

New York State Core Curriculum
Standards adopted 2005
Algebra 2 and Trigonometry

| Strand | Heading | Reference | Description | Boardworks High School Algebra presentations |
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| Number Sense and Operations Strand | Students will understand meanings of operations and procedures, and how they relate to one another. | A2.N.1 | Evaluate numerical expressions with negative and/or fractional exponents, without the aid of a calculator (when the answers are rational numbers) | Exponents Zero, negative and fractional exponents |
| | | A2.N.2 | Perform arithmetic operations (addition, subtraction, multiplication, division) with expressions containing irrational numbers in radical form | Manipulating radicals |
| | | A2.N.3 | Perform arithmetic operations with polynomial expressions containing rational coefficients | Operations with polynomials Dividing polynomials The factor theorem |
| | | A2.N.4 | Perform arithmetic operations on irrational expressions | Manipulating radicals |
| | | A2.N.5 | Rationalize a denominator containing a radical expression | Manipulating radicals |
| | | A2.N.6 | Write square roots of negative numbers in terms of i | – |
| | | A2.N.7 | Simplify powers of i | – |
| | | A2.N.8 | Determine the conjugate of a complex number | – |
| | | A2.N.9 | Perform arithmetic operations on complex numbers. | – |
| | | A2.N.10 | Know and apply sigma notation | The sum of an arithmetic series |
| | Students will represent and analyze algebraically a wide variety of problem solving situations. | A2.A.1 | Solve absolute value equations and inequalities involving linear expressions in one variable | Absolute value functions |
| | | A2.A.2 | Use the discriminant to determine the nature of the roots of a quadratic equation | The quadratic formula Solving quadratic equations |
| | | A2.A.3 | Solve systems of equations involving one linear equation and one quadratic equation algebraically Note: This includes rational equations that result in linear equations with extraneous roots. | Systems of linear and quadratic equations One linear and one quadratic equation |

Students will perform algebraic procedures accurately.

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| A2.A.4 | Solve quadratic inequalities in one and two variables, algebraically and graphically | Quadratic inequalities Solving quadratic inequalities |
| A2.A.5 | Use direct and inverse variation to solve for unknown values | Direct proportion Inverse proportion |
| A2.A.6 | Solve an application which results in an exponential function | Exponential growth and decay |
| A2.A.7 | Factor polynomial expressions completely, using any combination of the following techniques: common factor extraction, difference of two perfect squares, quadratic trinomials | Factoring Factoring quadratic expressions Quadratic equations and factoring Solving quadratic equations |
| A2.A.8 | Apply the rules of exponents to simplify expressions involving negative and/or fractional exponents | Exponent laws Exponents Zero, negative and fractional exponents |
| A2.A.9 | Rewrite algebraic expressions that contain negative exponents using only positive exponents | Negative exponents and reciprocals |
| A2.A.10 | Rewrite algebraic expressions with fractional exponents as radical expressions | Zero, negative and fractional exponents |
| A2.A.11 | Rewrite algebraic expressions in radical form as expressions with fractional exponents | Zero, negative and fractional exponents |
| A2.A.12 | Evaluate exponential expressions, including those with base e | Exponents Zero, fractional and negative exponents Exponentials and logarithms |
| A2.A.13 | Simplify radical expressions | Manipulating radicals |
| A2.A.14 | Perform addition, subtraction, multiplication, and division of radical expressions | Manipulating radicals |
| A2.A.15 | Rationalize denominators involving algebraic radical expressions | Manipulating radicals |
| A2.A.16 | Perform arithmetic operations with rational expressions and rename to lowest terms | Simplifying rational functions Operations with algebraic fractions Improper fractions |
| A2.A.17 | Simplify complex fractional expressions | Simplifying rational functions |
| A2.A.18 | Evaluate logarithmic expressions in any base | The laws of logarithms Solving equations involving logarithms |
| A2.A.19 | Apply the properties of logarithms to rewrite logarithmic expressions in equivalent forms | The laws of logarithms Solving equations involving logarithms |

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| | A2.A.20 | Determine the sum and product of the roots of a quadratic equation by examining its coefficients | Factoring quadratic expressions Quadratic equations and factoring Solving quadratic equations |
| | A2.A.21 | Determine the quadratic equation, given the sum and product of its roots | Factoring quadratic expressions Quadratic equations and factoring Solving quadratic equations |
| | A2.A.22 | Solve radical equations | Manipulating formulas Manipulating radicals |
| | A2.A.23 | Solve rational equations and inequalities | Simplifying rational functions Operations with algebraic fractions Improper fractions |
| | A2.A.24 | Know and apply the technique of completing the square | Completing the square Solving quadratic equations |
| | A2.A.25 | Solve quadratic equations, using the quadratic formula | The quadratic formula Solving quadratic equations |
| | A2.A.26 | Find the solution to polynomial equations of higher degree that can be solved using factoring and/or the quadratic formula | The quadratic formula Solving quadratic equations |
| | A2.A.27 | Solve exponential equations with and without common bases | Exponentials and logarithms Exponential growth and decay |
| | A2.A.28 | Solve a logarithmic equation by rewriting as an exponential equation | The laws of logarithms Solving equations involving logarithms |
| Students will recognize, use, and represent algebraically patterns, relations, and functions. | A2.A.29 | Identify an arithmetic or geometric sequence and find the formula for its nth term | Sequences and rules Arithmetic sequences Geometric sequences |
| | A2.A.30 | Determine the common difference in an arithmetic sequence | Arithmetic sequences |
| | A2.A.31 | Determine the common ratio in a geometric sequence | Geometric sequences |
| | A2.A.32 | Determine a specified term of an arithmetic or geometric sequence | Arithmetic sequences Geometric sequences |
| | A2.A.33 | Specify terms of a sequence, given its recursive definition | Other types of sequence |
| | A2.A.34 | Represent the sum of a series, using sigma notation | Sequences and series The sum of an arithmetic series The sum of a geometric series |

Algebra Strand

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| | A2.A.35 | Determine the sum of the first n terms of an arithmetic or geometric series | The sum of an arithmetic series The sum of a geometric series |
| | A2.A.36 | Apply the binomial theorem to expand a binomial and determine a specific term of a binomial expansion | Binomial coefficients |
| | A2.A.37 | Define a relation and function | Functions and relations |
| | A2.A.38 | Determine when a relation is a function | Functions and relations |
| | A2.A.39 | Determine the domain and range of a function from its equation | Domain, range and composite functions |
| | A2.A.40 | Write functions in functional notation | Function notation |
| | A2.A.41 | Use functional notation to evaluate functions for given values in the domain | Domain, range and composite functions |
| | A2.A.42 | Find the composition of functions | Domain, range and composite functions |
| | A2.A.43 | Determine if a function is one-to-one, onto, or both | Functions and relations |
| | A2.A.44 | Define the inverse of a function | Inverse functions |
| | A2.A.45 | Determine the inverse of a function and use composition to justify the result | Domain, range and composite functions Inverse functions |
| | A2.A.46 | Perform transformations with functions and relations: | Transforming functions part 1 Transforming functions part 2 |
| Coordinate Geometry | A2.A.47 | Determine the center-radius form for the equation of a circle in standard form | Coordinate geometry The equation of a circle |
| | A2.A.48 | Write the equation of a circle, given its center and a point on the circle | The equation of a circle |
| | A2.A.49 | Write the equation of a circle from its graph | Graphs of important non-linear functions |
| | A2.A.50 | Approximate the solution to polynomial equations of higher degree by inspecting the graph | Plotting and sketching graphs |
| | A2.A.51 | Determine the domain and range of a function from its graph | Domain, range and composite functions |
| | A2.A.52 | Identify relations and functions, using graphs | Functions and relations |
| | A2.A.53 | Graph exponential functions | Graphs of important non-linear functions Exponentials and logarithms Exponential growth and decay |
| | A2.A.54 | Graph logarithmic functions, using the inverse of the related exponential function | Exponentials and logarithms |
| Trigonometric Functions | A2.A.55 | Express and apply the six trigonometric functions as ratios of the sides of a right triangle | The three trigonometric ratios |

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| A2.A.56 | Know the exact and approximate values of the sine, cosine, and tangent of 0° , 30° , 45° , 60° , 90° , 180° , and 270° angles | The three trigonometric ratios Finding trigonometric ratios |
| A2.A.57 | Sketch and use the reference angle for angles in standard position | – |
| A2.A.58 | Know and apply the co-function and reciprocal relationships between trigonometric ratios | – |
| A2.A.59 | Use the reciprocal and co-function relationships to find the value of the secant, cosecant, and cotangent of 0° , 30° , 45° , 60° , 90° , 180° , and 270° angles | – |
| A2.A.60 | Sketch the unit circle and represent angles in standard position | – |
| A2.A.61 | Determine the length of an arc of a circle, given its radius and the measure of its central angle | – |
| A2.A.62 | Find the value of trigonometric functions, if given a point on the terminal side of angle | – |
| A2.A.63 | Use inverse functions to find the measure of an angle, given its sine, cosine, or tangent | Finding angles |
| A2.A.65 | Sketch the graph of the inverses of the sine, cosine, and tangent functions | – |
| A2.A.66 | Determine the trigonometric functions of any angle, using technology | The three trigonometric ratios Finding trigonometric ratios |
| A2.A.67 | Justify the Pythagorean identities | Introducing the Pythagorean theorem Pythagorean triples Finding unknown lengths Applying the Pythagorean theorem in 2-D Applying the Pythagorean theorem in space Right triangles |
| A2.A.68 | Solve trigonometric equations for all values of the variable from 0° to 360° | The three trigonometric ratios Finding trigonometric ratios |

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| | | A2.A.69 | Determine amplitude, period, frequency, and phase shift, given the graph or equation of a periodic function | – |
| | | A2.A.70 | Sketch and recognize one cycle of a function | Even, odd and periodic functions |
| | | A2.A.72 | Write the trigonometric function that is represented by a given periodic graph | Even, odd and periodic functions |
| | | A2.A.73 | Solve for an unknown side or angle, using the Law of Sines or the Law of Cosines | Finding side lengths Finding angles |
| | | A2.A.74 | Determine the area of a triangle or a parallelogram, given the measure of two sides and the included angle | – |
| | | A2.A.75 | Determine the solution(s) from the SSA situation (ambiguous case) | Finding side lengths Finding angles |
| | | A2.A.76 | Apply the angle sum and difference formulas for trigonometric functions | – |
| | | A2.A.77 | Apply the double-angle and half-angle formulas for trigonometric functions | – |
| Measurement Strand | Students will determine what can | A2.M.1 | Define radian measure | – |
| | | A2.M.2 | Convert between radian and degree measures | – |
| | Students will collect, organize, display, and analyze data. | A2.S.1 | Understand the differences among various kinds of studies (e.g., survey, observation, controlled experiment) | Specifying the problem and planning Types of data Collecting data Methods of sampling part 1 Methods of sampling part 2 |
| | | A2.S.2 | Determine factors which may affect the outcome of a survey | Specifying the problem and planning Types of data Collecting data Methods of sampling part 1 Methods of sampling part 2 |

Statistics and Probability Strand

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| Students will collect, organize, display, and analyze data. | A2.S.3 | Calculate measures of central tendency with group frequency distributions | The mode The mean The median Which measure of central tendency? Frequency diagrams Cumulative frequency step polygons Cumulative frequency graphs Calculating the mean from frequency tables |
| | A2.S.4 | Calculate measures of dispersion (range, quartiles, interquartile range, standard deviation, variance) for both samples and populations | Comparing data The range and interquartile range Standard deviation |
| | A2.S.5 | Know and apply the characteristics of the normal distribution | The normal distribution |
| Students will make predictions that are based upon data analysis. | A2.S.6 | Determine from a scatter plot whether a linear, logarithmic, exponential, or power regression model is most appropriate | Non-linear relationships Scatter plots Lines of best fit Linear regression |
| | A2.S.7 | Determine the function for the regression model, using appropriate technology, and use the regression function to interpolate and extrapolate from the data | Scatter plots Measuring correlation Linear regression |
| | A2.S.8 | Interpret within the linear regression model the value of the correlation coefficient as a measure of the strength of the relationship | Scatter plots Measuring correlation Linear regression |
| Students will understand and apply concepts of probability. | A2.S.9 | Differentiate between situations requiring permutations and those requiring combinations | Permutations Combinations |
| | A2.S.10 | Calculate the number of possible permutations of n items taken r at a time | Permutations |
| | A2.S.11 | Calculate the number of possible combinations of n items taken r at a time | Combinations |
| | A2.S.12 | Use permutations, combinations, and the Fundamental Principle of Counting to determine the number of elements in a sample space and a specific subset (event) | Permutations Combinations |

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| | | Introduction to probability Probabilities of single events Combined events part 1 Combined events part 2 Probabilities from tables and Venn diagrams Dependent events Probability notation |
| A2.S.13 | Calculate theoretical probabilities, including geometric applications | Dependent events Probability notation |
| A2.S.14 | Calculate empirical probabilities | Probability from experiments |
| A2.S.15 | Know and apply the binomial probability formula to events involving the terms exactly, at least, and at most | The binomial distribution part 1 The binomial distribution part 2 |
| A2.S.16 | Use the normal distribution as an approximation for binomial probabilities | The normal distribution The binomial distribution part 1 The binomial distribution part 2 |