Achievement Level Descriptors

Algebra: Concepts and Connections

Georgia Department of Education
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Achievement Levels and Achievement Level Descriptors

With the implementation of the Georgia Milestones Assessment System, Georgia educators have developed four achievement levels to describe student mastery and command of the knowledge and skills outlined in Georgia's content standards. Most students have at least some knowledge of the content described in the content standards; however, achievement levels succinctly describe how much mastery a student has. Achievement levels give meaning and context to scale scores by describing the knowledge and skills students must demonstrate to achieve each level.

The four achievement levels on Georgia Milestones are *Beginning Learner*, *Developing Learner*, *Proficient Learner*, and *Distinguished Learner*. The general meaning of each of the four levels is provided below:

Beginning Learners do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***need substantial academic support*** to be prepared for the next grade level or course and to be on track for post-secondary readiness.

Developing Learners demonstrate partial proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***need additional academic support*** to ensure success in the next grade level or course and to be on track for post-secondary readiness.

Proficient Learners demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***are prepared*** for the next grade level or course and are on track for post-secondary readiness.

Distinguished Learners demonstrate advanced proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***are well prepared*** for the next grade level or course and are well prepared for post-secondary readiness.

More detailed and content-specific concepts and skills are provided for each grade, content area, and course in the **Achievement Level Descriptors** (ALDs). ALDs are narrative descriptions of the knowledge and skills expected at each of the four achievement levels and were developed for each grade level, content area, and course by committees of Georgia educators.

ALDs show a progression of knowledge and skills for which students must demonstrate competency across the achievement levels. It is important to understand that a student should demonstrate mastery of the knowledge and skills within the student's achievement level as well as all content and skills in any achievement levels that precede the student's own, if any. For example, a Proficient Learner should also possess the knowledge and skills of a Developing Learner and a Beginning Learner.

POLICY DESCRIPTORS			
Beginning Learner	**Developing Learner**	**Proficient Learner**	**Distinguished Learner**
Beginning Learners do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students *need substantial academic support* to be prepared for the next grade level or course and to be on track for *post-secondary readiness.*	**Developing Learners demonstrate partial proficiency in the knowledge and skills** necessary at this grade level/course of learning, as specified in Georgia's content standards. The students *need additional academic support* to ensure success in the next grade level or course and to be on track for *post-secondary readiness.*	**Proficient Learners demonstrate proficiency in the knowledge and skills** necessary at this grade level/course of learning, as specified in Georgia's content standards. The students *are prepared* for the next grade level or course and are on track for *post-secondary readiness.*	**Distinguished Learners demonstrate advanced proficiency in the knowledge and skills** necessary at this grade level/course of learning, as specified in Georgia's content standards. The students *are well prepared* for the next grade level or course and are well prepared for *post-secondary readiness.*
RANGE DESCRIPTORS			
A student who achieves at the Beginning Learner level demonstrates minimal command of the grade-level standards.	A student who achieves at the Developing Learner level demonstrates partial command of the grade-level standards.	A student who achieves at the Proficient Learner level demonstrates proficiency of the grade-level standards.	A student who achieves at the Distinguished Learner level demonstrates advanced proficiency of the grade-level standards.
A.MM.1: Apply mathematics to real-life situations: model real-life phenomena using mathematics.			
Assessment of A.MM.1 is embedded within the other standards of Algebra: Concepts and Connections.			
A.FGR.2: Construct and interpret arithmetic sequences as functions, algebraically and graphically, to model and explain real-life phenomena. Use formal notation to represent linear functions and the key characteristics of graphs of linear functions, and informally compare linear and non-linear functions using parent graphs.			
• Identify a term in an arithmetic sequence. • Identify the graph of a linear function. • Given the graph of a linear function, identify the domain and range. • Given an equation in function notation, evaluate the function for a specified input. • Identify a function as linear or non-linear.	• Identify a rule to describe an arithmetic sequence. • Identify and interpret key characteristics of linear functions. • Describe the domain and range of a linear function by using formal notation. • Given a verbal description, create and evaluate an equation by using function notation. • Compare a linear function to the parent linear function $f(x) = x$.	• Solve real-life problems involving arithmetic sequences graphically and algebraically. • Analyze the key features of linear functions to interpret real-life phenomena. • Identify and interpret the domain and range of a linear function in the context of a real-life problem. • Interpret function notation in the context of a real-life problem. • Compare a non-linear function to the appropriate parent function.	• Solve real-life problems involving function notation, domain and range, and the comparison of functions.

A.GSR.3: Solve problems involving distance, midpoint, slope, area, and perimeter to model and explain real-life phenomena.			
• Identify parallel and perpendicular lines within a geometric context.	• Find the slope, the distance between two points, and the midpoints of line segments in simple shapes on the coordinate plane within a geometric context.	• Determine the areas and perimeters of parallelograms and triangles on the coordinate plane. • Solve problems involving distances on the coordinate plane by applying the distance formula and/or the midpoint formula within a geometric context.	• Solve complex, multi-step problems involving distances, slopes, and properties of geometric figures plotted on coordinate grids.
A.PAR.4: Create, analyze, and solve linear inequalities in two variables and systems of linear inequalities to model real-life phenomena.			
• Identify a data point as a solution to a linear inequality in two variables.	• Identify the graph of a solution set to a linear inequality in two variables in relevant situations. • Identify the solution to a system of linear inequalities by graphing in relevant situations.	• Create the graph of a solution set to a linear inequality in two variables. • Create linear inequalities in two variables to represent real-life situations. • Identify the solution set for a linear inequality based on the context. • Create a graph to solve a system of linear inequalities, and create systems of linear inequalities in two variables to represent real-life situations.	• Solve real-life problems involving inequalities in two variables by graphing and describe the solutions in context.
A.NR.5: Investigate rational and irrational numbers and rewrite expressions involving square roots and cube roots.			
• Identify the sum of rational and irrational numbers as rational or irrational.	• Rewrite a numeric expression involving radicals. • Identify the product of rational and irrational numbers as rational or irrational.	• Rewrite an algebraic expression involving radicals. • Explain why the sum or product of two numbers is rational or irrational.	• Solve real-life problems explaining why a sum or product of two numbers is rational or irrational.

A.PAR.6: Build quadratic expressions and equations to represent and model real-life phenomena; solve quadratic equations in mathematically applicable situations.			
• Identify the terms, factors, leading coefficients, coefficients, and/or constants in a quadratic expression. • Find the equivalent form of a quadratic expression or the solution to a quadratic equation. • Solve quadratic equations of the form $x^2 = p$. • Identify whether a data point is a solution for a quadratic equation in two variables.	• Identify key features of a quadratic expression given in standard, vertex, or factored form. • Solve a quadratic equation in one variable by inspection or by factoring with a leading coefficient of $a = 1$.	• Interpret parts of a quadratic expression in terms of a real-life situation. • Explain key features of a quadratic expression by converting between standard, vertex, and factored forms. • Create and solve a quadratic equation in one variable by factoring with a leading coefficient of $a \neq 1$, completing the square, or applying the quadratic formula. • Solve real-life problems by identifying a solution to a quadratic equation in two variables that fits in the framework.	• Solve real-life problems involving quadratic equations in either one or two variables, converting between forms of equations and describing the solution in the framework of the situation.

A.FGR.7: Construct and interpret quadratic functions from data points to model and explain real-life phenomena; describe key characteristics of the graph of a quadratic function to explain a mathematically applicable situation for which the graph serves as a model.			
• Evaluate a quadratic function for a given value of the domain. • Given the graph of a quadratic function, identify its domain and range. • Identify the labels for the axes of a graph of a quadratic function.	• Interpret a quadratic function for a given value of the domain in a real-life framework. • Given the graph of a quadratic function $f(x)$, identify the graph of $f(x) + k$, $kf(x)$, $f(kx)$, or $f(x + k)$ for a specified value of k. • Given a table of values or graph representing a quadratic function, identify key features of the function. • Describe the domain or range of a quadratic function by using formal notation. • Identify the maximum or minimum of a function written in vertex form. • Identify the graph of a quadratic function. • Determine the average rate of change of a quadratic function over a specified interval.	• Create a quadratic function that represents a real-life framework. • Explain the result of replacing $f(x)$ in a quadratic function with $f(x) + k$, $kf(x)$, $f(kx)$, or $f(x + k)$ for a specified value of k. • Create the graph of a quadratic function, and identify key features from the graph. • Identify and interpret problems involving the domain and/or range of a quadratic function in relation to real-life problems. • Rewrite a quadratic function in vertex form to reveal the maximum or minimum and describe that value in context. • Create a quadratic function to model a real-life problem. • Interpret and compare the average rate of change of a quadratic function and the average rate of change of a linear function over a specified interval. • Rewrite quadratic functions to highlight key features in the framework of real-life problems. • Compare key features of two different quadratic functions presented in different ways (e.g., tables, equations, graphs).	• Given a quadratic function represented in a mathematically applicable situation, explain the impact of adjusting the starting value (i.e., $f(x) + k$), multiplying the output by a constant (i.e., $kf(x)$), multiplying the input by a constant (i.e., $f(kx)$), or incorporating a shift (i.e., $f(x + k)$). • Solve real-life problems involving key features of quadratic functions, relating those key features to the mathematically applicable situations. • Solve real-life problems involving quadratic functions in various forms by manipulating and comparing the quadratic functions to highlight key features in mathematically applicable situations.

A.PAR.8: Create and analyze exponential expressions and equations to represent and model real-life phenomena; solve exponential equations in mathematically applicable situations.			
• Identify terms, factors, leading coefficients, coefficients, and constants in exponential expressions. • Find the value of an exponential equation in one variable for an integer value of the variable. • Recognize mathematically applicable situations that are represented by exponential functions, and identify the labels for the axes of a graph of an exponential function. • Identify whether a point is a solution for an exponential equation in two variables.	• Find the equivalent form of an exponential expression. • Identify the graph of an exponential function.	• Interpret parts of an exponential expression in terms of a mathematically applicable situation. • Create a single-variable exponential equation from inspection, graphing, or a table of values. • Create an exponential function that models a real-life situation. • Solve a real-life problem by identifying a solution to an exponential equation in two variables that fits in the mathematically applicable situation.	• Solve real-life problems involving exponential equations, and describe the solutions in terms of the situations.
A.FGR.9: Construct and analyze the graph of an exponential function to explain a mathematically applicable situation for which the graph serves as a model; compare exponential with linear and quadratic functions.			
• Evaluate an exponential function for a specific value of the domain. • Identify a term in a geometric sequence.	• Interpret an exponential function for a given value of the domain in context. • Given a table of values or a graph representing an exponential function, identify key features of the function. • Given the graph of the exponential function $f(x)$, identify the graph of $f(x) + k$ or $kf(x)$. • Identify a rule to describe a geometric sequence.	• Create an exponential function that represents a real-life situation. • Create the graph of an exponential function and identify key features from the graph. • Explain the result of replacing the exponential function $f(x)$ with $f(x) + k$ or $kf(x)$. • Solve real-life problems involving geometric sequences. • Compare key features of two functions presented in different ways (e.g., tables, equations, graphs).	• Given an exponential function in a real-life situation, explain the impact of adding a constant (i.e., $f(x) + k$) or multiplying the output by a constant (i.e., $kf(x)$) within the context of the situation. • Solve real-life problems involving functions in various forms and compare the key features in mathematically applicable situations.

A.DSR.10: Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems.			
• Find measures of center and/or variability of multiple data sets. • Identify the strength of a given correlation coefficient. • Determine when a linear model is the best model for a data set in two variables. • Determine whether a set of data that shows correlation is an example of causation.	• Compare measures of center or variability from two data sets. • Identify outliers in a data set. • Create a scatter plot and describe the relationship between the variables. • Write the equation of a line of best fit and/or graph the line of best fit of a scatter plot and make predictions. • Determine when an exponential or quadratic model is the best model for a data set in two variables. • Explain how correlation is not deterministic of causation.	• Compare measures of center or variability from more than two data sets. • Describe the impact of outliers on the shape, center, and variability of a data distribution. • Interpret the slope and intercept of a line of best fit in the framework of the problem. • Interpret the correlation coefficient for a set of data on a scatter plot.	• Solve real-life problems by comparing multiple data sets in one variable on number lines, using measures of center and variability and outliers to describe the similarities and differences of the data sets. • Solve real-life problems by comparing multiple data sets in two variables on scatter plots, using lines of best fit and correlation coefficients.

