

Nebraska mathematics performance level descriptors

Number & Quantity	Algebra	Functions	Geometry	Statistics & Probability
DEVELOPING (1–17)				
<ul style="list-style-type: none"> Perform one-operation computation with whole numbers and decimals Recognize equivalent fractions and fractions in lowest terms Identify a digit's place value Locate rational numbers (expressed as integers, fractions, decimals, and mixed numbers) on the number line Recognize one-digit factors of a number Exhibit knowledge of elementary number concepts such as rounding, the ordering of decimals, and pattern identification Write positive powers of 10 by using exponents <p><i>Note: A matrix as a representation of data is treated as a basic table (described in Statistics & Probability).</i></p>	<ul style="list-style-type: none"> Solve problems in one or two steps using whole numbers and using decimals in the context of money Solve routine one-step arithmetic problems using positive rational numbers, such as single-step percent Solve routine two-step arithmetic problems with integers Relate a graph to a situation described qualitatively in terms of familiar properties such as before and after, increasing and decreasing, higher and lower Apply a definition of an operation for whole numbers (e.g., $a \square b = 3a - b$) 	<ul style="list-style-type: none"> Extend a given pattern by a few terms for patterns that have a constant increase or decrease between terms Extend a given pattern by a few terms for patterns that have a constant factor between terms 	<ul style="list-style-type: none"> 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) Estimate the length of a line segment based on other lengths in a geometric figure 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) Identify angle pairs associated with parallel lines (i.e., congruent or supplementary) Compute the perimeter of polygons when all side lengths are given Compute the area of rectangles when whole number dimensions are given Locate points in the first quadrant 	<ul style="list-style-type: none"> Calculate the average/mean of a list of numbers Calculate the average given the number of data values and the sum of the data values Read basic tables and charts Extract relevant data from a basic table or chart and use the data in a computation Use the relationship between the probability of an event and the probability of its complement Determine the probability of a simple event
ON-TRACK (18–21)				
<ul style="list-style-type: none"> Order fractions Exhibit knowledge of elementary number concepts such as primes and greatest common factor Comprehend the concept of length on the number line, and find the distance between two points Find the distance in the coordinate plane between two points with the same x-coordinate or y-coordinate Understand absolute value in terms of distance Add two matrices that have whole number entries 	<ul style="list-style-type: none"> Perform straightforward word-to-symbol translations 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) 	<ul style="list-style-type: none"> Evaluate linear, quadratic, and polynomial functions, expressed in function notation, at integer values 	<ul style="list-style-type: none"> Use properties of parallel lines to find the measure of an angle Exhibit knowledge of basic angle properties and special sums of angle measures (e.g., 90°, 180°, and 360°) Compute the area and perimeter of triangles and rectangles in simple problems Use geometric formulas when all necessary information is given 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) Use symmetry of isosceles triangles to find unknown side lengths or angle measures Locate points in the coordinate plane 	<ul style="list-style-type: none"> Calculate the missing data value given the average and all data values but one Calculate the average/mean given the frequency counts of all the data values Translate from one representation of data to another (e.g., a bar graph to a circle graph) Describe events as combinations of other events (e.g., using <i>and</i>, <i>or</i>, and <i>not</i>) Exhibit knowledge of simple counting techniques

See the next page for descriptors associated with the ACT Benchmark performance level.

Nebraska mathematics performance level descriptors (continued)

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ACT BENCHMARK (22–36)				
<ul style="list-style-type: none"> Find and use the least common multiple Work with numerical factors Apply number properties involving prime factorization Apply number properties involving even/odd numbers and factors/multiples Apply number properties involving positive/negative numbers Analyze and draw conclusions based on number concepts Apply properties of rational exponents Apply properties of rational numbers and the rational number system Apply the facts that π is irrational and that the square root of an integer is rational only if that integer is a perfect square Apply properties of real numbers and the real number system, including properties of irrational numbers Exhibit some knowledge of the complex numbers Multiply two complex numbers Apply properties of complex numbers and the complex number system Use relations involving addition, subtraction, and scalar multiplication of vectors and of matrices Multiply matrices Apply properties of matrices and properties of matrices as a number system 	<ul style="list-style-type: none"> 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 Solve multistep arithmetic problems that involve planning or converting common derived units of measure (e.g., feet per second to miles per hour) Solve word problems containing several rates, proportions, or percentages 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) 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) 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) Build functions and write expressions, equations, and inequalities when the process requires planning and/or strategic manipulation Match linear equations with their graphs in the coordinate plane Identify characteristics of graphs based on a set of conditions or on a general equation such as $y = ax^2 + c$ Given an equation or function, find an equation or function whose graph is a translation by specified amounts in the horizontal and vertical directions Analyze and draw conclusions based on information from graphs in the coordinate plane Analyze and draw conclusions based on properties of algebra and/or functions 	<ul style="list-style-type: none"> Build functions and use quantitative information to identify graphs for relations that are proportional or linear Relate a graph to a situation described qualitatively in terms of faster change or slower change Understand the concept of a function as having a well-defined output value at each valid input value Recognize the difference between a function modeling a situation and the reality of the situation Compare actual values and the values of a modeling function to judge model fit and compare models Understand the concept of domain and range in terms of valid input and output, and in terms of function graphs Find the domain and range of polynomial functions and rational functions Find where a rational function's graph has a vertical asymptote Interpret statements that use function notation in terms of their context Use function notation for simple functions of two variables Build functions for relations that are inversely proportional or exponential Find the next term in a sequence described recursively Exhibit knowledge of geometric sequences Find a recursive expression for the general term in a sequence described recursively Exhibit knowledge of unit circle trigonometry Match graphs of basic trigonometric functions with their equations Use trigonometric concepts and basic identities to solve problems Exhibit knowledge of logarithms Evaluate composite functions at integer values Write an expression for the composite of two simple functions 	<ul style="list-style-type: none"> Compute the perimeter of simple composite geometric figures with unknown side lengths Compute the area of triangles and rectangles when one or more additional simple steps are required Compute the area and circumference of circles after identifying necessary information 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) Recognize that real-world measurements are typically imprecise and that an appropriate level of precision is related to the measuring device and procedure Compute the area of composite geometric figures when planning and/or visualization is required Use scale factors to determine the magnitude of a size change Translate points up, down, left, and right in the coordinate plane Find the coordinates of a point rotated 90° or 180° around a given center point Apply the midpoint formula in context Find the coordinates of a point reflected across a vertical or horizontal line or across $y = x$ Count the number of lines of symmetry of a geometric figure Given the length of two sides of a right triangle, find the third when the lengths are Pythagorean triples Use the Pythagorean theorem Use the distance formula Use several angle properties to find an unknown angle measure Solve multistep geometry problems that involve integrating concepts, planning, and/or visualization Apply properties of 30°-60°-90°, 45°-45°-90°, similar, and congruent triangles Express the sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths Apply basic trigonometric ratios to solve right-triangle problems Determine the slope of a line from points or a graph Use properties of parallel and perpendicular lines to determine an equation of a line or coordinates of a point Recognize special characteristics of parabolas and circles (e.g., the vertex of a parabola and the center or radius of a circle) Use relationships among angles, arcs, and distances in a circle Analyze and draw conclusions based on a set of conditions 	<ul style="list-style-type: none"> Manipulate data from tables and charts Analyze and draw conclusions based on information from tables and charts, including two-way frequency tables Distinguish between mean, median, and mode for a list of numbers Calculate or use a weighted average Use Venn diagrams in counting Apply counting techniques Compute straightforward probabilities for common situations Recognize the concept of independence expressed in real-world contexts Compute a probability when the event and/or sample space are not given or obvious Recognize that when data summaries are reported in the real world, results are often rounded and must be interpreted as having appropriate precision Recognize that when a statistical model is used, model values typically differ from actual values Understand the role of randomization in surveys, experiments, and observational studies Apply knowledge of conditional and joint probability, including in real-world contexts Recognize that part of the power of statistical modeling comes from looking at regularity in the differences between actual values and model values