

The following has been prepared in conjunction with a talk given at a Spring 2019 Teach Them Diligently conference for homeschoolers. It is intended as a resource for those who wish to improve their potential performance on the Math portion of the ACT. General information/guidelines/tips are presented. Then a connection between the usual high school curriculum and the Math ACT content is presented.

## General ACT Information

Knowing what to expect and how to prepare effectively will help improve ACT performance.

- Make sure you're comfortable using an allowable calculator. The TI 30 is an inexpensive allowable option that works very well. Graphing calculators are not permitted and aren't needed to solve any of the problems. Most problems can be done with little or no calculator use.  
The [official ACT calculator policy](#), updated December 10, 2018, states the examinees' and testing staff's responsibilities, prohibited calculators, calculators permitted with modifications, and regulations for computer-based testing environments.
- Sites that provide tips for doing well on the ACT:
  - [How to Get 36 on ACT Math: 8 Strategies by a Perfect Scorer](#) - This article was written by the co-founder and head of product design for this website, Allen Chang. He earned two perfect scores on the SAT, one perfect score on the ACT, and graduated from Harvard University summa cum laude. The eight strategies include general test-taking strategies as well as many strategies that are specific to the Math ACT.
  - [The Ultimate ACT Math Prep Guide: Strategies, Topics, and Tips](#) - This free site offers tons of information about preparing for the ACT. Each section offers a few example problems, so this site is definitely a good starting point.
  - [10 Must-Know ACT Math Tips](#) – This site provides some easy to use strategies to improve efficiency and accuracy while taking the test.
- Practice Questions and Study Manuals
  - [Tips and Practice Questions](#) from ACT
  - [Free Practice Questions](#)
  - The Official ACT Prep Guide, 2018-19 Edition ([Amazon link](#))
  - ACT Math: The Guide: Skip the Prep Courses ([Amazon link](#))
  - Ultimate Guide to the Math ACT ([Amazon link](#))
- Know what's going to be [on the test](#). See below for more details on the test content.

Remember that it's worth preparing for the ACT. Your scores can affect not only admission into college but also your ability to be ready for required collegiate courses without remediating.

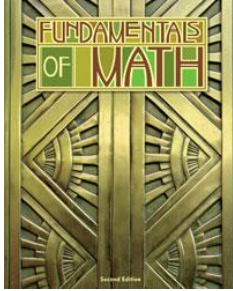
## Mapping the High School Curriculum to the ACT

The following relates the standard 7<sup>th</sup>-12<sup>th</sup> grade high school math curriculum to the content of the ACT. We've use the scope and sequence of the Bob Jones University Press (BJUP) math textbooks since the content is similar to many high school math curricula and we are personally familiar with the materials ([BJUP secondary math scope and sequence](#)). We trust you will be able to match much of the content listed below to the curriculum that you have chosen to use.

ACT content is broken into two main categories: straight-forward questions on pre-algebra, algebra, geometry and trigonometry (called Preparing for Higher Math, which represents 57-60% of the questions) and application/multi-step problems (called Integrating Essential Skills, which represents 40-43% of the questions). ACT also indicates that 25% of the questions will incorporate some sort of mathematical modeling of the problem.

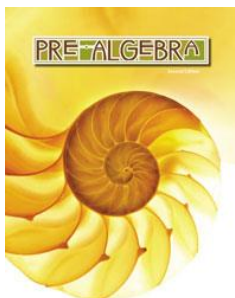
The following descriptions are taken directly from [the ACT website](#), and their headings will be used to connect the usual high school curriculum to the ACT content.

- **Preparing for Higher Math** (57–60%): This category captures the more recent mathematics that students are learning, starting when students begin using algebra as a general way of expressing and solving equations. This category is divided into the following five subcategories.
  - **Number & Quantity** (7–10%): Demonstrate knowledge of real and complex number systems. Students will understand and reason with numerical quantities in many forms, including integer and rational exponents, and vectors and matrices.
  - **Algebra** (12–15%): Solve, graph, and model multiple types of expressions. Students will employ many different kinds of equations, including but not limited to linear, polynomial, radical, and exponential relationships. The student will find solutions to systems of equations, even when represented by simple matrices, and apply their knowledge to applications.
  - **Functions** (12–15%): The questions in this category test knowledge of function definition, notation, representation, and application. Questions may include but are not limited to linear, radical, piecewise, polynomial, and logarithmic functions. Students will manipulate and translate functions, as well as find and apply important features of graphs.
  - **Geometry** (12–15%): Define and apply knowledge of shapes and solids, such as congruence and similarity relationships or surface area and volume measurements. Understand composition of objects, and solve for missing values in triangles, circles, and other figures, including using trigonometric ratios and equations of conic sections.
  - **Statistics & Probability** (8–12%): Describe center and spread of distributions, apply and analyze data collection methods, understand and model relationships in bivariate data, and calculate probabilities, including the related sample spaces.
- **Integrating Essential Skills** (40–43%): These questions address concepts typically learned before 8th grade, such as rates and percentages; proportional relationships; area, surface area, and volume; average and median; and expressing numbers in different ways. Students will solve problems of increasing complexity, combine skills in longer chains of steps, apply skills in more varied contexts, understand more connections, and become more fluent.
- **Modeling** (>25%): This category represents all questions that involve producing, interpreting, understanding, evaluating, and improving models. Each question is also counted in other appropriate reporting categories above. This category is an overall measure of how well students use modeling skills across mathematical topics.



## Fundamentals of Math traditionally 7<sup>th</sup> grade content

Curriculum Chapter/Topic	ACT Testing Content
Whole Numbers – Comparing and ordering; Estimating; Operations; Exponents; Roots of perfect squares	Number & Quantity
Decimals – Comparing and ordering; Rounding; Approximating square roots; Operations; Estimating square roots; Scientific notation	Number & Quantity
Number Theory – Divisibility; Factors; Prime and composite numbers GCD and LCM; Converting to and adding in other number bases	Number & Quantity
Fractions – Equivalent fractions; Mixed numbers; Comparing and ordering; Operations; Order of operations	Number & Quantity
Rational numbers – Ratio and proportion; Solving proportions; Scale drawings; Decimals as rational numbers; Finding a percent (part) of a number; Finding the percent; Finding the whole amount	Number & Quantity
Using percents – Enlargement and reduction; Sales tax; Discounts; Sale price; Simple interest; Commission; Percent change	Integrating Essential Skills
Measurements – Customary units of length; Capacity, and weight; SI (metric) units of length, capacity, and mass; Renaming metric units; Time zones; Temperature conversions; Precision	Integrating Essential Skills
Geometry – Measuring angles; Pairs of angles; Perpendicular and parallel lines; Transversal of parallel lines; Polygons; Circle; Perimeter and circumference; Pythagorean theorem; Congruent and similar figures	Integrating Essential Skills
Area and Volume – Area of quadrilaterals, triangles, and circles; Areas of similar figures; Surface area of prisms, cylinders, and pyramids; Volume of prisms and cylinders	Integrating Essential Skills
Probability and statistics – Fundamental principle of counting; Permutations; Probability; Mean, median, mode; Circle, bar, and line graphs; Histograms; Box-and-whisker plots; Stem-and-leaf diagrams	Statistics & Probability
Integers – Ordering; Operations; Applying order of operations; Expansion to and properties of the real numbers	Number & Quantity
Algebra – Evaluating expressions; Solving one-and two-step equations; Solving one-and two-step inequalities	Algebra
Relations and functions – Coordinate plane; Functions and function rules; Graphing linear functions; Slope; Translation of figures on a plane	Functions
Logic and set theory – Statements and negations; Compound and conditional statements and negations; Truth tables; Sets and subsets; Union and intersection of sets; Finite and infinite sets	



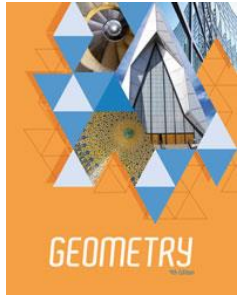
## Pre–Algebra traditionally 8<sup>th</sup> grade content

Curriculum Chapter/Topic	ACT Testing Content
Integers – Absolute value; Operation; Exponents; Order of operation; Scientific notation	Number & Quantity
Expressions – Real–number properties; Evaluating and simplifying expressions; Translating word phrases; Rounding and estimating results of operations	Number & Quantity
Equations – Solving two–step equations; Removal of parentheses; Subsets of the real numbers; Irrational numbers; Solving linear inequalities; Applying equations and inequalities	Algebra
Number Theory – Prime factorization; GCD and LCM; Arithmetic and geometric sequences; Number bases other than 10, including hexadecimal; Operations in other bases	Number & Quantity
Rational Numbers – Forms of ordering fractions and decimals; Decimal equivalents of fractions; Conversion of repeating decimals to fractions; Ratios and proportions; Subsets and properties of real numbers	Number & Quantity
Operations on rational numbers – Operations; Evaluating and simplifying expressions; Solving equations involving rationals; Operations in scientific notation	Number & Quantity
Percents – Solving percent equations; Applying percents; Scales; Discount, markup, commissions, tips, and interest (including compound); Percent change	Integrating Essential Skills
Applications – Equations with variables on both side; Writing and solving equations and inequalities	Algebra Modeling
Relations and functions – Coordinate plane; Functions; Graphing linear functions and linear inequalities; Slope; Direct variation	Functions
Statistics and probability – Population and sample; Mean, median, and mode; Scatterplot; Quartiles; Box–and–whisker; Stem–and–leaf; Histograms; Choosing the correct type of graph; Permutations; Combinations; Probability	Statistics & Probability
Radicals – Square roots; Radical equations; Equations with radicals; Equations of the form $ax^2+b=c$ ; Pythagorean theorem; Operations with radicals; Cube roots	Number & Quantity
Geometry – Pairs of angles; Polygons; Perimeter and circumference; Congruence and similarity; 30–60 and 45–45 right triangle ratios; Distance and midpoint formulas; Symmetry and transformation	Geometry
Areas and volume – Areas of quadrilaterals, triangles, and circles; Relation of lengths and areas of similar regions; Surface areas of prisms, cylinders, pyramids, cones, and spheres	Geometry Integrating Essential Skills
Polynomials – Definition of a polynomial; Operations with polynomials, including multiplying binomials and dividing a polynomial by a monomial	Algebra



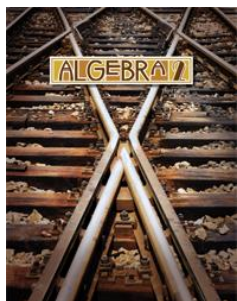
## Algebra 1 traditionally 9<sup>th</sup> grade content

Curriculum Chapter/Topic	ACT Testing Content
Operations – Review of the real number system, number lines, absolute value, arithmetic operations of integers and rational numbers, exponents, and order of operations	Number & Quantity
Variables and equations – Using variables, algebraic expressions, and formulas; Writing and solving linear equations	Algebra Functions
Using algebra – Solving literal equations and proportions; Applying equations to applications involving similar figures, percentages, money, motion, and mixtures	Algebra Modeling
Solving inequalities – Linear inequalities, including conjunctions, disjunctions; Absolute-value equations and inequalities	Algebra
Relations and functions – Representing relationships between data, using graphs, equations, and tables; Direct and inverse variations; Graphing absolute value functions	Functions Modeling
Linear functions – Graphs, slopes, and intercepts of linear equations; Determining the equation of a line; Parallel and perpendicular lines; Correlation and lines of fit; Graphing linear inequalities	Functions Statistics & Probability
Systems of equations and inequalities – Solving systems graphically, by substitution, and by elimination; Applications of systems	Algebra
Exponents – Products, quotients, and powers of exponential expressions; Scientific notation; Graphing exponential functions; Exponential growth and decay	Number & Quantity
Polynomials – Classification, evaluation, operations, special patterns	Algebra Functions Modeling
Factoring – Common monomials, trinomials, special patterns	Algebra Functions
Radicals – Simplification and operations with radicals; Pythagorean theorem; Distance and midpoint formulas; Solving radical equations and graphing radical functions; Applications	Number & Quantity
Quadratic Equations – Solving by factoring, taking roots, completing the square, and the quadratic formula; Graphing parabolas and finding zeros; Applications	Algebra Functions Modeling
Rational expressions and equations – Simplification and operations with rational expressions; Solving rational equations; Applications	Algebra Functions Modeling



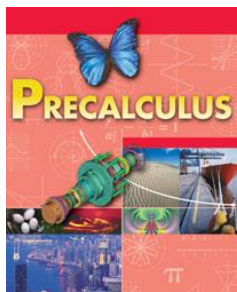
## Geometry traditionally 10<sup>th</sup> grade content

Curriculum Chapter/Topic	ACT Testing Content
Foundations of Geometry – Sets; definitions; incidence postulates and theorems; segment and angle measure; circles; polygons; polyhedra	Geometry
Reasoning and Proof – Inductive and deductive reasoning; truth tables; proofs using angles and segments; bisectors; constructions	
Parallel and Perpendicular Lines – Characteristics; proofs; constructions; and coordinate geometry	
Congruent Triangles – Angles in triangles; congruence postulates and theorems; flow-chart proofs; right triangles; midsegments	Geometry
Relationships in Triangles – Circumcenter; incenter; orthocenter; centroid; indirect proof; triangle inequalities; constructions	
Quadrilaterals – Classification; characteristics; proofs; analytic geometry related to trapezoids; kites; parallelograms; squares; rectangles; and rhombii	Geometry
Area – Postulates; polygons; Pythagorean Theorem; special triangles; regular polygons; and circles	Geometry Integrating Essential Skills
Circles – Chords; tangents; arc length; sectors; inscribed angles; secants; constructions; graphs	Geometry
Surface Area and Volume – Nets; prisms; cylinders; pyramids; spheres; non-Euclidean geometry; perspective	Geometry Integrating Essential Skills
Transformations and Symmetry – Reflections; translations; rotations; dilations; invariants; symmetry; applications	
Similarity – Triangles; right triangles; proportions; chords and tangents of circles; golden ratio	Geometry
Trigonometry – Basic ratios; solving right triangles; applications; vectors; areas; identities	Geometry



## Algebra 2 traditionally 11<sup>th</sup> grade content

Curriculum Chapter/Topic	ACT Testing Content
Operations – Real and complex numbers; Polynomial; Matrix; Function	Number & Quantity Algebra
Linear equations – Solving equations and inequalities; Absolute value equations and inequalities; Distance on number lines; Word problems; Compound inequalities	Algebra Modeling
Linear relations – Graphs of linear functions; Slopes; Special functions; Linear inequalities; Distances and midpoints; Modeling with linear regressions	Algebra Modeling
Systems – Solved graphically and algebraically; Systems of inequalities; Systems of three variables; Problem solving; Linear programming	Algebra Modeling
Matrices – Organizing data; Operations; Determinants; Solving systems using Cramer's Rule and inverse matrices; Transformations	Algebra
Quadratic equations – Solving factoring, taking roots, completing the square, and the quadratic formula; Using the discriminant; Complex roots; Quadratic inequalities	Number & Quantity Algebra
Polynomial functions – Roots, graphing, and modeling with quadratic and polynomial functions; Problem solving; Rational root, remainder, and factor theorems; Fundamental theorem of algebra	Algebra Functions
Radicals, Exponents, and Logarithms – Rational exponents; Inverse functions; Simplifying expressions; Solving equations, graphing and modeling with radical, exponential, and logarithmic functions; Natural and common logarithms	Algebra Functions Modeling
Rational Expressions – Simplifying; Solving equations; Graphing; Variations	Functions
Trigonometry – Right triangle and coordinate plane trigonometry; Special triangles and the unit circle; Radians; Graphs of trigonometric functions; Inverse functions	Geometry
Trigonometric Identities – Law of Sines; Law of Cosines; Problem solving; Proving identities; Trigonometric equations	
Sequences and Series – Explicit and recursive formulas; Arithmetic and geometric sequences and series; Summation notation	
Probability and Statistics – Counting principles; Theoretical and experimental probabilities; Independent, dependent, and mutually exclusive events; Binomial distribution, descriptive statistics, representing data; Normal distributions; Making inferences	Statistics & Probability Modeling
Analytic Geometry – Circles; Parabolas; Ellipses; Hyperbolas; Systems of quadratic relations	Geometry



Precalculus  
traditionally 12<sup>th</sup> grade content

Curriculum Chapter/Topic	ACT Testing Content
Trigonometry – Reference angles; Law of Sines; Law of Cosines	Geometry
Polynomials – Linear; Quadratic and polynomial functions; Factoring higher-degree polynomials; Zeros; Graphing	Algebra Functions
Functions – Power; Exponential; Piece; Periodic; Trigonometric; Reciprocal; Rational	Functions
Inverse Functions – Increasing and decreasing functions; Checking and finding inverses; Radical functions; Inverse trigonometric functions; Logarithms	
Equations – Polynomial; Rational; Radical; Logarithmic; Exponential functions; Identities; Trigonometric equations	Algebra Functions
Conic sections and polar graphs – Circles; Ellipses; Parabolas; Hyperbolas; Variation; Polar coordinates; Polar equations	Geometry
Complex numbers – Graphs; Polar form; Powers and roots; Vectors; Dot products; Applications	Number & Quantity
Matrix Algebra – Gaussian elimination; Determinants; Cramer's Rule; Inverses	Algebra
Statistics – Central tendency; Variability; Bell curve; Linear correlation; Hypothesis testing	Statistics & Probability
Sequences – Recursive and explicit formula; Arithmetic and geometric sequences; Mathematical induction; Summation	
Limits and Calculus – Limits of sequences; Series; Limits of functions; Continuous functions; Asymptotes; Limit theorems	
Differential calculus – Definition; Graphs, properties; Chain rule; Quotient rule; Motion applications	