

# OVERVIEW OF COMMON CORE ALGEBRA I STANDARDS

This overview contains all standards grouped by major conceptual categories for the course (Algebra, Functions, Number and Quantity, Statistics). Standards that are shared with Algebra I are labeled [I] below. Each standard is labeled below as major content (58-73% of Regents) (≡), supporting content (18-30% of Regents) (=), or additional content (5-17% of Regents) (–) to indicate its emphasis in the course as specified by the New York State Education Department (NYSED).

## ALGEBRA

### (50-56% OF REGENTS EXAM)

#### Linear Equations and Inequalities

- ≡ Solve one-variable linear equations and inequalities (A-REI.B.3)
- ≡ Justify steps in solving equations (A-REI.A.1) [II]
- Replace an equation in a system of equations with a multiple of the equation (A-REI.C.5)
- Solve systems of linear equations (A-REI.C.6) [II]
- ≡ Relate an equation's graph to its solutions (A-REI.D.10)
- ≡ Approximate and justify graphical solution to system of two equations (A-REI.D.11) [II]
- ≡ Solve inequalities graphically (A-REI.D.12)

#### Quadratic Equations

- ≡ Interpret expressions and their parts in context (A-SSE.A.1)
- ≡ Add, subtract, multiply polynomials (A-APR.A.1)
- ≡ Rewrite expressions in equivalent forms (A-SSE.A.2) [II]
- = Write expressions in equivalent forms to reveal properties (A-SSE.B.3) [II]
- = Factor quadratic expressions (A-SSE.B.3a)
- = Complete the square in quadratic expressions (A-SSE.B.3b)
- ≡ Solve quadratic equations algebraically (i.e. completing the square, taking square roots, quadratic formula, factoring) (A-REI.B.4) [II]
- = Identify zeroes of quadratic and cubic polynomials and use them to sketch graphs (A-APR.B.3) [II]
- ≡ Rearrange formulas to highlight a variable (A-CED.A.4)

#### Algebra and Modeling

- ≡ Create one-variable equations and inequalities (A-CED.A.1) [II]
- ≡ Create two-variable equations and inequalities (A-CED.A.2)
- ≡ Represent constraints by and interpret solutions to equations, inequalities, and systems (A-CED.A.3)

## FUNCTIONS

### (32-38% OF REGENTS EXAM)

#### Exponential Functions

- = Distinguish between situations modeled with linear and with exponential functions (F-LE.A.1)
- = Construct linear and exponential functions (including arithmetic and geometric sequences) (F-LE.A.2) [II]
- = Observe that exponential growth outpaces linear and quadratic growth (F-LE.A.3)
- = Rewrite exponential expressions (A-SSE.B.3c) [II]

#### Properties of Functions

(linear, quadratic, square root, cube root, piecewise, and exponential functions)

- ≡ Identify relations as functions (F-IF.A.1)
- ≡ Evaluate functions, use and interpret function notation (F-IF.A.2)
- ≡ Identify explicit and recursive sequences as functions (F-IF.A.3) [II]
- ≡ Sketch graphs of functions given verbal description, interpret key features of graphs and tables (F-IF.B.4) [II]
- ≡ Relate a function's domain to its graph and quantitative relationship (F-IF.B.5)
- ≡ Calculate and interpret average rate of change of a function over an interval (F-IF.B.6) [II]
- = Graph functions and show key features (F-IF.C.7), e.g. intercepts, maxima, minima for linear and quadratic functions (F-IF.C.7a) [II]
- = Graph square root, cube root, piecewise functions (incl. step, absolute value) (F-IF.C.7b)
- = Write a function in different forms to reveal its properties (F-IF.C.8) [II]
- = Factor and complete the square in a quadratic function to show and interpret zeros, extrema, and symmetry (F-IF.C.8a) [II]
- = Compare properties of two functions represented in different ways (F-IF.C.9) [II]

#### Functions and Modeling

- = Write a function to describe a relationship (F-BF.A.1) [II]
- Transform functions (F-BF.B.3) [II]
- = Interpret parameters of linear or exponential function in context (F-LE.B.5) [II]

## NUMBER & QUANTITY

### (2-8% OF REGENTS EXAM)

#### Sums and Products of Rational Numbers

- Explain the rationality of the sum or product of two rational numbers, the sum of rational and irrational numbers, and the product of nonzero rational and irrational numbers (N-RN.B.3)

#### Quantities and Modeling

- = Convert quantities between units and interpret the result (N-Q.A.1)
- = Define appropriate quantities for modeling (N-Q.A.2) [II]
- = Choose a level of accuracy for measurement (N-Q.A.3)

## STATISTICS

### (5-10% OF REGENTS EXAM)

#### Univariate Data

- Represent data with dotplots, histograms, boxplots (S-ID.A.1)
- Compare center (mean, median) and spread (IQR, standard deviation) for data sets (S-ID.A.2)
- Interpret differences in shape, center, spread, outliers for data sets (S-ID.A.3)

#### Bivariate Data

- = Create two-way tables, interpret relative (including joint, marginal, conditional) frequencies (S-ID.B.5)
- = Create scatterplots (S-ID.B.6) [II]
- = Fit linear, quadratic, exponential functions to data (S-ID.B.6a) [II]
- = Fit a linear function to a scatterplot (S-ID.B.6c)
- = Plot and analyze residuals (S-ID.B.6b)

#### Linear Models

- ≡ Interpret slope and intercept of a linear model in context (S-ID.C.7)
- ≡ Calculate and interpret correlation coefficient for linear fit (S-ID.C.8)
- ≡ Distinguish between correlation and causation (S-ID.C.9)

# OVERVIEW OF COMMON CORE GEOMETRY STANDARDS

This overview contains all standards grouped by major conceptual categories for the course (such as Congruence, Circles, and Modeling). Each standard is labeled below as Major content ( $\equiv$ ), Supporting content ( $=$ ), or Additional content ( $-$ ) to indicate its emphasis in the course as specified by the New York State Education Department (NYSED).

## CONGRUENCE (27-34% OF REGENTS EXAM)

### Transformations

- Define angle, circle, perpendicular line, parallel line, line segment (G-CO.A.1)
- Describe transformations as functions, compare transformations that do and do not preserve distance and angle (G-CO.A.2)
- Describe the rotations and reflections that carry a regular or irregular polygon onto itself (G-CO.A.3)
- Define rotations, point and line reflections, translations in terms of angles, circles, perp. lines, parallel lines, line segments (G-CO.A.4)
- Draw a transformed figure, specify the transformations that carry a given figure onto another (G-CO.A.5)

### Congruence and Rigid Motions

- ❖ Transform figures using rigid motions and determine if they are congruent. (G-CO.B.6)
- ❖ Use rigid motions to show that triangles are congruent if and only if corresponding angles and sides congruent (G-CO.B.7)
- ❖ Explain ASA, SAS, SSS, AAS, Hyp-Leg in terms of rigid motions (G-CO.B.8)

### Proofs Using Congruence

- ❖ Prove and apply theorems about lines and angles (G-CO.C.9)
- ❖ Prove and apply theorems about triangles, including ASA, SAS, SS, AAS, HL (G-CO.C.10)
- ❖ Prove and apply theorems about parallelograms (G-CO.C.11)

### Constructions

- ❖ Make, justify, apply constructions (e.g. copy segment; copy angle; bisect segment; bisect angle; construct triangle; construct perpendicular lines, incl. perpendicular bisector of line segment; construct line parallel to given line through point not on line; construct concurrency points of triangle) (G-CO.D.12)
- ❖ Construct equilateral triangle, square, regular hexagon inscribed in circle (G-CO.D.13)

## SIMILARITY, RT. TRIANGLES, & TRIGONOMETRY (29-37% OF REGENTS EXAM)

### Similarity Transformations

- ❖ Verify properties of dilations given by center and scale factor (G-SRT.A.1)
- ❖ Use similarity transformations to determine if figures are similar (G-SRT.A.2)
- ❖ Use properties of similarity transformations to establish AA similarity (G-SRT.A.3)

### Proofs Using Similarity

- ❖ Prove theorems about similar triangles (G-SRT.B.4)
- ❖ Use congruence and similarity criteria for triangles to solve problems and prove relationships, incl. AA, SAS, SSS (G-SRT.B.5)

### Trigonometry

- ❖ Define trigonometric ratios in terms of similar right triangles (G-SRT.C.6)
- ❖ Explain and use relationship between sine and cosine of complementary angles (G-SRT.C.7)
- ❖ Use trigonometric ratios and Pythagorean Theorem in applied problems (G-SRT.C.8)

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## CIRCLES (2-8% OF REGENTS EXAM)

### Circles

- Prove that all circles are similar (G-C.A.1)
- Identify and describe relationships among inscribed angles, radii, chords (G-C.A.2)
- Construct inscribed and circumscribed circles of a triangle, prove properties of angles of cyclic quadrilateral (G-C.A.3)

### Arc lengths and sectors

- Derive using similarity that arc length is proportional to radius, define radian, derive formula for area of sector (G-C.B.5)

## EXPRESSING GEO. PROPERTIES WITH EQUATIONS (12-18% OF REGENTS EXAM)

### Coordinate Geometry

- Derive equation of circle, complete the square to find center and radius of circle given equation (G-GPE.A.1)
- Prove geometric theorems algebraically (G-GPE.B.4)
- Prove slope criteria for parallel and perpendicular lines and use them to solve problems (G-GPE.B.5)
- Find point on directed line segment between two given points that partitions segment in a given ratio (G-GPE.B.6)
- Use coordinates to compute perimeters of polygons and areas of triangles and rectangles (G-GPE.B.7)

## GEOMETRIC MEASUREMENT AND DIMENSIONS (2-8% OF REGENTS EXAM)

- Informally prove formulas for circumference of circle; area of circle; volume of cylinder, pyramid, cone (include using Cavalieri's Principle) (G-GMD.A.1)
- Use volume formulas for cylinders, pyramids, cones, and spheres (G-GMD.A.3)
- Identify the shapes of 2-D cross-sections of 3-D objects, identify 3-D objects generated by rotations of 2-D objects (G-GMD.B.4)

## MODELING WITH GEOMETRY (8-15% OF REGENTS EXAM)

- ❖ Use geometric shapes, measures, and properties to describe objects (G-MG.A.1)
- ❖ Apply concepts of density based on area and volume in modeling situations (G-MG.A.2)
- ❖ Apply geometric methods to solve design problems (G-MG.A.3)

# OVERVIEW OF COMMON CORE ALGEBRA II STANDARDS

This overview contains all standards grouped by major conceptual categories for the course (Algebra, Functions, Number and Quantity, Statistics). Standards that are shared with Algebra I are labeled [I] below. Each standard is labeled below as Major content (51-65% of Regents) ( $\equiv$ ), Supporting content (14-28% of Regents) ( $=$ ), or Additional content (19-33% of Regents) ( $-$ ) to indicate its emphasis in the course as specified by the New York State Education Department (NYSED).

## ALGEBRA (35-44% OF REGENTS EXAM)

### Polynomials

- $\equiv$  Rewrite expressions in equivalent forms (A-SSE.A.2) [I]
- $\equiv$  Write expressions in equivalent forms to reveal properties (A-SSE.B.3) [I]
- $\equiv$  Apply the Remainder Theorem (A-APR.B.2)
- $\equiv$  Identify zeroes of quadratic and cubic polynomials and use them to sketch graphs (A-APR.B.3) [I]
- $=$  Solve quadratic equations by inspection, taking square roots, factoring, completing the square, quadratic formula, graphing) (A-REI.B.4) [I]
- $=$  Solve quadratic equations with complex solutions (N-CN.C.7)
- $=$  Divide polynomials with remainder, incl. with long division (A-APR.D.6)
- $=$  Prove and use polynomial identities (A-APR.C.4)

### Rational and Radical Equations

- $\equiv$  Justify steps in solving rational or radical equations (A-REI.A.1b) [I]
- $\equiv$  Solve rational and radical equations, identify extraneous solutions (A-REI.A.2)

### Systems of Equations

- $-$  Solve systems of three linear equations in three variables (A-REI.C.6)
- $-$  Solve a quadratic-linear system of equations algebraically and graphically (A-REI.C.7)
- $\equiv$  Approximate, justify, interpret graphical solution to  $f(x) = g(x)$ ,  $f(x) < g(x)$ ,  $f(x) \leq g(x)$  (A-REI.D.11) [I]

### Geometry

- $-$  Derive equation of parabola given focus and directrix (G-GPE.A.2)

### Algebra and Modeling

- $=$  Create one-variable equations and inequalities (A-CED.A.1) [I]

## STATISTICS (14-21% OF REGENTS EXAM)

### Univariate and Bivariate Data

- $-$  Determine if a normal curve is appropriate for data. Determine population percentages using a normal distribution (S-ID.A.4)
- $=$  Represent bivariate data on scatterplot (S-ID.B.6) [I]
- $=$  Fit linear, quadratic, exponential functions to data (S-ID.B.6a) [I]

### Inference

- $\equiv$  Determine if a statistic is likely to occur based on a given simulation (S-ICA.2)
- $\equiv$  Understand uses of, relationship of randomization to, and differences between surveys, experiments, observational studies (S-IC.B.3)
- $\equiv$  Given simulation model based on sample, construct 95% interval centered on sample; determine if suggested parameter is plausible (S-IC.B.4)
- $\equiv$  Compare two treatments and determine if the difference between parameters is significant (S-IC.B.5)
- $\equiv$  Use statistical language to draw conclusions from numerical summaries (S-IC.B.6a) and critique claims (S-IC.B.6b)

### Conditional Probability

- $-$  Describe events as subsets of sample space or unions, complements, intersections of other events (S-CP.A.1)
- $-$  Determine if events are independent (S-CP.A.2)
- $-$  Calculate and interpret conditional probability (S-CP.A.3, S-CP.B.6)
- $-$  Construct, interpret, use two-way tables to determine if events are independent (S-CP.A.4)
- $-$  Use Addition Rule of probability and interpret the answer (S-CP.B.7)

## NUMBER & QUANTITY (5-12% OF REGENTS EXAM)

### Rational Exponents

- $\equiv$  Explore rational exponents as extension of integer exponents (N-RN.A.1)
- $\equiv$  Convert between expressions with radicals and rational exponents (N-RN.A.2)

### Complex Numbers

- $-$  Understand  $i$  and  $a + bi$  form (N-CN.A.1)
- $-$  Add, subtract, multiply complex numbers (N-CN.A.2)

## FUNCTIONS (30-40% OF REGENTS EXAM)

### Properties of Functions

- $\equiv$  Sketch graphs of functions given verbal description, interpret key features of graphs and tables (F-IF.B.4) [I]
- $\equiv$  Calculate and interpret average rate of change of a function over an interval (F-IF.B.6) [I]
- $=$  Graph and show features of graphs (F-IF.C.7)
- $=$  Graph polynomial functions and show zeroes and end behavior (F-IF.C.7c)
- $=$  Graph cube root, exponential, log (show intercepts, end behavior), trig (show period, midline, amplitude) functions (F-IF.C.7e)
- $=$  Write a function in different forms to reveal its properties (F-IF.C.8) (e.g. Interpret exponential functions and classify as growth or decay) (F-IF.C.8b) [I]
- $=$  Compare properties of two functions represented in different ways (F-IF.C.9) [I]
- $-$  Find the inverse of a function (F-BF.B.4)

### Exponential and Logarithmic Functions

- $\equiv$  Rewrite exponential expressions (A-SSE.B.3c) [I]
- $=$  Use logarithms to solve exponential equations (base 2, 10,  $e$ ), evaluate logs (F-LE.A.4)

### Sequences and Series

- $=$  Construct linear and exponential functions, incl. arithmetic and geometric sequences (F-LE.A.2) [I]
- $=$  Identify explicit and recursive sequences as functions with integer domain (F-IF.A.3) [I]
- $\equiv$  Write arithmetic and geometric sequences explicitly and recursively, translate between the forms, use for modeling (F-BF.A.2)
- $\equiv$  Derive and use formula for geometric series with summation notation (A-SSE.B.4)

### Trigonometric Functions

- $-$  Define radian measure (F-TF.A.1)
- $-$  Use unit circle and given angles in radian measure to calculate values of 6 trig functions (F-TF.A.2)
- $-$  Use sine or cosine functions to model periodic behavior (F-TF.B.5)
- $-$  Prove Pythagorean identity and use it to find trig functions given values of other trig functions (F-TF.C.8)

### Functions and Modeling

- $\equiv$  Write a function to describe a relationship (F-BF.A.1) [I]
- $\equiv$  Combine functions using arithmetic operations (F-BF.A.1b)
- $-$  Transform functions, recognize even and odd functions (F-BF.B.3) [I]
- $-$  Interpret parameters of linear or exponential function in context (F-LE.B.5) [I]