

# Appendix A: Subject Assessments and Reporting Categories

## Reading

**ACT Aspire reading assessments** determine whether students can understand what increasingly challenging texts say explicitly and what can reasonably be inferred from these texts, understand general academic and domain-specific language in the context in which it is used, and integrate knowledge and ideas from multiple texts.

### Reporting Categories

**Key Ideas and Details.** The questions and tasks in this skill category assess students' ability to read texts closely; to determine central ideas and themes and summarize information and ideas accurately; and to understand sequential, comparative, and cause-effect relationships.

**Craft and Structure.** The questions and tasks in this skill category assess students' ability to determine word and phrase meanings and analyze an author's word choice rhetorically as well as influences on the English language, to analyze text structure, and to understand purpose and point of view in texts.

**Integration of Knowledge and Ideas.** The questions and tasks in this skill category assess students' ability to understand how arguments are constructed, to make connections to prior knowledge, and to make connections between and among texts.

## English

**ACT Aspire English assessments** evaluate students' ability to revise and edit texts; to understand the rhetorical purpose and focus of a piece of writing in order to develop a topic effectively; to use strategies for logical organization, topical unity, and general cohesion; and to employ knowledge of language to ensure that writing is precise, concise, and stylistically consistent.

### Reporting Categories

**Production of Writing.** The questions and tasks in this skill category assess students' ability to understand the rhetorical purpose and focus of a piece of writing in order to develop a topic effectively; to use strategies to achieve logical organization, topical unity, and general cohesion; and to ensure that writing is precise, concise, and stylistically consistent.

**Knowledge of Language.** The questions and tasks in this skill category assess students' ability to demonstrate effective language use through ensuring precision and concision in word choice and maintaining consistency in style and tone.

**Conventions of Standard English.** The questions and tasks in this skill category assess students' understanding of the conventions of standard English grammar, usage, and mechanics to revise and edit text.

## Writing

**ACT Aspire writing assessments** are designed to provide a strong indication of whether students have the writing skills they will need to succeed as they begin work at their next grade level. Student responses are evaluated according to analytic rubrics that assess the generation, development, organization, and communication of ideas in standard written English.

### Reporting Categories

**Ideas and Analysis.** This skill category assesses students' ability to generate ideas in response to a given writing task. The ideas are assessed based on the extent to which they lead to critical and complex argument, analysis, or reflection.

**Development and Support.** This skill category assesses students' ability to explore and explain their ideas. Skillful writers provide persuasive support for their claims, illustrate their ideas with well-chosen examples, or convey meaning through effective narration.

**Organization.** This skill category assesses students' ability to shape their ideas into a cohesive body of writing. Through effective organization, a writer builds a logical argument, provides a clearly sequenced explanation, or relays a coherent narrative.

**Language Use and Conventions.** This skill category assesses students' ability to communicate ideas in standard written English. Strong writers demonstrate command-of-language conventions and make purposeful stylistic choices to clarify and guide the reader's understanding.

## Science

**ACT Aspire science assessments** assess students' science practices using real-world scientific scenarios. Scenarios in upper-grade assessments include student investigations, formal scientific research, formal scientific data from references, and students or scientists providing competing explanations for real scientific phenomena. At the earlier grades, topics generally focus on everyday student discovery rather than formal science.

### Reporting Categories

#### Grades 3–5

**Interpretation of Data.** The questions and tasks in this skill category assess students' ability to manipulate and analyze student-gathered data presented in simple tables, graphs, and diagrams (e.g., select and compare data, find trends in data, convert a table into a simple graph, and extend from trends in data).

**Scientific Investigation.** The questions and tasks in this skill category assess students' ability to understand experimental tools, procedures, and design (e.g., identify the factor the students changed during an investigation) and compare and extend investigations (e.g., describe differences between two student investigations).

**Evaluation of Models, Inferences, and Experimental Results.** The questions and tasks in this skill category assess students' ability to judge the validity of simple scientific information and make conclusions and predictions based on that information (e.g., determine which set of data supports or weakens a student's claim).

### Grades 6–Early High School

**Interpretation of Data.** The questions and tasks in this skill category assess students' ability to manipulate and analyze scientific data presented in tables, graphs, and diagrams (e.g., recognize trends in data, translate tabular data into graphs, interpolate and extrapolate, and reason mathematically).

**Scientific Investigation.** The questions and tasks in this skill category assess students' ability to understand experimental tools, procedures, and design (e.g., identify variables and controls) and compare, extend, and modify experiments (e.g., predict the results of additional trials).

**Evaluation of Models, Inferences, and Experimental Results.** The questions and tasks in this skill category assess students' ability to judge the validity of scientific information and formulate conclusions and predictions based on that information (e.g., determine which explanation for a scientific phenomenon is supported by new findings).

## Mathematics

**ACT Aspire mathematics assessments** assess students' ability to solve problems, explain and justify, and model with the mathematics up through the given grade.

### Reporting Categories

#### Grade 3

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to grade 3 and include Operations and Algebraic Thinking, Number and Operations in Base 10, Number and Operations—Fractions, Measurement and Data, and Geometry.

**Foundation.** The questions and tasks in this skill category assess students' continued use and strengthening of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain mathematical reasons for why things work the way they do.

**Modeling.** The questions and tasks in this skill category assess students' ability to connect problems to mathematical drawings and expressions that can help them understand the problem and figure out what to do.

**Number and Operations—Fractions.** The questions and tasks in this skill category assess students' ability to understand fractions, especially unit fractions, as numbers and as parts of a whole; understand that different-looking fractions can be the same number; and compare two fractions based on the size of numerators or denominators.

**Number and Operations in Base 10.** The questions and tasks in this skill category assess students' ability to use place value to add and subtract within 1,000; to round to 10s and 100s; and to multiply 1-digit numbers by multiples of 10 that are 2-digit numbers.

**Operations and Algebraic Thinking.** The questions and tasks in this skill category assess students' ability to understand multiplying as finding the total number in equal-sized groups, and dividing as sharing equally; multiply and divide within 100; and write expressions using multiplication and division.

**Geometry.** The questions and tasks in this skill category assess students' ability to understand how sets of shapes (like rectangles and rhombuses) can be part of a larger set of shapes (like quadrilaterals) and how to divide shapes into parts with equal areas.

**Measurement and Data.** The questions and tasks in this skill category assess students' ability to understand measuring, show a set of measurements on a bar graph, find area using unit squares, connect multiplication to the area of a rectangle in terms of unit squares, and solve problems about perimeter and area.

#### Grade 4

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to grade 4 and include Operations and Algebraic Thinking, Number and Operations in Base 10, Number and Operations—Fractions, Measurement and Data, and Geometry.

**Foundation.** The questions and tasks in this skill category assess students' continued use and strengthening of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain mathematical reasons for why things work the way they do.

**Modeling.** The questions and tasks in this skill category assess students' ability to connect problems to mathematical drawings and expressions that can help them understand the problem and figure out what to do.

**Number and Operations—Fractions.** The questions and tasks in this skill category assess students' ability to explain fraction equivalence, compare two fractions, add and subtract fractions (including mixed numbers) with like denominators, multiply a fraction by a whole number, and use decimal notation for fractions.

**Number and Operations in Base 10.** The questions and tasks in this skill category assess students' ability to understand place value for multidigit whole numbers and use this understanding to perform multidigit arithmetic.

**Operations and Algebraic Thinking.** The questions and tasks in this skill category assess students' ability to understand how to solve multistep word problems using operations with whole numbers, find factors and multiples of whole numbers within 1–100, and generate and analyze patterns that follow a given rule.

**Geometry.** The questions and tasks in this skill category assess students' ability to draw and identify lines and angles, classify shapes by properties of their lines and angles, and understand a line of symmetry in terms of folding along the line.

**Measurement and Data.** The questions and tasks in this skill category assess students' ability to solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit in the same measurement system and to understand angle concepts and measure angles.

#### Grade 5

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to grade 5 and include Operations and Algebraic Thinking, Number and Operations in Base 10, Number and Operations—Fractions, Measurement and Data, and Geometry.

**Foundation.** The questions and tasks in this skill category assess students' continued use and strengthening of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain mathematical reasons for why things work the way they do.

**Modeling.** The questions and tasks in this skill category assess students' ability to connect problems to mathematical drawings and expressions that can help them understand the problem and figure out what to do.

**Number and Operations—Fractions.** The questions and tasks in this skill category assess students' ability to use equivalent fractions to add and subtract fractions with unlike denominators, interpret fractions as division, interpret multiplication as scaling, multiply fractions, divide unit fractions by whole numbers and vice versa, and divide 4-digit numbers by 2-digit factors.

**Number and Operations in Base 10.** The questions and tasks in this skill category assess students' ability to understand how the value of a digit changes if it shifts one place; explain patterns when multiplying by a power of 10; and add, subtract, multiply, and divide decimals to hundredths and explain the calculation strategy.

**Operations and Algebraic Thinking.** The questions and tasks in this skill category assess students' ability to write expressions to record calculations; interpret numerical expressions without finding the value; and, for two rules, generate patterns, compare corresponding terms, and graph ordered pairs of corresponding terms.

**Geometry.** The questions and tasks in this skill category assess students' ability to graph points in the first quadrant to solve problems, classify two-dimensional figures into categories that have a hierarchy, and understand that properties of all figures in a category also apply to all figures in a subcategory.

**Measurement and Data.** The questions and tasks in this skill category assess students' ability to convert within a given measurement system, understand volume in terms of unit cubes, and relate volume to multiplication and addition.

#### Grade 6

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to grade 6 and include Ratios and Proportional Relationships, The Number System, Expressions and Equations, Geometry, and Statistics and Probability.

**Foundation.** The questions and tasks in this skill category assess students' continued integration, strengthening, and application of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain reasons behind mathematical statements, results, and procedures.

**Modeling.** The questions and tasks in this skill category assess students' ability to demonstrate their modeling skills by creating, interpreting, evaluating, and improving mathematical models.

**The Number System.** The questions and tasks in this skill category assess students' ability to divide fractions by fractions and explain why procedures make sense, explain and use relationships between a positive whole number or fraction and its negative counterpart, and understand absolute value as distance from zero.

**Expressions and Equations.** The questions and tasks in this skill category assess students' ability to apply arithmetic understandings to algebraic expressions, understand what solving an equation means, solve one-variable equations and inequalities, write an equation to represent a quantity in terms of a related quantity and analyze the relationship, and assess numerical expressions with whole-number exponents.

**Ratios and Proportional Relationships.** The questions and tasks in this skill category assess students' ability to understand ratio concepts, including unit rate; connect rate relationships to multiplication and division and to equivalent fractions; and use ratio reasoning to solve problems.

**Geometry.** The questions and tasks in this skill category assess students' ability to rearrange parts of triangles and special quadrilaterals to form rectangles and connect to area formulas; decompose shapes, including nets, into triangles and rectangles to find area and surface area; understand why the volume formula works for right rectangular prisms with fractional dimensions; and draw polygons in the coordinate plane.

**Statistics and Probability.** The questions and tasks in this skill category assess students' ability to recognize statistical questions as expecting variability across a population, display data in plots on the number line, and summarize data in relation to context.

## Grade 7

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to grade 7 and include Ratios and Proportional Relationships, The Number System, Expressions and Equations, Geometry, and Statistics and Probability.

**Foundation.** The questions and tasks in this skill category assess students' continued integration, strengthening, and application of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain reasons behind mathematical statements, results, and procedures.

**Modeling.** The questions and tasks in this skill category assess students' ability to demonstrate their modeling skills by creating, interpreting, evaluating, and improving mathematical models.

**The Number System.** The questions and tasks in this skill category assess students' ability to understand how addition, subtraction, multiplication, and division extend to negative integers and fractions and to convert a fraction to decimal form and know it must terminate in zeroes or eventually repeat.

**Expressions and Equations.** The questions and tasks in this skill category assess students' ability to use properties of operations to create equivalent expressions, solve problems using numerical and algebraic expressions and simple equations, and compare solving algebraically to solving arithmetically.

**Ratios and Proportional Relationships.** The questions and tasks in this skill category assess students' ability to recognize, represent, and analyze proportional relationships between quantities and solve multistep ratio and percent problems and to compute unit rates from ratios of fractions.

**Geometry.** The questions and tasks in this skill category assess students' ability to describe geometric relationships, for example, about scale drawings; construct triangles with given angle measures or side lengths; solve problems involving area, surface area, and volume; and describe how circumference and area are related for a circle.

**Statistics and Probability.** The questions and tasks in this skill category assess students' ability to understand that random sampling produces samples that tend to represent the population, compare populations based on random samples, interpret probability in terms of likelihood, and find probability using organized lists or drawings.

### Grade 8

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to grade 8 and include The Number System, Expressions and Equations, Functions, Geometry, and Statistics and Probability.

**Foundation.** The questions and tasks in this skill category assess students' continued integration, strengthening, and application of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain reasons behind mathematical statements, results, and procedures.

**Modeling.** The questions and tasks in this skill category assess students' ability to demonstrate their modeling skills by creating, interpreting, evaluating, and improving mathematical models.

**The Number System.** The questions and tasks in this skill category assess students' ability to recognize decimal expansion of numbers, understand rational numbers as those whose decimal expansions eventually repeat, approximate irrational numbers, and convert the form of rational numbers.

**Expressions and Equations.** The questions and tasks in this skill category assess students' ability to work with integer exponents, scientific notation, square roots, and cube roots; connect proportional relationships, lines, and linear equations; and solve linear equations and pairs of linear equations.

**Functions.** The questions and tasks in this skill category assess students' ability to understand functions in terms of input-output using rules, tables, graphs, and descriptions; understand  $y = mx + b$  as a linear function with constant rate of change; and model with linear functions.

**Geometry.** The questions and tasks in this skill category assess students' ability to understand congruence and similarity in terms of rotations, reflections, translations, and dilations; understand the Pythagorean Theorem; and find volumes of cylinders, cones, and spheres.

**Statistics and Probability.** The questions and tasks in this skill category assess students' ability to use patterns of association between 2 quantities as seen in scatterplots and in 2-way frequency tables, and, for appropriate scatterplots, model with a linear function and interpret slope and intercept.

### Early High School

**Grade Level Progress.** The questions and tasks in this skill category assess students' understanding of and fluency in mathematics new to the early high school grades (grades 9 and 10) and include Number and Quantity, Algebra, Functions, Geometry, and Statistics and Probability.

**Foundation.** The questions and tasks in this skill category assess students' continued integration, strengthening, and application of mathematics learned in earlier grades.

**Justification and Explanation.** The tasks in this skill category assess students' ability to explain reasons behind mathematical statements, results, and procedures.

**Modeling.** The questions and tasks in this skill category assess students' ability to demonstrate their modeling skills by creating, interpreting, evaluating, and improving mathematical models.

**Number and Quantity.** The questions and tasks in this skill category assess students' ability to understand how properties of exponents extend to all rational numbers, rewrite radical expressions in terms of rational exponents, use units to solve problems, and understand numbers in terms of decimal expansion.

**Algebra.** The questions and tasks in this skill category assess students' ability to see structure in expressions; perform operations on polynomials; create equations; understand and explain solving as a reasoning process; and solve linear equations and inequalities, or pairs of these, and quadratic equations.

**Functions.** The questions and tasks in this skill category assess students' ability to interpret functions in different representations; understand average rate of change; and build and model with functions; all with a focus on linear, exponential, quadratic, square-root, absolute value, and piecewise-defined functions.

**Geometry.** The questions and tasks in this skill category assess students' ability to apply and derive geometric relationships and explain geometric reasoning related to congruence, similarity, lines, angles, triangles, parallelograms, circles, and distance; and to model with geometric objects.

**Statistics and Probability.** The questions and tasks in this skill category assess students' ability to compare distributions and interpret differences, interpret 2-way frequency tables and conditional probability in context, fit models to scatterplots and examine residuals, understand randomization in surveys and experiments, and find probability for sampling with and without replacement.