Georgia Milestones Assessment System

Achievement Level Descriptors

Grade 8 Mathematics

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.
8.NR.1: Solve problems involving irrational numbers and rational approximations of irrational numbers to explain realistic applications.			
• Recognize irrational numbers as a category distinct from rational numbers. • Identify whole-number values between which an irrational number belongs.	• Classify real numbers as rational or irrational. • Approximate irrational numbers by estimating or locating them on a number line.	• Convert a decimal expansion that repeats into a rational number. • Compare an irrational number to another number (rational or irrational) by using a benchmark or number line. • Estimate the values of expressions that contain both rational and irrational numbers.	• Solve realistic problems involving rational approximations of irrational numbers, including using estimation.

8.NR.2: Solve problems involving radicals and integer exponents including relevant application situations; apply place value understanding with scientific notation and use scientific notation to explain real phenomena.			
• Using only positive exponents, apply one property of exponents to identify equivalent expressions. • Represent whole-number multiples of 10 in scientific notation. • Interpret scientific notation.	• Apply one property of exponents to generate equivalent numerical expressions. • Evaluate square roots of perfect squares ≤ 625 and cube roots of perfect cubes ≥ −1,000 and ≤ 1,000. • Use square root and cube root symbols to represent solutions to equations in the form $x^2 = p$ and $x^3 = p$, where p is a perfect square or perfect cube. • Use scientific notation to estimate both very large and very small quantities. • Add, subtract, multiply, or divide numbers expressed in scientific notation.	• Apply more than one property of exponents to generate equivalent numerical expressions. • Use square root and cube root symbols to represent positive and negative solutions to equations in the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. • Compare two numbers written in scientific notation in a real-life context to determine how much times one number is the other number. • Solve relevant mathematical problems involving addition, subtraction, multiplication, or division of numbers expressed in scientific notation.	• Determine whether multiple expressions both with and without exponents are equivalent. • Solve realistic problems involving addition, subtraction, multiplication, or division of numbers expressed in both scientific notation and decimal notation.

8.PAR.3: Create and interpret expressions within relevant situations. Create, interpret, and solve linear equations and linear inequalities in one variable to model and explain real phenomena.			
• Identify terms, factors, and coefficients in an expression. • Solve linear equations in the form of $ax + b = cx$ with one solution.	• Interpret terms, factors, operations, and coefficients of an expression in context in binomial expressions. • Solve linear equations in one variable that have infinitely many solutions or no solutions, and identify the linear equation or inequality in one variable that models a relevant application. • Use relevant algebraic properties to solve one-variable equations or inequalities. • Justify the steps of a one-solution equation or inequality. • Solve linear equations and inequalities in one variable with coefficients represented by letters (e.g., $ax + 3 = 7$, solve for x).	• Interpret terms, factors, operations, and coefficients of an expression in context in multi-term expressions by using formulas. • Describe situations with one solution ($x = a$), infinitely many solutions ($a = a$), or no solutions ($a = b$) when solving a one-variable equation. • Create and solve a linear equation or inequality in one variable that models a relevant application. • Solve linear equations and inequalities, including compound inequalities, in one variable from relevant mathematical phenomena with coefficients represented by letters and describe the solution in the context of the problem. • Rearrange formulas and different linear and literal mathematical equations to highlight a quantity of interest and be able to use the new formula to solve for an appropriate value.	• Explain real-world phenomena involving linear equations and inequalities, including compound inequalities in one variable, and relate solutions or solution sets back to the contexts of the real phenomena.
8.PAR.4: Show and explain the connections between proportional and non-proportional relationships, lines, and linear equations; create and interpret graphical mathematical models and use the graphical, mathematical model to explain real phenomena represented in the graph.			
• Given an equation in the form $y = mx + b$ and/or the graph of that equation, identify the slope and the y-intercept. • Identify points that make a linear equation given in two variables true.	• Explain how the slope and y-intercept change in a graphical representation as the values of m and b change in the equation $y = mx + b$. • Given an equation in slope-intercept form, match/create a graph of the equation.	• Create the equation $y = mx + b$ when given a graphical representation. • Relate graphical mathematical models to applicable situations.	• Create and interpret linear graphical mathematical models to explain real phenomena represented in graphs.

8.FGR.5: Describe the properties of functions to define, evaluate, and compare relationships, and use functions and graphs of functions to model and explain real phenomena.			
• Know the meaning of the domain of a function. • Determine the initial value and rate of change of a function. • Identify an equation written in one of the three forms as a linear function. • Determine the rate of change when given a relationship.	• Recognize whether a relationship is a function. • Identify and describe functions based on qualitative features (e.g., linear or nonlinear, increasing or decreasing). • Identify the domain of a function when given a table or graphic representation. • Compare the initial values and rates of change of two functions represented in the same way. • Given specific information, write a linear equation in any form. • Determine the initial value when given a table or graph. • Given a linear equation in any form, graph the function on a coordinate grid.	• Explain how a function rule assigns each input to exactly one output. • Create and interpret graphs of linear and nonlinear functions that exhibit qualitative features based on realistic situations. • Relate the domain of a function to the given real-world or mathematical context. • Compare the initial values and rates of change of two functions represented in different ways. • Rewrite linear equations in a different form. • Explain when to use each form of an equation. • Construct linear functions to model relationships in realistic mathematical problems or from a pair of (x, y) values. • Explain the meaning of the rate of change and initial value of a linear function in terms of the situation the function models and in terms of its graph or a table of values. • Analyze and explain the key characteristics of the graph of a linear function.	• Construct, graph, and analyze linear and nonlinear functions; solve realistic problems and interpret functions in terms of the situations they model; and explain key features of linear functions written in various algebraic forms to describe applicable situations.
8.FGR.6: Solve practical, linear problems involving situations using bivariate quantitative data.			
	• Determine whether a scatter plot is represented by a linear association and, if so, whether that association is positive or negative. • Given a scatter plot and the line of best fit or an equation of the line of best fit, use a value of one variable to predict the value of the other variable.	• Construct an estimated line of best fit and assess whether a given line is a good fit by judging the closeness of the data points. • Interpret the slope and y-intercept of a line of best fit in the context of a realistic problem.	• Write an equation for the line of best fit and analyze data distributions involving lines of best fit to make informal inferences and answer statistical investigative questions.

8.FGR.7: Justify and use various strategies to solve systems of linear equations to model and explain realistic phenomena.			
• Describe a mathematical problem that involves two linear equations. • Given the graph of a set of linear equations, identify the point of intersection of the lines as the solution to the system. • Recognize from a graph that there is no solution to a system of equations formed by parallel lines.	• Create a table or graph to help interpret a mathematical problem relating two linear equations. • Given the solution to a system of equations, show mathematically that the given solution is the point of intersection. • Identify the approximate solution to a system of linear equations from the graph of the system. • Given the equations for a system of linear equations, determine whether the graphed lines will be parallel, perpendicular, or neither parallel nor perpendicular.	• Compare different scenarios leading to two linear equations and make inferences relating to the given mathematical problem. • Explain the significance of the intersection of the graph of a system of linear equations within the given context of the question. • Given a system of linear equations and (x, y) values for each of the equations, approximate the solution to the system of equations. • Solve systems of two linear equations in two variables algebraically to find exact solutions. • Given the equation of a line, create an equation for a line that is parallel or perpendicular to the given line.	• Solve realistic problems involving systems of linear equations and interpret the solutions in relation to the problem.
8.GSR.8: Solve geometric problems involving the Pythagorean Theorem and the volume of geometric figures to explain real phenomena.			
• Given a drawing, determine the unknown side length of a right triangle.	• Given a description of two sides of a right triangle, determine the unknown side length of the right triangle. • Given two coordinate points (x, y) or points graphed in the coordinate plane, use the Pythagorean theorem to determine the distance between the points. • Use the formula for the volume of a cone, cylinder, or sphere to determine the volume of a figure.	• Explain a proof of the Pythagorean theorem and its converse by using visual models. • Given a drawing of a polygon or of a three-dimensional figure made up of right triangles, use the Pythagorean theorem to determine an unknown dimension. • Use the Pythagorean theorem to find the distance between two points to solve practical, mathematical problems. • Find the volumes of cones, cylinders, or spheres to solve relevant problems.	• Solve complex or multi-step authentic problems involving the Pythagorean theorem or the volumes of cones, cylinders, or spheres.

