

# Big Ideas Algebra 1, Geometry and Algebra 2 © 2015

	Algebra 1	Geometry	Algebra 2
<b>Number and Quantity</b>			
<b>The Real Number System (HSN-RN)</b>			
<b>Properties of exponents to rational exponents</b>			
Properties of exponents	●		◆
Radical notation	●		◆
<b>Properties of rational and irrational numbers</b>			
Sum or product of (non-zero) rational number and irrational number	●		
Sum or product of two rational numbers	●		
<b>Quantities (HSN-Q)</b>			
<b>Reasoning and units to solve</b>			
Accuracy to limitation on measurement	●		
Data display	●		
Define quantities for descriptive modeling	●		◆
Graphical display	●		
Interpret units in a formula	●		
Level of accuracy	●		
Scale and origin in graph	●		
Units to solve multi-step problems	●		
<b>The Complex Number System (HSN-CN)</b>			
<b>Arithmetic operations</b>			
$a+bi$ form of a complex number, $a$ and $b$ real			●
Add complex numbers			●
Complex number $i$ such that $i^2=-1$			●
Conjugate of complex numbers			●
Multiply complex numbers			●
Subtract complex numbers			●
<b>Complex numbers in polynomial identities and equations</b>			
Fundamental Theorem of Algebra			●
Polynomial identities to complex numbers			●
Quadratic equation with real coefficient(s) and complex solution(s)			●
<b>Algebra</b>			
<b>Seeing Structure in Expressions (A-SSE)</b>			
<b>Function concept and function notations</b>			
Coefficient	●		◆
Factor	●		◆
Product in an expression	●		◆
Rewrite an expression	●		◆
Term	●		◆
<b>Equivalent forms of expressions to solve problems</b>			
Complete the square	●		
Equivalent form production	●		◆
Properties of exponents: exponential function transformation	●		◆

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Properties of exponents: sum of a finite geometric series formula			●
Properties of the quantity represented	●		◆
Quadratic factoring	●		
<b>Arithmetic with Polynomials and Rational Expressions (A-APR)</b>			
<b>Arithmetic operations on polynomials</b>			
Add polynomial expressions	●		◆
Multiply polynomial expressions	●		◆
Subtract polynomial expressions	●		◆
<b>Zeros and factors of polynomials</b>			
Factor to identify zeros	●		◆
Graph construction	●		◆
Remainder Theorem			●
<b>Polynomial identities to solve problems</b>			
Binomial Theorem			●
Polynomial identity proofs to describe numerical relationships			●
<b>Rewrite rational expressions</b>			
Add rational expressions			●
Computer algebra system			●
Divide rational expressions			●
Inspection			●
Long division			●
Multiply rational expressions			●
Rational expressions written in different forms			●
Subtract rational expressions			●
<b>Create Equations (A-CED)</b>			
<b>Describe numbers or relationships</b>			
Constraints by equations or inequalities	●		◆
Constraints by systems of equations or inequalities	●		◆
Equation in one variable	●		◆
Equation in two or more variables	●		◆
Formula rearrangement to solve for a quantity of interest	●		
Graph equations on coordinate axes	●		
Inequality in one variable	●		
Viable/non-viable solutions for modeling	●		
<b>Reasoning with Equations and Inequalities (A-REI)</b>			
<b>Solving equations as a reasoning process</b>			
Construct argument to justify solution method	●		◆
Explain reasoning	●		◆
Radical equation in one variable			●
Rational equation in one variable			●
<b>Solving equations and inequalities in one variable</b>			
Coefficients as a letter	●		
Complex solutions	●		◆
Factorization	●		◆

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Linear equation	●		
Linear inequality	●		
Quadratic equation: by inspection	●		◆
Quadratic equation: complete the square	●		◆
Quadratic formula	●		◆
<b>System of equations</b>			
Algebraic solution (exact)	●		◆
Graphical solution (approximate)	●		◆
Solution for two equations in two variables	●		
System of one linear equation and one quadratic equation	●		◆
System of two linear equations	●		
<b>Graphical solutions for equations and inequalities</b>			
Absolute value function	●		◆
Approximate solution from graph	●		◆
Exponential function	●		◆
Graph on a coordinate plane	●		
Intersection(s) as solution(s)	●		◆
Linear function	●		◆
Linear inequality solution as a half-plane	●		
Logarithmic function			●
Polynomial function	●		◆
Rational function			●
Solution set to a system of inequalities as intersection of corresponding half-planes	●		
Table of values	●		◆
<b>Functions</b>			
<b>Interpreting Functions (F-IF)</b>			
<b>Function concept and function notations</b>			
Element of the domain, $x$	●		
Element of the range, $f(x)$	●		
Function $f$	●		
Function notation	●		
Graph of $f$ for equation $y=f(x)$	●		
Output of $f$ corresponds to input $x$	●		
Sequence as a function	●		◆
<b>Applications in context</b>			
Average rate of change	●		◆
Domain as related to graph	●		◆
End behavior			●
Graph key features	●		◆
Intercepts	●		◆
Interval behavior (increase, decrease)			●
Periodicity			●
Relative maximum(s) and minimum(s)			●
Symmetry	●		◆

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Table key features	●		◆
<b>Function representation by graph</b>			
Absolute value	●		◆
Compare function represented graphically to algebraically	●		◆
Cube root	●		◆
Exponent properties	●		◆
Exponential	●		◆
Exponential growth or decay	●		◆
Graph key features	●		◆
Linear	●		◆
Logarithmic			●
Piecewise-defined	●		
Polynomial			●
Quadratic	●		◆
Quadratic function expressed factored, completing the square	●		◆
Rational			●
Square root	●		◆
Trigonometric			●
<b>Building Functions (F-BF)</b>			
<b>Relationship between two quantities</b>			
Arithmetic sequence	●		◆
Calculation from a context	●		◆
Combine function types arithmetically	●		◆
Compose function (composite)	●		◆
Explicit expression	●		◆
Geometric sequence	●		◆
Recursive process	●		◆
<b>New function from existing function</b>			
Even function	●		◆
Exponent and logarithm inverse relationship			●
Graph effect from change	●		◆
Inverse function expression	●		◆
Odd function	●		◆
<b>Linear, Quadratic, and Exponential Models (F-LE)</b>			
<b>Construct and compare linear, quadratic, exponential models</b>			
Constant percent growth or decay rate of change	●		
Constant rate of change	●		
Evaluate logarithm using technology			●
Exponential function growth exceeds polynomial function growth	●		
Exponential model function growth	●		
Express the solution as a logarithm			●
Function construction from a graph, relationship description, input-output pairs (tables)	●		◆
Linear model function growth	●		

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	Algebra 1	Geometry	Algebra 2
Parameter interpretation	●		◆
<b>Trigonometric Functions (F-TF)</b>			
<b>Domain from unit circle</b>			
Counterclockwise traversal around unit circle			●
Radian measure as arc length subtended by an angle in unit circle			●
Unit circle in coordinate plane			●
<b>Periodic phenomena</b>			
Amplitude			●
Frequency			●
Midline			●
<b>Trigonometric identities</b>			
Prove addition and subtraction formulas			●
Pythagorean identity proof			●
Pythagorean identity to find trigonometric value			●
<b>Geometry</b>			
<b>Congruence (G-CO)</b>			
<b>Transformations in the plane</b>			
Defined terms: angle, circle, perpendicular line, parallel line, line segment		●	
Definition of rotation, reflection, and translation		●	
Draw transformed figure		●	
Rotation and reflection		●	
Sequence of a transformation		●	
Transformation as a function		●	
Transformation representation		●	
Translation versus stretch		●	
Undefined terms: point, line, distance along a line, distance around a circular arc		●	
<b>Rigid motion congruence</b>			
Determine congruency		●	
Transform a figure		●	
Triangle congruency criteria (ASA, SAS, SSS)		●	
Triangle congruency using corresponding pairs of sides and corresponding pairs of angles		●	
<b>Prove geometric theorems</b>			
Line and angle		●	
Parallelogram		●	
Triangle		●	
<b>Geometric construction</b>			
Compass		●	
Equilateral triangle, square, regular hexagon inscribed in a circle		●	
Paper folding		●	
Reflective devices		●	
Software		●	

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Straightedge		●	
String		●	
<b>Similarity, Right Triangles, Trigonometry (G-SRT)</b>			
<b>Similarity transformations</b>			
AA triangle criterion		●	
Definition of similarity		●	
Dilation given center and scale factor		●	
Similar triangles		●	
<b>Prove similarity theorems</b>			
Geometric figure relationships		●	
Triangles		●	
<b>Trigonometric ratios and right triangles</b>			
Cosine as ratio of adjacent to hypotenuse		●	
Pythagorean Theorem		●	
Sine and cosine relationship		●	
Sine as ratio of opposite to hypotenuse		●	
Solve right triangles		●	
Tangent as ratio of opposite to adjacent		●	
Trigonometric ratio definitions for acute angles		●	
<b>Trigonometry in general triangles</b>			
Area formula		●	
Law of Cosines		●	
Law of Sines		●	
Non-right triangles		●	
Right triangles		●	
<b>Circles (G-C)</b>			
<b>Circle theorems</b>			
Angles of a quadrilateral inscribed in a circle		●	
Chords		●	
Circumscribed circle in a triangle		●	
Inscribed angle		●	
Inscribed circle in a triangle		●	
Radii		●	
Similarity		●	
Tangent line to a circle construction		●	
<b>Arc length and area of sectors</b>			
Arc length intercepted by an angle as ratio		●	
Area of a sector formula		●	
Radian measure		●	
<b>Expressing Geometric Properties with Equations (G-GPE)</b>			
<b>Conic section equation and geometry</b>			
Center		●	
Complete the square		●	
Directrix			●
Equation of a circle		●	
Equation of a parabola			●

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Focus			●
Radius		●	
<b>Algebraic proofs of geometric theorems</b>			
Area computation, triangle and rectangle		●	
Coordinates		●	
Perimeter computation, polygon		●	
Segment partition for a given ratio		●	
Slope of parallel lines	●	◆	
Slope of perpendicular lines	●	◆	
<b>Geometric Measurement and Dimension (G-GMD)</b>			
<b>Volume formulas</b>			
Area of a circle		●	
Cavalieri's principle		●	
Circumference of a circle		●	
Problem solving		●	
Volume of a cone		●	
Volume of a cylinder		●	
Volume of a pyramid		●	
Volume of a sphere		●	
<b>Two-dimensional and three-dimensional object relationships</b>			
Cross-section of three-dimensional objects		●	
Rotation of two-dimensional object		●	
<b>Modeling with Geometry (G-MG)</b>			
<b>Modeling situations</b>			
Density based on area and volume		●	
Describe objects		●	
Design problem solutions		●	
<b>Statistics and Probability</b>			
<b>Interpreting Categorical and Quantitative Data (S-ID)</b>			
<b>Single count or measurement variable</b>			
Box plot	●		
Compare centers and spreads of data sets	●		
Dot plot	●		
Effects of outliers	●		
Estimate area under the normal curve			●
Estimate population percentage			●
Histogram	●		
Interpret shapes, centers, and spreads of data sets	●		
Normal distribution			●
<b>Two categorical and quantitative variables</b>			
Fit a linear model to data	●		
Fit function to data (linear, quadratic, exponential)	●		◆
Plot and analyze residuals	●		
Recognize associations and trends	●		
Relative frequencies (joint, marginal, conditional)	●		
Scatter plot	●		

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Two-way frequency table	●		
<b>Interpret linear models</b>			
Correlation and causation	●		
Correlation coefficient for a linear fit	●		
Intercept (constant term)	●		
Slope (rate of change)	●		
<b>Making Inferences and Justifying Conclusions (S-IC)</b>			
<b>Random processes</b>			
Inferences about a population			●
Model consistent with results			●
<b>Sample surveys, experiments, and observational studies</b>			
Compare a randomized experiment			●
Evaluate a report			●
Margin of error			●
Population mean or proportion			●
Randomization			●
Simulations			●
<b>Conditional Probability and the Rules of Probability (S-CP)</b>			
<b>Independence and conditional probability</b>			
Conditional probability			●
Independent and conditional probability			●
Independent probability determination			●
Sample space description			●
Two-way frequency table for probability			●
Union (or), intersection (and), complement (not)			●
<b>Rules of probability</b>			
Addition Rule of probability			●
Conditional probability of A given B as a fraction			●
Multiplication Rule of probability			●
Permutation and combination to compute probability of a compound event			●
<b>Using Probability to Make Decisions</b>			
<b>Evaluate outcomes</b>			
Fair decision using probability			●
Probability concepts for decision-making			●