Minnesota Mathematics

Grade 8

Adopted 2008

Number & Operation

1. **Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.** 8.1.1
    1. Classify real numbers as rational or irrational. Know that when a square root of a positive integer is not an integer, then it is irrational. Know that the sum of a rational number and an irrational number is irrational, and the product of a non-zero rational number and an irrational number is irrational. 8.1.1.1
    2. Compare real numbers; locate real numbers on a number line. Identify the square root of a positive integer as an integer, or if it is not an integer, locate it as a real number between two consecutive positive integers. 8.1.1.2
    3. Determine rational approximations for solutions to problems involving real numbers. 8.1.1.3
    4. Know and apply the properties of positive and negative integer exponents to generate equivalent numerical expressions. 8.1.1.4
    5. Express approximations of very large and very small numbers using scientific notation; understand how calculators display numbers in scientific notation. Multiply and divide numbers expressed in scientific notation, express the answer in scientific notation, using the correct number of significant digits when physical measurements are involved. 8.1.1.5

Algebra

1. **Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.** 8.2.1
    1. Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable. Use functional notation, such as f(x), to represent such relationships. 8.2.1.1
    2. Use linear functions to represent relationships in which changing the input variable by some amount leads to a change in the output variable that is a constant times that amount. 8.2.1.2
    3. Understand that a function is linear if it can be expressed in the form f(x) = mx + b or if its graph is a straight line. 8.2.1.3
    4. Understand that an arithmetic sequence is a linear function that can be expressed in the form f(x) = mx + b , where x = 0, 1, 2, 3,… 8.2.1.4
    5. Understand that a geometric sequence is a non-linear function that can be expressed in the form f(x)=ab^x, where x = 0, 1, 2, 3,… 8.2.1.5

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2. **Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.** 8.2.2

    1. Represent linear functions with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another. 8.2.2.1
    2. Identify graphical properties of linear functions including slopes and intercepts. Know that the slope equals the rate of change, and that the y-intercept is zero when the function represents a proportional relationship. 8.2.2.2
    3. Identify how coefficient changes in the equation f(x) = mx + b affect the graphs of linear functions. Know how to use graphing technology to examine these effects. 8.2.2.3
    4. Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems. 8.2.2.4
    5. Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems. 8.2.2.5

3. **Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.** 8.2.3

    1. Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables. 8.2.3.1
    2. Justify steps in generating equivalent expressions by identifying the properties used, including the properties of algebra. Properties include the associative, commutative and distributive laws, and the order of operations, including grouping symbols. 8.2.3.2

4. **Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.** 8.2.4

    1. Use linear equations to represent situations involving a constant rate of change, including proportional and non-proportional relationships. 8.2.4.1
    2. Solve multi-step equations in one variable. Solve for one variable in a multi-variable equation in terms of the other variables. Justify the steps by identifying the properties of equalities used. 8.2.4.2
    3. Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms. Given sufficient information, find an equation of a line. 8.2.4.3
    4. Use linear inequalities to represent relationships in various contexts. 8.2.4.4
    5. Solve linear inequalities using properties of inequalities. Graph the solutions on a number line. 8.2.4.5
    6. Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve such equations and inequalities and graph the solutions on a number line. 8.2.4.6

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7. Represent relationships in various contexts using systems of linear equations. Solve systems of linear equations in two variables symbolically, graphically and numerically. 8.2.4.7
8. Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations. 8.2.4.8
9. Use the relationship between square roots and squares of a number to solve problems. 8.2.4.9

Geometry & Measurement

1. **Solve problems involving right triangles using the Pythagorean Theorem and its converse.** 8.3.1
    1. Use the Pythagorean Theorem to solve problems involving right triangles. 8.3.1.1
    2. Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean Theorem to find the distance between any two points in a coordinate system. 8.3.1.2
    3. Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software. 8.3.1.3
2. **Solve problems involving parallel and perpendicular lines on a coordinate system.** 8.3.2
    1. Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine these relationships. 8.3.2.1
    2. Analyze polygons on a coordinate system by determining the slopes of their sides. 8.3.2.2
    3. Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel and perpendicular to the given line, symbolically and graphically. 8.3.2.3

Data Analysis & Probability

1. **Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.** 8.4.1
    1. Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display scatterplots and corresponding lines of best fit. 8.4.1.1
    2. Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set. 8.4.1.2
    3. Assess the reasonableness of predictions using scatterplots by interpreting them in the original context. 8.4.1.3