SOUTH CAROLINA
DEPARTMENT OF EDUCATION

Mathematics Assessment Specifications for Teachers
Algebra 1

Office of Assessment and Standards

Updated September 2025

South Carolina Department of Education

Contents

Introduction

The End-of-Course Examination Program (EOCEP) for Algebra 1 assessment specifications are based on the development of summative assessments that measure the *2025 South Carolina College- and Career-Ready (SC CCR) Mathematics Standards*. The assessment specifications provide important information regarding the content to be measured. The assessment specifications also serve as a road map to guide South Carolina educators in the development and subsequent review of test items that best measure the *2025 SC CCR Math Standards*. These documents are intended as a guide for test item developers working in and with the Office of Assessment and Standards and not as a curriculum or instructional guide. The information found within these documents reflects the content limits and the foundational knowledge targets addressed by the state assessment.

Please note: This document is reviewed and updated annually to ensure alignment with current standards and assessment practices.

Each test item specification is aligned to the given strand, standard, and grade-level indicator, and includes the following key information:

- Example Tasks
- Assessment Guidelines
- Webb's Depth of Knowledge (DOK) or cognitive level(s)
- Item types

Assessment Specifications Descriptions

Strands: This document is divided into four major strands: Data, Probability, and Statistical Reasoning (DPSR); Measurement, Geometry, and Spatial Reasoning (MGSR); Numerical Reasoning (NR); and Patterns, Algebra, and Functional Reasoning (PAFR).

Standards and Indicators: According to the *Procedures for Cyclical Review of South Carolina Academic Standards*, "academic standards are statements of the most important, consensually determined expectations for student learning in a particular discipline. Each of the newly revised South Carolina standards statements will be supported by specific instructional objectives called indicators" (Barton & Spearman, 2016). Each standard contains one or more vertically articulated grade-level indicators. The grade-level indicators set the end-of-year learning expectation.

***Math Vocabulary for Assessment*:** The words included are academic terms related to the assessment. It is important to note that the Math Vocabulary for Assessment is *not an exhaustive list*.

Indicator Insights: Indicator Insights provide an understanding of the indicator for the classroom teacher. These insights provide teachers with clarifying information about the expectations and/or the content of the indicator. Some insights may provide connections to indicators in other standards or strands.

Example Tasks: The intent of this section is to describe examples of how the attached indicator may be assessed. The example tasks are *not an exhaustive list*.

Assessment Guidelines: Parameters that define the learning expectations.
These guidelines provide a measurable framework for assessing student's knowledge, skills, and abilities, however, classroom work *should extend beyond these limits*.

Prior knowledge such as key words/terms, phrases, classifications, etc., from previous grade level standards is an expectation and may be assessed in test items.

Depth of Knowledge (DOK): Depth of knowledge involves the cognitive complexity, or the nature of thinking, required for a given test item. Webb's DOK levels are used in the development of test items to assess cognitive demand. Therefore, when developing test items with DOK in mind, each test item should be as demanding cognitively as what the actual standard describes. Webb's DOK includes four levels, arranged from low (basic recall) to high (extended thinking). Each test item in the EOCEP Algebra 1 assessment is written to one of the following three levels of cognitive complexity:

- Level 1: Recall
- Level 2: Application of a Skill/Concept
- Level 3: Strategic Thinking

Item Types: The EOCEP Algebra 1 assessments are composed of various test item types.

- **Selected-Response (SR) Items:** Students are presented with a test item and four possible answer options. Students demonstrate their knowledge by selecting the one correct answer. A correct response to an SR test item is worth one score point in the EOCEP Algebra 1 assessment.
- **Technology-Enhanced (TE) Items:** TE items share the same functional structure as traditional test items. All test items are worth one score point. TE items include, but are not limited to, the following:

Type of Item	Description
Drag and Drop Input	Students click on selectable objects and sort them into groups, steps, or other arrangements to demonstrate their knowledge. Some examples of selectable objects include single numerical values, numerical expressions or equations, algebraic equations or expressions, graphs, statements, operational signs, geometric figures, and tables.
Drop-Down Input	Students are expected to select their response from a drop-down list or drop-down menu.
Hot Spot	Students interact with selectable objects to demonstrate their knowledge, skills, and abilities to answer a question. Selectable objects include whole or parts of figures, graphs, tables, verbal descriptions, or symbolic representations.
Matching	Students demonstrate their knowledge by connecting a line from each response in a set of graphics on the left side of the screen to a response in a set of graphics on the right side of the screen.
Match Interaction Table	Students are presented with a matrix consisting of mathematical or English statements across the columns and rows. Students demonstrate their knowledge by selecting one or more correct answers per row to associate correct statements in the matrix.

- **Technology-Enhanced (TE) Constructed-Response Items**: TE Constructed-Response items require students to construct their own response, rather than selecting from predetermined options. All test items are worth one score point. TE Constructed-Response items include, but are not limited to, the following:

Type of Item	Description
Graphing Input	The student is presented with a graph. The student is expected to respond by plotting points, drawing a line, or labeling parts of the graph.
Keypad Input	Students are presented with a test item. The student is asked to respond by writing their numerical answer or writing a mathematical expression or equation to answer the test item.
Number Line Input	The student is presented with a number line. The student is expected to respond by plotting points, drawing a line, or labeling parts of the number line.

Calculator

The Desmos scientific and graphing calculators are built into the online testing platform and are available for every test item on the EOCEP Algebra 1 assessment. Students may also use a handheld scientific calculator or an approved graphing calculator. For details on calculator use during testing, please refer to the Calculator Requirements page on the SCDE website.

Editorial Suggestions

If you have editorial suggestions for annual edits on this document, please complete our form: Mathematics Assessment Specifications for Teachers Editorial Suggestions located on our Quick Links for Teachers page, or scan the QR code.

Acknowledgment

The SCDE Office of Assessment and Standards would like to thank the South Carolina teachers and content specialists who have served on our various assessment committees. Without your expertise and input, this resource would not have been possible.

Data, Probability, and Statistical Reasoning (DPSR)

Standard A1.DPSR.1

Use statistical reasoning to summarize, represent, and interpret data on two categorical and quantitative variables.

Math Vocabulary for Assessment: categorical data, two-way frequency tables, relative frequency, association, trend, linear association, quantitative data, no association, weak, moderate, or strong positive association, weak, moderate, or strong negative association, line of best fit, correlation, correlation coefficient

Indicator	**A1.DPSR.1.1** Summarize categorical data in two-way frequency tables, interpret relative frequencies in real-world situations, and informally determine possible associations and trends in the data.
Indicator Insight	Include joint, marginal, and conditional relative frequencies.
	Assessment Specifications
Example Tasks	Students will be able to • summarize data in two-way frequency tables. • work with two-way frequency tables with missing information. • interpret data in two-way frequency tables. • compare the data in two-way frequency tables.
Assessment Guidelines	Students are not expected to know the vocabulary terms joint, marginal, or conditional relative frequencies. Students are expected to know how to use the symbolic notation for union and intersection.
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.DPSR.1.2** Summarize quantitative data in a table and on a scatterplot and describe how the variables are associated. Limit to linear data.
Indicator Insight	Description must include: • Direction – positive or negative. • Association – none, weak, moderate, or strong.
A1.DPSR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to • describe the shape of a scatterplot using the words listed. • interpret the shape using the context.
Assessment Guidelines	Students are not expected to indicate correlation or causation but should be able to write statements like "as the height of the rocket increases, the amount of fuel in the tank decreases", based on information from a given scatterplot. Assessment should focus on linear models and descriptors of direction (positive or negative) and associations such as: none [0, 0.2), weak [0.2, 0.5), moderate [0.5, 0.7), or strong [0.7,1].
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.DPSR.1.3** Find a linear function for a scatterplot that suggests a linear association.
Indicator Insight	Include instruction with and without technology to assist with finding the line of best fit for two quantitative variables. Use the given model, or choose a model suggested by the shape of the graph.
4.DPSR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to • find the equation of the line of best fit given a data set. • find the equation of a line of best fit given a graph of data. • use technology to find the line of best fit. • use two points to estimate a line of best fit. • select from a list of equations which one fits best using visual context like negative/positive slope or the approximate value of a y-intercept. • select a line of best fit visually that matches a scatterplot.
Assessment Guidelines	Students are expected to be able to work with a calculator to find the line of best fit. We recommend using the embedded SC Desmos testing calculator. Please refer to the [Calculator Requirements] page to view the differences in the Desmos testing vs standard calculator Students are not expected to find non-linear regression lines. Assessment should focus on linear models and data sets with 7 data points or fewer when students are expected to enter the data to find the line of best fit.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.DPSR.1.4** For linear associations, use technology to determine the correlation coefficient, evaluate the strength of the association, and find the line of best fit.
Indicator Insight	Correlation applies to linear models only. Use technology or statistical software to assist in finding linear associations.
4.DPSR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to • use technology to find a correlation coefficient. • interpret the correlation coefficient in terms of context. • evaluate the strength of the association. • interpret the meaning of the line of best fit in context.
Assessment Guidelines	Students are expected to be able to work with a calculator to find the correlation coefficient. We recommend using the embedded SC Desmos testing calculator. Please refer to the Calculator Requirements page to view the differences in the Desmos testing vs standard calculator. Assessment should focus on linear models, data sets with 7 data points or fewer when students are expected to enter the data to find the correlation coefficient, and descriptors of direction (positive or negative) and associations such as: none [0, 0.2), weak [0.2, 0.5), moderate [0.5, 0.7), or strong [0.7,1].
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Standard A1.DPSR.2

Analyze and interpret models for two categorical and quantitative variables.

Math Vocabulary for Assessment: inference, interpret, slope, unit rate of change, predict, estimate

Indicator	**A1.DPSR.2.1** Use two-way frequency tables to make inferences and interpret the data in terms of real-world or mathematical situations.
Indicator Insight	Use relative frequencies to identify possible associations.
	Assessment Specifications
Example Tasks	Students will be able to • determine percentages or ratios based on two-way frequency tables. • interpret data in terms of real-world or mathematical situations.
Assessment Guidelines	The assessment may require students to compare and contrast concepts, analyze relationships between variables, and/or apply predictive reasoning. Students are not expected to know the vocabulary terms joint, marginal, or conditional relative frequencies. Students are expected to know how to use the symbolic notation for union and intersection.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.DPSR.2.2** Interpret the slope and the intercept of a linear model in the context of the data.
Indicator Insight	Interpret slope as a unit rate of change (including units). For every one unit of increase in the x variable, the y variable will increase or decrease the amount and the direction of the slope. The y-intercept of a linear model may not make sense when interpreted within the context of the data.
4.DPSR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to • interpret the slope of a linear model based on data. • interpret the y-intercept in the context of a linear model based on data. • interpret the x-intercept in the context of a linear model based on data. • compare the difference between the y-intercept and the context of the initial value.
Assessment Guidelines	Students are expected to be able to describe *y*-intercept and slope using other words including but not limited to initial value and rate of change. Assessment should focus on linear models.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.DPSR.2.3** Use a linear model to interpolate and extrapolate unknown values close to the data set.
Indicator Insight	Explore interpolation and extrapolation. Discuss the dangers of extrapolation. Use technology or statistical software.
4.DPSR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to • make predictions based on linear models shown on graphs. • make predictions based on linear models in equation form. • justify why a value should or should not be used to extrapolate from a given model.
Assessment Guidelines	Students are not expected to know the vocabulary terms “interpolate” and “extrapolate” and can instead use terms like predict or estimate. Students are expected to be able to be familiar with situations that use “years since XXXX” and how that works within an equation. Assessment should focus on linear models.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Measurement, Geometry, and Spatial Reasoning (MGSR)

Standard A1.MGSR.1

Use geometric concepts and measurement opportunities to model mathematical and real-world situations

Math Vocabulary for Assessment: limitation, scale, discrete, continuous

Indicator	**A1.MGSR.1.1** Identify any limitations specific to a real-world situation.
Indicator Insight	Produce a graph for a contextual situation and determine a scale that shows key features of the graph. Limitations might include measuring to the nearest cent or dollar or whole unit (such as people or cars) when a fraction does not make sense
A1.MGSR.1.1	**Assessment Specifications**
Example Tasks	Students will be able to • identify when rounding is appropriate based on real-world situations. • identify the limits of the domain and/range of a situation based on the real-world situation. • identify appropriate scales to ensure key features of a graph are shown.
Assessment Guidelines	Students are not expected to have an understanding of significant digits. Students are expected to see both discrete and continuous examples for inputs and outputs.
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Numerical Reasoning (NR)

Standard A1.NR.1

Represent all points on the number line as irrational and rational numbers in the real number system.

Math Vocabulary for Assessment: rational, irrational, numerical and algebraic expressions, radicals, rationalize, square root, cube root, terms

Indicator	**A1.NR.1.1** Rewrite numerical and algebraic expressions of irrational and rational numbers involving radicals, including addition, subtraction, multiplication, and division. Limit to square and cube roots.
Indicator Insight	Include all operations with algebraic expressions with emphasis on rational and radical terms.
Assessment Specifications	
Example Tasks	Students will be able to • rewrite expressions involving radicals. • simplify radicals.
Assessment Guidelines	Students are expected to rationalize denominators that do not include conjugates. Students are expected to be exposed to fractional exponents that could simplify to a square root or cube root using exponent laws. Students are not expected to take a 4th or higher root of a number or variable. Assessment should focus on algebraic concepts (numeric concepts are covered in 8th grade).
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Standard A1.NR.2

Represent exponents and radical expressions in different ways.

Math Vocabulary for Assessment: rational exponents, radicals, radical expressions, square root, cube root

Indicator	**A1.NR.2.1** Translate between rational exponents and radical expressions of irrational and rational numbers. Use properties of addition, subtraction, multiplication, and division to simplify radical and rational expressions. Limit to square and cube roots.
Indicator Insight	Discuss when rational exponents or radical forms may be more useful given the mathematical or real-world context involved.
A1.NR.2.1	**Assessment Specifications**
Example Tasks	Students will be able to • translate between rational exponents and radical expressions. • simplify expressions containing radical expressions. • determine which form would be most useful given a situation.
Assessment Guidelines	Students are expected to write expressions in radical form. Students are expected to be exposed to fractional exponents that could simplify to a square root or cube root using exponent laws. Students are not expected to take a 4th or higher root of a number or variable. Assessment should focus on square roots and cube roots and no more than five variables.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Patterns, Algebra, and Functional Reasoning (PAFR)

Standard A1.PAFR.1

Transform and/or solve equations and expressions in one variable that model real-world and mathematical situations, interpret the solutions, and determine whether they are reasonable.

Math Vocabulary for Assessment: solution, standard form, slope intercept, point slope form, vertex form, standard form for quadratics, factored form, exponential form, base, literal equation, absolute value equation, polynomial, terms, degree, property of equality

Indicator	**A1.PAFR.1.1** Transform an equation in one variable to create new equations that have the same solution as the original and justify the steps taken.
Indicator Insight	Single variable forms may have analogous two-variable forms. Analogous forms include for linear: standard, yintercept, and point slope, for quadratic: vertex, standard, and factored. For exponential, limit to the same bases.
A1.PAFR.1.1	**Assessment Specifications**
Example Tasks	Students will be able to • transform an equation into a new equivalent equation. • justify steps needed to transform an equation to an equivalent equation.
Assessment Guidelines	Students are expected to be able to solve problems involving absolute value. Students are expected to be able to find equivalent forms of equations that have similar two-variable forms; For example, an equivalent form of $5 = x^2 - x - 7$ is $0 = (x - 4)(x + 3)$. Assessment should focus on equations in one variable.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.1.2** Solve literal equations and formulas for a specified variable including equations and formulas that arise in a variety of disciplines
Indicator Insight	The process of solving literal equations should incorporate similar strategies used in solving for unknown numerical quantities.
4.PAFR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to solve literal equations and formulas for a specified variable.
Assessment Guidelines	Students are expected to be able to solve equations seen in other high school courses, including Geometry, and other disciplines, like Biology.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.1.3** Solve mathematical and real-world situations using linear, quadratic, exponential (same bases), and linear absolute value equations in one variable.
Indicator Insight	The steps used for solving an equation should be identified as a justification for the solution process.
	Assessment Specifications
Example Tasks	Students will be able to • solve equations in one variable. • justify the steps needed to solve the equations. • interpret the solution in terms of the context.
Assessment Guidelines	Assessment should focus on one-variable equations, linear equations, quadratic equations, exponential equations (same bases on both sides), and linear absolute value equations.
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.1.4** Add, subtract, and multiply polynomials with initial terms up to a degree of 2.
Indicator Insight	When performing operations with polynomials, relate to the properties of equality.
4.PAFR.1.2	**Assessment Specifications**
Example Tasks	Students will be able to • add polynomials. • subtract polynomials. • multiply polynomials.
Assessment Guidelines	Assessment should focus on polynomials with degree 2 or less, and multiplication should be limited to 3 factors or less.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Standard A1.PAFR.2

Create, solve, and transform equations and inequalities in two or more variables to represent relationships between quantities and graph the equations on coordinate axes using appropriate labels, units, and scales.

Math Vocabulary for Assessment: linear, quadratic, exponential, linear absolute value function, growth/ decay model, graph of linear inequality, system of linear equations, exact/ approximate solution, growth/decay rate, slope, y-intercept, vertex, roots, x-intercept, domain, range, maximum, minimum, line of symmetry, completing the square, factoring, quadratic formula, elimination method, substitution method, arithmetic sequence, geometric sequence, explicit function, recursive function, consecutive

Indicator	**A1.PAFR.2.1** Transform linear, quadratic, exponential, and linear absolute value functions to equivalent forms to identify slope and yintercept for linear, vertex, and roots (if any) for quadratic and linear absolute value, and y-intercept for exponential.
Indicator Insight	Determine which form of a function is used to identify the information. Fluently transform linear functions into multiple forms. Linear forms include standard, intercept, y-intercept, and point-slope. Fluently transform quadratic functions into multiple forms. Quadratic forms include vertex, standard, and factored. Fluently transform exponential functions using growth and decay models. Limit exponential to the same bases.
	Assessment Specifications
Example Tasks	Students will be able to • recognize the appropriate form of an equation needed to identify a specific feature. • transform an equation to an equivalent form. • identify key features from an equation.
Assessment Guidelines	Students are expected to know the forms of functions by the names listed in the indicator insight. For linear functions, the terms are standard, intercept, y-intercept, and point-slope. For quadratic functions, the terms are vertex, standard, and factored. Assessment should focus on specific functions and terms. For linear functions, the terms are slope and *y*-intercept. For quadratic functions and linear absolute value functions, the terms are vertex and roots. For exponential functions, the term is *y*-intercept.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.2** Solve quadratic equations by completing the square, factoring, and the quadratic formula, explaining the connection between the zeros of the function derived from the equation, its linear factors (if it factors), the x-intercepts of its graph (if they exist), and the solutions (if any) to the corresponding quadratic equation.
Indicator Insight	Completing the square may include a visual model such as algebra tiles. Quadratic equations that result in negative numbers underneath the square root are determined to have no solutions in the real number system.
Assessment Specifications	
Example Tasks	Students will be able to • recognize an appropriate method for solving a quadratic equation. • solve a quadratic equation by a method listed. • recognize what the discriminant of the quadratic means.
Assessment Guidelines	Assessment should focus on quadratic functions where *a* = 1 OR *a* is an integer factor of *b* and *c*. The variables a, b, and c should always be integer coefficients, not fraction or decimal coefficients. Assessment should include functions with no context.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.3** Solve and graph linear, quadratic, exponential, and linear absolute value equations given in tabular, symbolic, and/or verbal forms using intercepts, domain and range, intervals of increasing and decreasing, vertex (maximum and minimum), end-behavior, and symmetry, and interpret these in terms of mathematical and real-world situations.
Indicator Insight	Tabular form should involve a spreadsheet.
A1.PAFR.2.3	**Assessment Specifications**
Example Tasks	Students will be able to • solve equations using key features. • graph equations using key features. • interpret the meaning of key features in terms of real-world situations. • identify appropriate graphs, including scales, based on real-world situations.
Assessment Guidelines	Students are expected to see functions in tables, symbolically, and verbally and be able to graph and solve them. Assessment should focus on linear, quadratic, exponential, and linear absolute value functions.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.4** Create, solve, and graph linear inequalities in two variables.
Indicator Insight	Inequalities are used to solve contextual problems.
A1.PAFR.2.4	**Assessment Specifications**
Example Tasks	Students will be able to • create linear inequalities in two variables. • solve linear inequalities in two variables. • graph linear inequalities in two variables on a coordinate plane. • determine whether a point is a solution to a linear inequality.
Assessment Guidelines	Students are expected to work with linear inequalities that have real-world situations as well.
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.5** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
Indicator Insight	Use contextual situations and sets of ordered pairs to create functions to describe relationships.
4.PAFR.2.4	**Assessment Specifications**
Example Tasks	Students will be able to • write arithmetic sequences explicitly from a situation or another form. • write arithmetic sequences recursively from a situation or another form. • write geometric sequences explicitly from a situation or another form. • write geometric sequences recursively from a situation or another form. • recognize whether a situation is arithmetic or geometric. • translate between a recursive definition and explicit formula
Assessment Guidelines	Students are expected to write and recognize recursive arithmetic sequences in the form $a_n = a_{n-1} + d$ and recursive geometric sequences in the form $a_n = r \cdot a_{n-1}$.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.6** Create symbolic representations of linear and exponential functions, including arithmetic and geometric sequences, given graphs, verbal descriptions, and tables.
Indicator Insight	When given an addition/subtraction pattern or a multiplication/division sequence, generalize an arithmetic or geometric sequence; create both explicit and recursive functions for the pattern. Connect linear functions and arithmetic sequences. Connect exponential functions and geometric sequences.
4.PAFR.2.4	**Assessment Specifications**
Example Tasks	Students will be able to • write equations for linear functions given graphs, verbal descriptions, or tables. • write equations for exponential functions given graphs, verbal descriptions, or tables.
Assessment Guidelines	Students are expected to be able to connect linear functions to arithmetic sequences and exponential functions to geometric sequences.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.7** Use graphs to obtain exact and/or approximate solutions of equations, inequalities, and systems of linear equations in two variables (given or obtained by using technology).
Indicator Insight	A possible strategy to use successive approximations as a method to solve the system $y = f(x)$ and $y = g(x)$ to find approximate solutions with graphs and tables.
4.PAFR.2.4	**Assessment Specifications**
Example Tasks	Students will be able to • solve or estimate a solution to an equation given a graph. • solve or estimate a solution to an inequality given a graph. • solve or estimate a solution to a system of linear equations using a graph.
Assessment Guidelines	Students are expected to be given a graph for test items in this standard. Students are expected to be asked for a specific value in the range that fits a specific value in the domain given a graph.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.8** Solve an equation of the form $f(x) = g(x)$ graphically by identifying the x-coordinate(s) of the point(s) of intersection of the graphs of $y = f(x)$ and $y = g(x)$.
Indicator Insight	The x-coordinate(s) of the point(s) where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solution(s) of the equation $f(x) = g(x)$.
4.PAFR.2.4	**Assessment Specifications**
Example Tasks	Students will be able to recognize the x-coordinate or coordinates that solve $f(x) = g(x)$ from a graph.
Assessment Guidelines	Students are expected to know that the x-coordinate is the only coordinate of interest at the points of intersection. Students are expected to see various types of functions graphed. There are no limits on the type of functions that could be graphed other than the limits of the class (linear, exponential, quadratic, linear absolute value).
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.9** Solve systems of linear equations algebraically and graphically.
Indicator Insight	Solving algebraically means using linear combinations (elimination) and substitution. Teachers are encouraged to teach solving equations collectively, not in isolation.
	Assessment Specifications
Example Tasks	Students will be able to • solve systems of linear equations both algebraically and graphically. • recognize how to use elimination to solve a system of linear equations. • recognize how to use substitution to solve a system of linear of equations. • recognize when a system of linear equations has one solution, no solutions, or infinitely many solutions.
Assessment Guidelines	Students are expected to be exposed to systems of linear equations that include real-world situations.
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.2.10** Analyze the growth/decay rate between linear and exponential functions specifically between consecutive integers.
Indicator Insight	Demonstrate that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals. Use graphs and tables to recognize that a quantity increasing exponentially eventually exceeds a quantity increasing linearly.
4.PAFR.2.4	**Assessment Specifications**
Example Tasks	Students will be able to • determine whether a function is linear or exponential. • determine the growth/decay rate between consecutive integers in a linear or exponential function. • compare the growth/decay rate between consecutive integers in a linear or exponential function. • recognize that a quantity increasing exponentially eventually exceeds a quantity increasing linearly.
Assessment Guidelines	Assessment should focus on comparing linear and exponential functions.
DOK(s)	1, 2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Standard A1.PAFR.3

Represent and interpret functions symbolically and graphically.

Math Vocabulary for Assessment: input, output, function notation, mapping, domain, range, interval notation, set notation, intercepts, intervals, increasing, decreasing, constant, maximums, minimums, symmetry, lead coefficients

Indicator	**A1.PAFR.3.1** Recognize that $f(x)$ denotes the output of function f that corresponds to the input x, and this corresponds to the set of all the ordered pairs *(x, y)* that satisfy the equation *y = f(x)* both tabularly and graphically
Indicator Insight	Function notation reveals both the input and output in a single statement. Connect the statements "the graph of *f*" and "the graph of *y = f(x).*"
Assessment Specifications	
Example Tasks	Students will be able to • connect ordered pairs to their meaning in function notation. • determine an output given an input, or vice versa, graphically or tabularly. • recognize the meaning of the elements of function notation in words. • recognize that a graph of a linear, exponential, or quadratic function must be a continuous line through all the ordered pairs that satisfy the equation *y* = *f*(*x*).
Assessment Guidelines	Assessment may focus on the interpretation of function notation, ordered pairs, graphical, and tabular representations. Students may be asked to explain the connections between the representations. Assessment items will focus on points beyond intercepts, maximums, minimums, etc.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.3.2** Use the definition of a function to analyze the domain and range of a function in relation to its graph, mapping, table, verbal, and/or symbolic description and, where applicable, using interval and set notation.
Indicator Insight	Tabular representation may be done using a spreadsheet
A1.PAFR.3.2	**Assessment Specifications**
Example Tasks	Students will be able to • identify the domain and range of a function. • compare the domain and range of a function.
Assessment Guidelines	Students are expected to write domain and range in both interval and set notation. Domain and range should include endpoints when applicable (i.e., inclusive inequalities) and use brackets (e.g., $0 \le x \le 2$ or [0, 2]). Students are expected to be exposed to a variety of functions outside of the main functions covered in Algebra (linear, exponential, quadratic, linear absolute value) including continuous piecewise functions. If the function is not one of the main four, key features should be shown or a symbolic representation should be provided that can be entered into Desmos.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.3.3** Translate among graphical, tabular, verbal, and symbolic representations in function notation, to identify intercepts, intervals where the function is increasing, decreasing, constant, maximums and minimums, and symmetries and explain their meanings in real-world and mathematical situations.
Indicator Insight	A computer algebra system may be used for translating among the different representations.
	Assessment Specifications
Example Tasks	Students will be able to • identify features of the graph of a function given in different forms. • translate among different forms of a function. • explain the meaning of key features of a function in terms of real-world and mathematical situations.
Assessment Guidelines	Students are expected to write increasing and decreasing sections of a function in both interval and set notation. These intervals do **not** include endpoints, so they should be strict inequalities and should use parentheses when writing interval notation, as seen here: $0 < x < 2$ or (0, 2).
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.3.4** Interpret how lead coefficients impact the shape of a function’s graph.
Indicator Insight	Relate the value of the coefficients to geometric transformations.
	Assessment Specifications
Example Tasks	Students will be able to • interpret the impact of k on $f(x)$ in $kf(x)$. • recognize how a positive/negative value for a in $ax^2 + bx + c$ impacts the graph. • recognize how a positive/negative value for m in $y = mx + b$ impacts the graph.
Assessment Guidelines	Students are expected to be exposed to functions other than just linear, exponential, quadratic, and linear absolute value when dealing with the impact of a leading coefficient on the shape of a function’s graph.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Standard A1.PAFR.4

Reason with parent functions in varying representations to find families of functions that all have similar distinguishing attributes common to the family and use common characteristics to aid in rewriting and identifying linear, linear absolute value, quadratic, and exponential functions.

Math Vocabulary for Assessment: transformations, parent functions, translations, reflections, dilations, rates of change, key features, intercepts, domain and range, intervals of increasing and decreasing, constant, average rate of change, maximum values, minimum values

Indicator	**A1.PAFR.4.1** Describe the effect of the transformations $k\,f(x)$, $f(x) + k$, $f(x - k)$, and combinations of such transformations on the graph of parent function $y = f(x)$ for any real number k; find the value of k given the graphs; and write the equation of a transformed parent function given its graph.
Indicator Insight	Use technology with a parent function to explore the results when different transformations are applied – translations, reflections, and dilations
A1.PAFR.4.1	**Assessment Specifications**
Example Tasks	Students will be able to • determine what transformation occurred to get from one graph to another graph. • determine what transformation occurred to get from one function to another function. • describe what would happen to a function when a given transformation is performed. • write the equation of a transformed function. • determine the value of k in a transformation.
Assessment Guidelines	Assessment should focus on linear, exponential, quadratic, and linear absolute value functions.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.4.2** Given a real-world or mathematical situation, determine the parent graph that best models the situation.
Indicator Insight	Consider rates of change, graphs, context, or a table of values to determine the parent function.
4.PAFR.3.3	**Assessment Specifications**
Example Tasks	Students will be able to • determine what type of function best models a real-world or mathematical situation. • justify why a certain parent function is most appropriate given the context provided.
Assessment Guidelines	Students are not expected to create, solve, or graph the situations. They are expected to use the context, graph, tables, or information provided to determine which type of parent function best represents the situation.
DOK(s)	1, 2
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response

Indicator	**A1.PAFR.4.3** Given different representations of two different functions, compare key features including intercepts, domain and range, intervals of increasing and decreasing, constant, average rate of change, and maximum and minimum values.
Indicator Insight	Flexibly use different representations of functions (graphs, tables, verbal, and symbols) to compare key features of the functions.
	Assessment Specifications
Example Tasks	Students will be able to • compare key features of two functions given with different representations. • compare key features of two functions given with the same representation. • find the average rate of change of a function. • recognize that a quantity increasing exponentially eventually exceeds a quantity increasing quadratically (as an extension of A1.PAFR.2.10).
Assessment Guidelines	Students are expected to compare two different functions given in the same representation as well as in different representations. Students are expected to be able to find the average rate of change of a single function. Students are expected to be able to move between representations of a single function using their knowledge from A1.PAFR.3.3 to be able to compare functions.
DOK(s)	2, 3
Item Types	Selected-Response Technology-Enhanced Technology-Enhanced Constructed-Response