



Table of Contents

Introduction and Test Strategy..... 4	3.9 Right Triangle Trigonometry ‘SOH-CAH-TOA’.... 256
Calculator Quiz..... 5	3.10 Congruent and Similar Figures.....264
Important Features of the Book.....6	3.11 Other Triangle Relationships..... 272
ACT Math Formulas..... 7	3.12 Distance and Midpoint Formulas..... 279
 	3.13 Slopes of Lines..... 284
CHAPTER 1: Pre–Algebra and Fundamentals.... 9	3.14 Line Graphs, Intercepts and Other Features.... 289
1.1 Sets and Groups of Numbers..... 10	3.15 Properties of Circles..... 303
1.2 Factors, Multiples and Primes..... 13	3.16 Properties of Ellipses.....311
1.3 GCF and LCM..... 18	3.17 Graphing Inequalities..... 316
1.4 Fractions and Mixed Numbers.....24	
1.5 Percent Problems..... 33	CHAPTER 4: Statistics and Probability.....323
1.6 Money Problems and Amount Matching..... 44	4.1 Mean, Median, Mode, Range and Deviation.....324
1.7 Ratios, Rates and Proportions.....51	4.2 Counting and Arrangements..... 335
1.8 Integers, Expressions and Order of Operations... 67	4.3 Probability.....348
 	4.4 Graphs, Charts and Plots..... 367
CHAPTER 2: Algebra and Functions.....75	
2.1 Solving Equations..... 76	CHAPTER 5: Trigonometry..... 376
2.2 Solving Inequalities.....84	5.1 Trigonometry and Angles on the X–Y Plane.....377
2.3 Translation of Equations and Inequalities.....89	5.2 Trigonometric Equations and Identities..... 383
2.4 Absolute Value..... 95	5.3 Graphs of Trigonometric Functions.....387
2.5 Systems of Equations..... 103	5.4 Law of Sines, Law of Cosines and Area..... 393
2.6 Functions..... 110	
2.7 Exponents.....117	CHAPTER 6: Other ACT Math Topics..... 401
2.8 Scientific Notation..... 126	6.1 Matrices.....402
2.9 Polynomials..... 131	6.2 Sequences and Series..... 409
2.10 Factoring Polynomials..... 137	6.3 Distance, Rate and Time420
2.11 Quadratics and Parabolas..... 144	6.4 Logarithms..... 426
2.12 Roots and Radicals..... 155	6.5 Imaginary and Complex Numbers.....430
2.13 Consecutive Integers and Graph Behavior..... 168	6.6 Vectors..... 437
2.14 Rational Functions and Expressions.....180	
2.15 Using Answer Choices to Solve Problems.....194	Extended Solutions.....441
 	Index529
CHAPTER 3: Plane & Coordinate Geometry...202	Math Review Cards.....534
3.1 Plotting Points in the X–Y Plane..... 203	
3.2 Geometry Basics..... 207	
3.3 Perimeter and Area..... 212	
3.4 Compound and Composite Shapes..... 223	
3.5 Volume and Surface Area..... 228	
3.6 Angle Relationships..... 236	
3.7 Properties of Polygons.....243	
3.8 The Pythagorean Theorem..... 253	

OVERVIEW

MATH ON THE FLY, 548 Pages

CHAPTER 1: Pre–Algebra and Fundamentals

1.1 Sets and Groups of Numbers

real, complex, irrational, rational numbers, integers, whole numbers, natural numbers

1.2 Factors, Multiples and Primes

factor tables, factor trees, factors, multiples, primes, prime factorization

1.3 GCF and LCM

greatest common factor, least common multiple

1.4 Fractions and Mixed Numbers

add/subtract/multiply/divide fractions, fractions of amounts, word problems involving one whole, minimizing/maximizing fractions, comparing fractions and decimals

1.5 Percent Problems

fraction/decimal/percent conversions, percents of amounts, percents word problems, percent change, solving percent problems by translation

1.6 Money Problems and Amount Matching

initial fee and rate problems, amount/membership plan matching, work and overtime, profit/revenue/cost, basic loan/credit problems

1.7 Ratios, Rates and Proportions

two–part and three–part ratios, equivalent ratios, “sum” ratio problems, combining ratios, rates and unit rates, solving word problems with cross multiplication, measurement, dimensional analysis, direct and inverse variation

1.8 Integers, Expressions and Order of Operations

add/subtract/multiply/divide integers, order of operations, plugging into expressions, symbolic expressions, combining like terms, distributive property

CHAPTER 2: Algebra and Functions

2.1 Solving Equations

one-step equations, multi-step equations, solving equations with cross multiplication, equations with infinite solutions/no solution, solving for variables in literal equations and formulas

2.2 Solving Inequalities

multi-step inequalities, inequalities with infinite solutions/no solution, three-part inequalities, graphing inequalities on number lines, compound inequalities

2.3 Translation of Equations and Inequalities

key words used in expressions, writing expressions in the correct order, translating multiple operations, changing words to equations and inequalities, translating phrases to solve word problems

2.4 Absolute Value

absolute value expressions, absolute value equations and inequalities, using answer choices to solve absolute value problems

2.5 Systems of Equations

solving systems by substitution, solving systems by elimination, systems with infinite solutions or no solution, systems of equations word problems

2.6 Functions

plugging into functions, composite functions, reading functions from graphs and tables, multivariate functions, piecewise functions

2.7 Exponents

product, quotient and power rules of exponents, distributing powers, the zero power, negative exponents, solving exponential equations

2.8 Scientific Notation

scientific notation and standard form, add/subtract/multiply/divide numbers in scientific notation

2.9 Polynomials

add/subtract/multiply/divide polynomials, F.O.I.L. method

2.10 Factoring Polynomials

factoring out the GCF, difference of squares, factoring trinomials of the form $Ax^2 + Bx + C$, sum and difference of cubes

2.11 Quadratics and Parabolas

solving equations by factoring, solving equations using square roots, discriminant, quadratic formula, features of parabolas, parabola transformations

2.12 Roots and Radicals

square roots, cube roots and higher roots, simplifying roots and radicals, fractional exponents, estimating square roots, add/subtract/multiply/divide roots, solving equations involving exponents and roots

2.13 Consecutive Integers and Graph Behavior

consecutive integer problems, comparing functions on graphs, zeros of polynomial functions, domain and range, graph transformations, even and odd functions

2.14 Rational Functions and Expressions

add/subtract/multiply/divide/simplify rational expressions, complex fractions, domain restrictions, vertical and horizontal asymptotes

2.15 Using Answer Choices to Solve Problems

solving problems where plugging in numbers is required, making up your own numbers as a test strategy, using answer choices as a test strategy

CHAPTER 3: Plane & Coordinate Geometry

3.1 Plotting Points in the X–Y Plane

plotting (x,y) points, quadrants, translations and reflections of points,

3.2 Geometry Basics

geometric definitions, bisectors, altitudes, midpoints, naming angles and shapes, congruent sides, parallel and perpendicular segments, two-dimensional shapes, three-dimensional solids

3.3 Perimeter and Area

perimeter, area, squares, rectangles, parallelograms, triangles, trapezoids, circumference/area of circles, finding the area of shaded regions, geometric probability

3.4 Compound and Composite Shapes

perimeter/area of compound figures, finding area by subtraction

3.5 Volume and Surface Area

volume, surface area, cubes, rectangular prisms, prisms in general, cylinders

3.6 Angle Relationships

types of angles, complementary/supplementary angles, vertical and adjacent angles, parallel lines and transversals, corresponding/alternate interior/same-side interior angles

3.7 Properties of Polygons

angles inside triangles/quadrilaterals/pentagons, isosceles and equilateral triangles, parallelograms, trapezoids, isosceles trapezoids, sum of interior angles of polygons

3.8 The Pythagorean Theorem

Pythagorean theorem, Pythagorean triples

3.9 Right Triangle Trigonometry ‘SOH-CAH-TOA’

sine/cosine/tangent ratios, using the trig ratios to find sides and angles, solving simple trigonometric equations

3.10 Congruent and Similar Figures

congruent figures, similar figures, word problems, perimeter and area of similar figures, side-splitter theorem

3.11 Other Triangle Relationships

classifying triangles by angles and sides, triangle inequality theorem, special right triangles, 45° – 45° – 90° triangles, 30° – 60° – 90° triangles

3.12 Distance and Midpoint Formulas

distance formula, midpoint formula, using the midpoint to find endpoints

3.13 Slopes of Lines

slope formula, using “rise over run” to find slope on graphs

3.14 Line Graphs, Intercepts and Other Features

vertical lines, horizontal lines, graphing lines in slope-intercept form, finding points on lines, finding equations of lines from tables, finding equations of lines algebraically when given a point and slope, x and y intercepts, parallel and perpendicular lines

3.15 Properties of Circles

arcs of circles, central angles, inscribed angles, arc length, tangents, congruent chords, using radii in circles, equation of a circle

3.16 Properties of Ellipses

equations of ellipses, minor and major axes, focal points of ellipses

3.17 Graphing Inequalities

linear inequalities, parabolic inequalities, circular inequalities, systems of inequalities

CHAPTER 4: Statistics and Probability

4.1 Mean, Median, Mode and Range

arithmetic mean, median, mode, range, standard deviation, frequency distributions

4.2 Counting and Arrangements

fundamental counting principle, Venn diagrams, factorials, permutations, combinations

4.3 Probability

simple probability, complement of events, probability of multiple events, picking items with/without replacement, calculating odds, probability distributions, expected value, two-way tables, conditional probability, mutually exclusive events, independent events,

4.4 Graphs, Charts and Plots

frequency tables, bar graphs, histograms, line graphs, stem and leaf plots, pie charts

CHAPTER 5: Trigonometry

5.1 Trigonometry and Angles on the X–Y Plane

degree and radian conversions, coterminal angles, finding trig ratios of angles that pass through points

5.2 Trigonometry Equations and Identities

solving trigonometric equations, simplifying trigonometric expressions, trigonometric identities

5.3 Graphs of Trigonometric Functions

sine curves, cosine curves, amplitude, period, transformations of trig curves, period of secant/cosecant/tangent curves

5.4 Law of Sines, Law of Cosines and Area

law of sines, law of cosines, using trig to find area of triangles

CHAPTER 6: Other ACT Math Topics

6.1 Matrices

add/subtract/multiply matrices, equivalent matrices, determinant of 2×2 matrices

6.2 Sequences and Series

arithmetic sequences and series, geometric sequences and series, recursive sequences, loops, ones-digit problems

6.3 Distance, Rate and Time

distance, rate, time, average speed, collision problems

6.4 Logarithms

logarithmic form, exponential form, logarithmic equations, rules of logarithms

6.5 Imaginary and Complex Numbers

imaginary numbers, graphing complex numbers, modulus, add/subtract/multiply/divide complex numbers

6.6 Vectors

vector component form, unit vector notation, graphing vectors, adding and subtracting vectors, scalar multiplication, magnitude of vectors