


### Kentucky Academic Standards for Mathematics (High School) Crosswalk Overview

ACT Math Standards	Corresponding KAS for Math Math Practices	Corresponding KAS Math Cross Cutting Concepts
Number and Quantity (N)	<ul style="list-style-type: none"> <li>Make Sense of Problems and Persevere in Solving Them</li> <li>Reason Abstractly and Quantitatively</li> <li>Model with Mathematics</li> <li>Attend to Precision</li> <li>Look For and Express Regularity in Repeated Reasoning</li> </ul>	<ul style="list-style-type: none"> <li>Problem Solving</li> <li>Data, Real-World Situations, and Solutions</li> <li>Scale, Proportion, and Quantity</li> </ul>
Algebra (A) and Functions (F)	<ul style="list-style-type: none"> <li>Reason Abstractly and Quantitatively</li> <li>Construct Viable Arguments and Critique Reasoning</li> <li>Model with Mathematics</li> <li>Attend to Precision</li> <li>Look For and Make Use of Structure</li> </ul>	<ul style="list-style-type: none"> <li>Systems and System Models</li> <li>Mathematical Connections</li> </ul>
Geometry (G), Statistics and Probability (S)	<ul style="list-style-type: none"> <li>Make Sense of Problems and Persevere in Solving Them</li> <li>Reason Abstractly and Quantitatively</li> <li>Construct Viable Arguments and Critique Reasoning</li> <li>Model with Mathematics</li> <li>Attend to Precision</li> </ul>	<ul style="list-style-type: none"> <li>Structure and Function</li> <li>Patterns</li> </ul>

Content of the ACT Mathematics Test			
	Content Area	Possible Topics & Percentages	# Questions
#1	Pre-Algebra	Fractions, Percent, Proportion, Equations, Probability, Descriptive Stats (23%)	14
#2	Elementary Algebra	Polynomials, Quadratics, Systems (17%)	10
#3	Intermediate Algebra	Radical and Rational Operations, Matrices, Complex Numbers (15%)	9
#4	Coordinate Geometry	Conics, Distance, Perpendicular and Parallel Lines, Transformations (15%)	9
#5	Plane Geometry	Plane Figures, Circles, Proof (23%)	14
#6	Trigonometry	Functions, Identities, Equations (7%)	4



**Math ACT—Benchmark Analysis**

To receive the benchmark score of **19 (for Contemporary Math)**, at least **26** questions, benchmark score of **22 (for College Algebra)**, at least **31** questions, and score of 27 (**for Calculus**), at least **44** questions must be answered correctly.

60 questions – 60 minutes

## Key Ideas and Details: Number and Quantity (N)

ACT Mathematics: Number and Quantity (N) Scoring Range with Standards					
Approaching Benchmark		Meets Benchmark	Exceeds Benchmark		
13-15	16-19	20-23	24-27	28-32	33-36
<p>N 201. Perform one-operation computation with whole numbers and decimals</p> <p>N 202. Recognize equivalent fractions and fractions in lowest terms</p> <p>N 203. Locate positive rational numbers (expressed as whole numbers, fractions, decimals, and mixed numbers) on the number line</p>	<p>N 301. Recognize one-digit factors of a number</p> <p>N 302. Identify a digit's place value</p> <p>N 303. Locate rational numbers on the number line</p> <p><i>Note: A matrix as a representation of data is treated here as a basic table.</i></p>	<p><b>N 401. Exhibit knowledge of elementary number concepts such as rounding, the ordering of decimals, pattern identification, primes, and greatest common factor</b></p> <p><b>N 402. Write positive powers of 10 by using exponents</b></p> <p><b>N 403. Comprehend the concept of length on the number line, and find the distance between two points</b></p> <p><b>N 404. Understand absolute value in terms of distance</b></p> <p><b>N 405. Find the distance in the coordinate plane between two points with the same x-coordinate or y-coordinate</b></p> <p><b>N 406. Add two matrices that have whole number entries</b></p>	<p>N 501. Order fractions</p> <p>N 502. Find and use the least common multiple</p> <p>N 503. Work with numerical factors</p> <p>N 504. Exhibit some knowledge of the complex numbers</p> <p>N 505. Add and subtract matrices that have integer entries</p>	<p>N 601. Apply number properties involving prime factorization</p> <p>N 602. Apply number properties involving even/odd numbers and factors/multiples</p> <p>N 603. Apply number properties involving positive/negative numbers</p> <p>N 604. Apply the facts that <math>\pi</math> is irrational and that the square root of an integer is rational only if that integer is a perfect square</p> <p>N 605. Apply properties of rational exponents</p> <p>N 606. Multiply two complex numbers</p> <p>N 607. Use relations involving addition, subtraction, and scalar multiplication of vectors and of matrices</p>	<p>N 701. Analyze and draw conclusions based on number concepts</p> <p>N 702. Apply properties of rational numbers and the rational number system</p> <p>N 703. Apply properties of real numbers and the real number system, including properties of irrational numbers</p> <p>N 704. Apply properties of complex numbers and the complex number system</p> <p>N 705. Multiply matrices</p> <p>N 706. Apply properties of matrices and properties of matrices as a number system</p>

## Key Ideas and Details: Algebra (A)

ACT Mathematics: Algebra (A) Scoring Range with Standards					
Approaching Benchmark		Meets Benchmark	Exceeds Benchmark		
13-15	16-19	20-23	24-27	28-32	33-36
<p>AF 201. Solve problems in one or two steps using whole numbers and using decimals in the context of money</p> <p>A 201. Exhibit knowledge of basic expressions (e.g., identify an expression for a total as <math>b + g</math>)</p> <p>A 202. Solve equations in the form <math>x + a = b</math>, where <math>a</math> and <math>b</math> are whole numbers or decimals</p>	<p>AF 301. Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent</p> <p>AF 302. Solve some routine two-step arithmetic problems</p> <p>AF 303. Relate a graph to a situation described qualitatively in terms of familiar properties such as before and after, increasing and decreasing, higher and lower</p> <p>AF 304. Apply a definition of an operation for whole numbers (e.g., <math>a \square b = 3a - b</math>)</p> <p>A 301. Substitute whole numbers for unknown quantities to evaluate expressions</p> <p>A 302. Solve one-step equations to get integer or decimal answers</p> <p>A 303. Combine like terms (e.g., <math>2x + 5x</math>)</p>	<p><b>AF 401. Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and estimating by using a given average value in place of actual values</b></p> <p><b>AF 402. Perform straightforward word-to-symbol translations</b></p> <p><b>AF 403. Relate a graph to a situation described in terms of a starting value and an additional amount per unit (e.g., unit cost, weekly growth)</b></p> <p><b>A 401. Evaluate algebraic expressions by substituting integers for unknown quantities</b></p> <p><b>A 402. Add and subtract simple algebraic expressions</b></p> <p><b>A 403. Solve routine first-degree equations</b></p> <p><b>A 404. Multiply two binomials</b></p> <p><b>A 405. Match simple inequalities with their graphs on the number line (e.g., <math>x \geq -3</math> <math>5 \leq x \leq -35</math>)</b></p>	<p>AF 501. Solve multistep arithmetic problems that involve planning or converting common derived units of measure (e.g., feet per second to miles per hour)</p> <p>AF 502. Build functions and write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)</p> <p>AF 503. Match linear equations with their graphs in the coordinate plane</p> <p>A 501. Recognize that when numerical quantities are reported in real-world contexts, the numbers are often rounded</p> <p>A 502. Solve real-world problems by using first-degree equations</p> <p>A 503. Solve first-degree inequalities when the method does not involve reversing the inequality sign</p>	<p>AF 601. Solve word problems containing several rates, proportions, or percentages</p> <p>AF 602. Build functions and write expressions, equations, and inequalities for common algebra settings (e.g., distance to a point on a curve and profit for variable cost and demand)</p> <p>AF 603. Interpret and use information from graphs in the coordinate plane</p> <p>AF 604. Given an equation or function, find an equation or function whose graph is a translation by a specified amount up or down</p> <p>A 601. Manipulate expressions and equations</p> <p>A 602. Solve linear inequalities when the method involves reversing the inequality sign</p> <p>A 603. Match linear inequalities with their</p>	<p>AF 701. Solve complex arithmetic problems involving percent of increase or decrease or requiring integration of several concepts (e.g., using several ratios, comparing percentages, or comparing averages)</p> <p>AF 702. Build functions and write expressions, equations, and inequalities when the process requires planning and/or strategic manipulation</p> <p>AF 703. Analyze and draw conclusions based on properties of algebra and/or functions</p> <p>AF 704. Analyze and draw conclusions based on information from graphs in the coordinate plane</p> <p>AF 705. Identify characteristics of graphs based on a set of conditions or on a general equation such as <math>y = ax^2 + c</math></p> <p>AF 706. Given an equation or function, find an equation or function whose graph is a translation by specified</p>

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		<p><b>A 406. Exhibit knowledge of slope</b></p>	<p>A 504. Match compound inequalities with their graphs on the number line (e.g., <math>-10.5 &lt; x \leq 20.3</math>)</p> <p>A 505. Add, subtract, and multiply polynomials</p> <p>A 506. Identify solutions to simple quadratic equations</p> <p>A 507. Solve quadratic equations in the form <math>(x + a)(x + b) = 0</math>, where <math>a</math> and <math>b</math> are numbers or variables</p> <p>A 508. Factor simple quadratics (e.g., the difference of squares and perfect square trinomials)</p> <p>A 509. Work with squares and square roots of numbers</p> <p>A 510. Work with cubes and cube roots of numbers</p> <p>A 511. Work with scientific notation</p> <p>A 512. Work problems involving positive integer exponents</p> <p>A 513. Determine when an expression is undefined</p> <p>A 514. Determine the slope of a line from an equation.</p>	<p>graphs on the number line</p> <p>A 604. Solve systems of two linear equations</p> <p>A 605. Solve quadratic equations</p> <p>A 606. Solve absolute value equations</p>	<p>amounts in the horizontal and vertical directions</p> <p>A 701. Solve simple absolute value inequalities</p> <p>A 702. Match simple quadratic inequalities with their graphs on the number line</p> <p>A 703. Apply the remainder theorem for polynomials, that <math>P(a)</math> is the remainder when <math>P(x)</math> is divided by <math>(x - a)</math></p>
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## Key Ideas and Details: Functions (F)

ACT Mathematics: Functions (F) Scoring Range with Standards					
Approaching Benchmark		Meets Benchmark	Exceeds Benchmark		
13-15	16-19	20-23	24-27	28-32	33-36
<p>AF 201. Solve problems in one or two steps using whole numbers and using decimals in the context of money</p> <p>F 201. Extend a given pattern by a few terms for patterns that have a constant increase or decrease between terms</p>	<p>AF 301. Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent</p> <p>AF 302. Solve some routine two-step arithmetic problems</p> <p>AF 303. Relate a graph to a situation described qualitatively in terms of familiar properties such as before and after, increasing and decreasing, higher and lower</p> <p>AF 304. Apply a definition of an operation for whole numbers (e.g., <math>a \square b = 3a - b</math>)</p> <p>F 301. Extend a given pattern by a few terms for patterns that have a constant factor between terms</p>	<p><b>AF 401. Solve routine two-step or three-step arithmetic problems involving concepts such as rate and proportion, tax added, percentage off, and estimating by using a given average value in place of actual values</b></p> <p><b>AF 402. Perform straightforward word-to-symbol translations</b></p> <p><b>AF 403. Relate a graph to a situation described in terms of a starting value and an additional amount per unit (e.g., unit cost, weekly growth)</b></p> <p><b>F 401. Evaluate linear and quadratic functions, expressed in function notation, at integer values</b></p>	<p>AF 501. Solve multistep arithmetic problems that involve planning or converting common derived units of measure (e.g., feet per second to miles per hour)</p> <p>AF 502. Build functions and write expressions, equations, or inequalities with a single variable for common pre-algebra settings (e.g., rate and distance problems and problems that can be solved by using proportions)</p> <p>AF 503. Match linear equations with their graphs in the coordinate plane</p> <p>F 501. Evaluate polynomial functions, expressed in function notation, at integer values</p> <p>F 502. Find the next term in a sequence described recursively</p> <p>F 503. Build functions and use quantitative information to identify graphs for relations that are proportional or linear</p>	<p>AF 601. Solve word problems containing several rates, proportions, or percentages</p> <p>AF 602. Build functions and write expressions, equations, and inequalities for common algebra settings (e.g., distance to a point on a curve and profit for variable cost and demand)</p> <p>AF 603. Interpret and use information from graphs in the coordinate plane</p> <p>AF 604. Given an equation or function, find an equation or function whose graph is a translation by a specified amount up or down</p> <p>F 601. Relate a graph to a situation described qualitatively in terms of faster change or slower change</p> <p>F 602. Build functions for relations that are inversely proportional</p>	<p>AF 701. Solve complex arithmetic problems involving percent of increase or decrease or requiring integration of several concepts (e.g., using several ratios, comparing percentages, or comparing averages)</p> <p>AF 702. Build functions and write expressions, equations, and inequalities when the process requires planning and/or strategic manipulation</p> <p>AF 703. Analyze and draw conclusions based on properties of algebra and/or functions</p> <p>AF 704. Analyze and draw conclusions based on information from graphs in the coordinate plane</p> <p>AF 705. Identify characteristics of graphs based on a set of conditions or on a general equation such as <math>y = ax^2 + c</math></p> <p>AF 706. Given an equation or function, find an equation or function whose graph is a translation by specified</p>

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			<p>F 504. Attend to the difference between a function modeling a situation and the reality of the situation</p> <p>F 505. Understand the concept of a function as having a well-defined output value at each valid input value</p> <p>F 506. Understand the concept of domain and range in terms of valid input and output, and in terms of function graphs</p> <p>F 507. Interpret statements that use function notation in terms of their context</p> <p>F 508. Find the domain of polynomial functions and rational functions</p> <p>F 509. Find the range of polynomial functions</p> <p>F 510. Find where a rational function's graph has a vertical asymptote</p> <p>F 511. Use function notation for simple functions of two variables</p>	<p>F 603. Find a recursive expression for the general term in a sequence described recursively</p> <p>F 604. Evaluate composite functions at integer values</p>	<p>amounts in the horizontal and vertical directions</p> <p>F 701. Compare actual values and the values of a modeling function to judge model fit and compare models</p> <p>F 702. Build functions for relations that are exponential</p> <p>F 703. Exhibit knowledge of geometric sequences</p> <p>F 704. Exhibit knowledge of unit circle trigonometry</p> <p>F 705. Match graphs of basic trigonometric functions with their equations</p> <p>F 706. Use trigonometric concepts and basic identities to solve problems</p> <p>F 707. Exhibit knowledge of logarithms</p> <p>F 708. Write an expression for the composite of two simple functions</p>
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## Key Ideas and Details: Geometry (G)

ACT Mathematics: Geometry (G) Scoring Range with Standards					
Approaching Benchmark		Meets Benchmark	Exceeds Benchmark		
13-15	16-19	20-23	24-27	28-32	33-36
<p>G 201. Estimate the length of a line segment based on other lengths in a geometric figure</p> <p>G 202. Calculate the length of a line segment based on the lengths of other line segments that go in the same direction (e.g., overlapping line segments and parallel sides of polygons with only right angles)</p> <p>G 203. Perform common conversions of money and of length, weight, mass, and time within a measurement system (e.g., dollars to dimes, inches to feet, and hours to minutes)</p>	<p>G 301. Exhibit some knowledge of the angles associated with parallel lines</p> <p>G 302. Compute the perimeter of polygons when all side lengths are given</p> <p>G 303. Compute the area of rectangles when whole number dimensions are given</p> <p>G 304. Locate points in the first quadrant</p>	<p><b>G 401. Use properties of parallel lines to find the measure of an angle</b></p> <p><b>G 402. Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., <math>90^\circ</math>, <math>180^\circ</math>, and <math>360^\circ</math>)</b></p> <p><b>G 403. Compute the area and perimeter of triangles and rectangles in simple problems</b></p> <p><b>G 404. Find the length of the hypotenuse of a right triangle when only very simple computation is involved (e.g., 3-4-5 and 6-8-10 triangles)</b></p> <p><b>G 405. Use geometric formulas when all necessary information is given</b></p> <p><b>G 406. Locate points in the coordinate plane</b></p> <p><b>G 407. Translate points up, down, left, and right in the coordinate plane</b></p>	<p>G 501. Use several angle properties to find an unknown angle measure</p> <p>G 502. Count the number of lines of symmetry of a geometric figure</p> <p>G 503. Use symmetry of isosceles triangles to find unknown side lengths or angle measures</p> <p>G 504. Recognize that real-world measurements are typically imprecise and that an appropriate level of precision is related to the measuring device and procedure</p> <p>G 505. Compute the perimeter of simple composite geometric figures with unknown side lengths</p> <p>G 506. Compute the area of triangles and rectangles when one or more additional simple steps are required</p> <p>G 507. Compute the area and circumference of circles after identifying necessary information</p> <p>G 508. Given the length of two sides of a right triangle, find the third</p>	<p>G 601. Use relationships involving area, perimeter, and volume of geometric figures to compute another measure (e.g., surface area for a cube of a given volume and simple geometric probability)</p> <p>G 602. Use the Pythagorean theorem</p> <p>G 603. Apply properties of <math>30^\circ</math>-<math>60^\circ</math>-<math>90^\circ</math>, <math>45^\circ</math>-<math>45^\circ</math>-<math>90^\circ</math>, similar, and congruent triangles</p> <p>G 604. Apply basic trigonometric ratios to solve right-triangle problems</p> <p>G 605. Use the distance formula</p> <p>G 606. Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point</p> <p>G 607. Find the coordinates of a point reflected across a vertical or horizontal line or across <math>y = x</math></p> <p>G 608. Find the coordinates of a point rotated <math>90^\circ</math> about the origin</p> <p>G 609. Recognize special characteristics of parabolas</p>	<p>G 701. Use relationships among angles, arcs, and distances in a circle</p> <p>G 702. Compute the area of composite geometric figures when planning and/or visualization is required</p> <p>G 703. Use scale factors to determine the magnitude of a size change</p> <p>G 704. Analyze and draw conclusions based on a set of conditions</p> <p>G 705. Solve multistep geometry problems that involve integrating concepts, planning, and/or visualization</p>



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			<p>when the lengths are Pythagorean triples</p> <p>G 509. Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths</p> <p>G 510. Determine the slope of a line from points or a graph</p> <p>G 511. Find the midpoint of a line segment</p> <p>G 512. Find the coordinates of a point rotated <math>180^\circ</math> around a given center point</p>	<p>and circles (e.g., the vertex of a parabola and the center or radius of a circle)</p>	
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## Key Ideas and Details: Statistics and Probability (S)

ACT Mathematics: Statistics and Probability (S) Scoring Range with Standards					
Approaching Benchmark		Meets Benchmark	Exceeds Benchmark		
13-15	16-19	20-23	24-27	28-32	33-36
<p>S 201. Calculate the average of a list of positive whole numbers</p> <p>S 202. Extract one relevant number from a basic table or chart, and use it in a single computation</p>	<p>S 301. Calculate the average of a list of numbers</p> <p>S 302. Calculate the average given the number of data values and the sum of the data values</p> <p>S 303. Read basic tables and charts</p> <p>S 304. Extract relevant data from a basic table or chart and use the data in a computation</p> <p>S 305. Use the relationship between the probability of an event and the probability of its complement</p>	<p><b>S 401. Calculate the missing data value given the average and all data values but one</b></p> <p><b>S 402. Translate from one representation of data to another (e.g., a bar graph to a circle graph)</b></p> <p><b>S 403. Determine the probability of a simple event</b></p> <p><b>S 404. Describe events as combinations of other events (e.g., using <i>and</i>, <i>or</i>, and <i>not</i>)</b></p> <p><b>S 405. Exhibit knowledge of simple counting techniques</b></p>	<p>S 501. Calculate the average given the frequency counts of all the data values</p> <p>S 502. Manipulate data from tables and charts</p> <p>S 503. Compute straightforward probabilities for common situations</p> <p>S 504. Use Venn diagrams in counting</p> <p>S 505. Recognize that when data summaries are reported in the real world, results are often rounded and must be interpreted as having appropriate precision</p> <p>S 506. Recognize that when a statistical model is used, model values typically differ from actual values</p>	<p>S 601. Calculate or use a weighted average</p> <p>S 602. Interpret and use information from tables and charts, including two-way frequency tables</p> <p>S 603. Apply counting techniques</p> <p>S 604. Compute a probability when the event and/or sample space are not given or obvious</p> <p>S 605. Recognize the concepts of conditional and joint probability expressed in real-world contexts</p> <p>S 606. Recognize the concept of independence expressed in real-world contexts</p>	<p>S 701. Distinguish between mean, median, and mode for a list of numbers</p> <p>S 702. Analyze and draw conclusions based on information from tables and charts, including two-way frequency tables</p> <p>S 703. Understand the role of randomization in surveys, experiments, and observational studies</p> <p>S 704. Exhibit knowledge of conditional and joint probability</p> <p>S 705. Recognize that part of the power of statistical modeling comes from looking at regularity in the differences between actual values and model values</p>