and use the model to answer questions about the situation. **6**

7. Rational Equations and Functions

a. Solve rational equations. **14**

b. Sketch the graph of a rational function. **12**

c. Given the graph of a rational function, identify the *x*- and *y*-intercepts, vertical asymptotes, using various methods and tools which may include a graphing calculator. **10**

d. Model a situation that can be described by a rational function and use the model to answer questions about the situation. **12**

Standard 3: Data Analysis and Statistics — The student will use data analysis and statistics to formulate and justify predictions from a set of data.

1. Analysis of Collected Data Involving Two Variables

a. Interpret data on a scatter plot using a linear, exponential, or quadratic model/equation. **20**

b. Identify whether the model/equation is a curve of best fit for the data, using various methods and tools which may include a graphing calculator. **24**

2. *Measures of Central Tendency and Variability

a. Analyze and synthesize data from a sample using appropriate measures of central tendency (mean, median, mode, weighted average). **14**

b. Analyze and synthesize data from a sample using appropriate measures of variability (range, variance, standard deviation). **20**