The following topics are covered on the Algebra 1 Challenge Exam.

Equations & Inequalities

1. Simplify expressions using the order of operations
2. Solve linear equations
3. Solve equations for a stated variable
4. Solve absolute value equations
5. Solve proportions
6. Graph number line inequalities
7. Express inequalities using interval and set-builder notations
8. Solve simple, compound and absolute value inequalities

Functions

1. Define relations and functions
2. Recognize functions from an equation, table or graph
3. Use function notation
4. Identify correlation in scatterplots
5. Use scatterplots and lines of best fit as prediction tools

Linear Functions

1. Identify linear functions from an equation or graph
2. Calculate the slope of a line, including vertical and horizontal lines
3. Graph lines in slope-intercept form
4. Graph vertical and horizontal lines
5. Find the x-intercept and y-intercept of a line
6. Graph lines in standard form
7. Graph lines in point-slope form
8. Graph lines given a point on the line and a parallel or perpendicular slope
9. Write equations of lines given a point and the slope or given two points

Data Analysis and Probability

1. Organize and display data using graphs, box-and-whisker plots, and stem-and-leaf plots
2. Create frequency distributions and histograms from data
3. Calculate measures of central tendency (mean, median, mode) and variance (range)
5. Use experimental probability to predict outcomes, including for independent and dependent events
6. Calculate the theoretical probability of an event occurring
7. Calculate the odds of an event occurring

Systems of Equations and Inequalities

1. Solve Systems of linear equations by graphing, substitution or elimination
2. Graph linear inequalities
3. Solve systems of linear inequalities

Exponents and Radicals

1. Use the rules of exponents to simplify expressions
2. Simplify radical expressions
3. Add, subtract, multiply and divide radical expressions
4. Rationalize the denominator of a fraction
5. Rewrite radicals as integers with rational exponents

Polynomials and Factoring

1. Name a polynomial by its degree and number of terms
2. Add, subtract and multiply polynomials
3. Recognize special products of binomials (DOTS, PST)
4. Find the greatest common factor (GCF) of expressions
5. Factor out a GCF
6. Factor trinomials $x^2 + bx + c$ and $ax^2 + bx + c$
7. Factor perfect square trinomials $x^2 + 2xy + y^2$ and $x^2 - 2xy + y^2$
8. Factor binomials $x^2 - y^2$

Quadratic Functions

1. Identify quadratic functions from an equation or graph
2. Identify the vertex, y-intercept, axis of symmetry, domain and range of a quadratic function
3. Graph quadratic functions in standard form $y = ax^2 + bx + c$
4. Graph quadratic functions in vertex form $y = a(x - h)^2 + k$
5. Transform quadratic functions using translations, reflections, compressions and stretches

Quadratic Equations

1. Use a GC to solve quadratic equations by graphing
2. Solve quadratic equations by factoring
3. Solve quadratic equations using square roots
4. Solve quadratic equations by completing the square
5. Use the discriminant to describe the nature and number of roots of a quadratic equation
6. Solve quadratic equations using the quadratic formula