STUDYPREP — MATH COURSES

FULL COURSE CURRICULUM

Algebra 1

A complete, standards-aligned Algebra 1 course covering number & quantity, linear equations, functions, systems, polynomials, factoring, quadratics, and data analysis. Aligned to CCSS Algebra 1.

11	57	111
Units	Topics	Estimated days (~22 weeks)

Course Overview

Unit 1 — Number & Quantity	3 topics · 7 days
Unit 2 — Foundations of Algebra	6 topics · 8 days
Unit 3 — Linear Equations & Inequalities	7 topics · 12 days
Unit 4 — Functions & Relations	6 topics · 10 days
Unit 5 — Linear Functions & Graphing	6 topics · 12 days
Unit 6 — Systems of Equations	5 topics · 10 days
Unit 7 — Exponential Functions & Sequences	5 topics · 12 days
Unit 8 — Exponents & Polynomials	5 topics · 10 days
Unit 9 — Factoring	5 topics · 10 days
Unit 10 — Quadratic Functions	6 topics · 12 days
Unit 11 — Statistics & Data Analysis	3 topics · 8 days

Unit 1 — Number & Quantity

7 days

TOPIC	DESCRIPTION
Rational & Irrational Numbers	Classifying real numbers as rational or irrational; decimal expansions; locating on a number line; properties of each set.
Radicals & Rational Exponents	Simplifying square and cube roots; converting between radical notation and rational exponent notation; applying exponent rules to rational exponents.
Units of Measure	Choosing and interpreting units; unit conversions; dimensional analysis; identifying appropriate precision.

Unit 2 — Foundations of Algebra

8 days

TOPIC	DESCRIPTION
Variables, Expressions & Order of Operations	Evaluating algebraic expressions, PEMDAS/BODMAS, writing expressions from descriptions.
Real Numbers & Properties	Commutative, associative, distributive, identity, and inverse properties of real numbers.
Simplifying & Evaluating Expressions	Combining like terms, distributive property, substituting values into expressions.
Translating Words to Algebra	Key phrases for operations; setting up algebraic expressions and equations from word problems.
Structure of Expressions	Interpreting parts of an expression — what each term, factor, and coefficient represents in context; rewriting expressions to reveal structure.
Introduction to Equations	What is a solution; checking solutions by substitution; open vs. closed sentences.

Unit 3 — Linear Equations & Inequalities

12 days

TOPIC	DESCRIPTION
One-Step Equations	Solving equations using addition, subtraction, multiplication, and division properties of equality.
Multi-Step Equations	Solving equations requiring multiple operations; combining like terms before solving.
Equations with Variables on Both Sides	Moving variable terms to one side; identifying no-solution and identity equations.
Literal Equations & Formulas	Solving for a specified variable; rearranging geometric and scientific formulas.
Reasoning & Justifying Steps	Naming the property used at each step; constructing logical arguments for solution processes.
Linear Inequalities	Solving one- and two-step inequalities; graphing solution sets on a number line; reversing inequality with negative multiplication.
Compound Inequalities & Absolute Value	And/or compound inequalities; solving absolute value equations and inequalities.

Unit 4 — Functions & Relations

10 days

TOPIC	DESCRIPTION
Relations vs. Functions	Mapping diagrams, vertical line test, ordered pairs, tables as functions.
Function Notation	f(x) notation; evaluating functions for given inputs; composition of functions (intro).
Domain & Range	Identifying domain and range from graphs, tables, and ordered pairs; continuous vs. discrete functions.
Rate of Change	Average rate of change from tables and graphs; interpreting rate of change in context.
Linear vs. Non-Linear Functions	Constant rate of change identifies linear functions; recognizing non-linear patterns in tables and graphs.
Graph Transformations	Shifting (horizontal/vertical translations), stretching and compressing, reflecting across axes; effect of a, h, k in $f(x) = a \cdot f(x - h) + k$.

Unit 5 — Linear Functions & Graphing

12 days

TOPIC	DESCRIPTION
Slope Formula	Rise over run; slope formula $m = (y_2 - y_1)/(x_2 - x_1)$; positive/negative/zero/undefined slopes.
Slope-Intercept Form	$y = mx + b$; identifying slope and y-intercept; graphing from slope-intercept form.
Point-Slope Form	$y - y_1 = m(x - x_1)$; writing equations given a point and slope.
Standard Form & Intercepts	$Ax + By = C$; finding x- and y-intercepts; graphing using intercepts.
Writing Equations of Lines	Writing linear equations from two points, from a graph, from a table of values.
Parallel & Perpendicular Lines	Equal slopes for parallel lines; negative reciprocal slopes for perpendicular lines.

Unit 6 — Systems of Equations

10 days

TOPIC	DESCRIPTION
Solving Systems by Graphing	Graphing two linear equations; identifying the intersection point as the solution.
Solving by Substitution	Isolating one variable and substituting into the second equation.
Solving by Elimination	Adding or subtracting equations to eliminate a variable; multiplying to align coefficients.
Special Systems	No-solution (parallel lines) and infinitely many solutions (same line); interpreting graphically.
Systems of Inequalities	Graphing each inequality; shading the feasible region; identifying solution sets.

Unit 7 — Exponential Functions & Sequences

12 days

TOPIC	DESCRIPTION
Exponential Functions & Growth/Decay	$f(x) = ab^x$ form; identifying growth ($b > 1$) vs. decay ($0 < b < 1$); graphing; real-world models like population and half-life.
Comparing Linear & Exponential Growth	Constant differences (linear) vs. constant ratios (exponential); comparing tables, graphs, and equations.
Creating Exponential Equations	Writing exponential equations from context (initial value and growth/decay rate); modeling word problems.
Arithmetic Sequences	Common difference; explicit formula $a_n = a_1 + (n-1)d$; recursive formula; recognizing as linear functions.
Geometric Sequences	Common ratio; explicit formula $a_n = a_1 \cdot r^{n-1}$; recursive formula; recognizing as exponential functions.

Unit 8 — Exponents & Polynomials

10 days

TOPIC	DESCRIPTION
Laws of Exponents	Product, quotient, power, zero exponent, and negative exponent rules with numeric and variable bases.
Scientific Notation	Writing numbers in scientific notation; multiplying and dividing numbers in scientific notation.
Adding & Subtracting Polynomials	Identifying degree and leading coefficient; combining like terms in polynomial expressions.
Multiplying Polynomials	Distributing a monomial; FOIL method for binomials; multiplying polynomials of higher degree.
Special Products	Difference of squares $(a + b)(a - b) = a^2 - b^2$; perfect square trinomials $(a \pm b)^2 = a^2 \pm 2ab + b^2$.

Unit 9 — Factoring

10 days

TOPIC	DESCRIPTION
GCF & Factoring Out	Finding GCF of polynomial terms; factoring GCF from expressions; factoring by grouping.
Factoring Trinomials (a = 1)	Factoring $x^2 + bx + c$ by finding two numbers that multiply to c and add to b.
Factoring Trinomials (a ≠ 1)	Factoring $ax^2 + bx + c$ using the AC method or trial and error.
Factoring Special Cases	Factoring difference of squares $a^2 - b^2$; perfect square trinomials.
Solving Quadratics by Factoring	Applying the zero-product property to solve quadratic equations after factoring.

Unit 10 — Quadratic Functions

12 days

TOPIC	DESCRIPTION
Introduction to Quadratics	Standard form $ax^2 + bx + c$; identifying coefficients; recognizing parabola shape and direction.
Graphing Parabolas	Finding vertex using $x = -b/2a$; axis of symmetry; x-intercepts (zeros); y-intercept; sketching the parabola.
Solving by Square Roots	Isolating x^2 and taking the square root (±); solving equations of the form $ax^2 + c = 0$.
Completing the Square	Adding $(b/2)^2$ to both sides to convert standard form to vertex form; solving by this method.
Quadratic Formula & Discriminant	Applying $x = (-b \pm \sqrt{(b^2-4ac)}) / 2a$; using the discriminant to determine number and type of solutions.
Quadratic Applications	Setting up and solving area problems, projectile motion, and other real-world quadratic models.

Unit 11 — Statistics & Data Analysis

8 days

TOPIC	DESCRIPTION
One-Variable Data	Dot plots, histograms, box plots; measures of center (mean, median) and spread (range, IQR, standard deviation); identifying outliers and shape of distributions.
Two-Variable Data	Scatter plots; identifying association and form; two-way frequency tables for categorical data.
Linear Models & Lines of Best Fit	Drawing and finding lines of best fit; interpreting slope and y-intercept in context; using the model for predictions; correlation vs. causation.

Course Summary

UNIT	TOPICS	EST. DAYS
1. Number & Quantity	3	7
2. Foundations of Algebra	6	8

3. Linear Equations & Inequalities	7	12
4. Functions & Relations	6	10
5. Linear Functions & Graphing	6	12
6. Systems of Equations	5	10
7. Exponential Functions & Sequences	5	12
8. Exponents & Polynomials	5	10
9. Factoring	5	10
10. Quadratic Functions	6	12
11. Statistics & Data Analysis	3	8
Total	**57**	**111**