

**Florida Department of Education
Adult General Education
Curriculum Frameworks**

GED® MATHEMATICAL REASONING	
Program Title	GED® Preparation
Program Number	9900130
Program Length	Varies
Course Title	GED® Mathematical Reasoning
Course Number	9900134
CIP Number	1532.010207
Grade Equivalent	9.0-12.9
Grade Level	30, 31
Recommended Length	Varies (See Program Structure)

PURPOSE

The GED® Preparation Program consists of four content-area assessments: Reasoning through Language Arts, Mathematical Reasoning, Science, and Social Studies. The purpose of the program is to prepare students to obtain the knowledge and skills necessary to pass the Official GED® Tests and be awarded a State of Florida High School Diploma. An additional performance level will certify that the student is career and college ready. This program strives to motivate students not only to obtain a State of Florida High School Diploma via passage of the four GED® subject area tests, but to continue their education to earn a postsecondary degree, certificate, or industry certification.

The purpose of the Mathematical Reasoning course of the GED® program is to prepare students to pass the GED® Mathematical Test. This test will focus on the fundamentals of mathematics in two major content areas: quantitative problem solving and algebraic problem solving. Students will achieve a deeper conceptual understanding, procedural skill and fluency, and the ability to apply these fundamentals in realistic situations.

PLACEMENT

Beginning with the 2019-20 school year, students should score at the NRS Level 5 or higher on a state approved eligible Mathematics assessment to be placed in the GED® Mathematical Reasoning preparation course.

Note: Students may continue to be reported with the GED® Comprehensive course number if they have tested at the NRS ABE Level of 5 or higher in at least one (Reading or Mathematics) of the eligible assessment subtests as per Rule 6A-6.014, F.A.C. Language will no longer be accepted for placement in GED® Preparation courses. The student should, however, also be enrolled in Adult Basic Education (ABE) to continue instruction in the appropriate subject area until they can demonstrate a NRS ABE Level 5 or higher level. Level 5 or above should be met to be placed in Social Studies or Science.

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THE 2014 GED® ASSESSMENT

Information on the GED® 2014 Assessment and the performance targets and content topics are derived from the Assessment Guide for Educators provided by GED® Testing Service. The manual can be downloaded at https://ged.com/educators_admins/program/.

In addition to the content-based indicators listed with each performance target, the GED® mathematics test will also focus on reasoning skills, as embodied by the GED® Mathematical Practices. The mathematical practices provide specifications for assessing real-world problem-solving skills in a mathematical context rather than requiring students only to memorize, recognize and apply a long list of mathematical algorithms. See Chapter Two for more information on Mathematical Practices in the Assessment Guide for Educators which can be downloaded at https://ged.com/educators_admins/teaching/teaching_resources/

The following specifications guide the GED® Mathematical Reasoning test:

- Approximately 45 percent of the test focuses on quantitative problem solving and approximately 55 percent emphasizes algebraic problem solving.
- The test includes items that test procedural skill and fluency as well as problem solving
- Both academic and workforce contexts are used for items that measure problem solving skills.
- Approximately 50 percent of the items are written to a Depth of Knowledge cognitive complexity level of 2
- Approximately 30 percent of the items are aligned to a Mathematical Practice Standard in addition to a content indicator.
- Candidates are provided with an on-screen scientific calculator for use on most of the items on the GED® Mathematical Reasoning test.

Webb’s Depth of Knowledge (DOK) Model

The GED Testing Service® is using Webb’s Depth of Knowledge model to guide test item development for the GED® 2014 assessment. Unlike the Bloom’s Taxonomy system that was used for the GED®2002 Test Series, the DOK levels are not a taxonomical tool that uses verbs to classify the level of each cognitive demand. The DOK is the cognitive demand required to correctly answer test questions. The DOK level describes the kind of thinking involved in the task. A greater DOK level requires greater conceptual understanding and cognitive processing by the students. The DOK model includes 4 levels: (1) recall, (2) basic application of skill/concept, (3) strategic thinking, and (4) extended thinking. Roughly 80 percent of the items across all four tests will be written to DOK levels two and three, and roughly 20 percent will require test-takers to engage level one DOK skills. Level four entails skills required to successfully complete long-term research projects. Therefore, DOK level four is beyond the scope of this assessment.

PROGRAM STRUCTURE

The GED® program is non-graded and characterized by open-entry/open-exit and/or managed enrollment, self-paced instructional modules, differentiated instruction, flexible schedules, and performance-based evaluation. Agencies are awarded one LCP (V-Y) per test passed by the student.

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While the course length can vary, the recommended length for Mathematical Reasoning is approximately 250 hours.

Course Number	Course Title	Recommended Length	LCP Level
9900134	GED Mathematical Reasoning	Varies*	Y

**Recommended Length: A maximum of 1300 hours may be funded (state) per each reportable year for an adult education student. However, this should not prevent students from receiving instruction beyond the 1300 hours if needed. For example, you may report 1500 instructional hours but only 1300 hours will be used in the funding calculation.*

Note: Section 1003.435(4), F.S., states, “A candidate for a high school equivalency diploma shall be at least 18 years of age on the date of the examination, except that in extraordinary circumstances, as provided for in rules of the district school board, a candidate may take the examination after reaching the age of 16.”

SPECIAL NOTES

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. **Adult students with disabilities must self-identify and request such services.** Students with disabilities may need accommodations in areas such as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

Adult Education Instructor Certification Requirements

As per section 1012.39 (1)(b), F.S., each school district shall establish the minimal qualifications for part-time and full-time teachers in adult education programs

Career and Adult Education Planning

The following career development standards are designed to be integrated into the GED® frameworks to assist students with career exploration and planning. Students can access Florida’s career information delivery system or a comparable system for career exploration and development of a career plan.

Standards

- CP. GED.01 Develop skills to locate, evaluate, and interpret career information.
- CP. GED.02 Identify interests, skills, and personal preferences that influence career and education choices.
- CP.GED.03 Identify career cluster and related pathways that match career and education goals.
- CP.GED.04 Develop and manage a career and education plan.

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Digital Literacy (Technology)

Computer skills have become essential in today’s world. Students use a variety of technology tools such as calculators, cell phones, and computers for multiple uses; communicate with friends and family, apply for work, classroom instruction, testing, and in the workplace. Technology standards are designed to be integrated in the GED® instruction.

Standards

- DL.GED.01 Develop basic keyboarding and numerical keypad skills.
- DL.GED.02 Produce a variety of documents such as research papers, resumes, charts, and tables using word processing programs.
- DL.GED.03 Use Internet search engines such as Google, Bing, or Yahoo to collect data and information.
- DL.GED.04 Practice safe, legal, and responsible sharing of information, data, and opinions online.

Workforce Preparation Activities

The term “workforce preparation activities” means activities, programs, or services designed to help an individual acquire a combination of basic academic skills, critical thinking skills, digital literacy skills, and self-management skills, including competencies in utilizing resources, using information, working with others, understanding systems, and obtaining skills necessary for successful transition into and completion of postsecondary education or training, or employment. (Workforce Innovation and Opportunity Act (WIOA), 2014).

The following activities should be integrated into the classroom instruction:

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| Critical Thinking | All students will make decisions and solve problems by specifying goals, identifying resources and constraints, generating alternatives, considering impacts, choosing appropriate alternatives, implementing plans of action, and evaluating results. |
| Teamwork | All students will learn to work cooperatively with people with diverse backgrounds and abilities. Students will identify with the group’s goals and values, learn to exercise leadership, teach others new skills, serve clients or customers, and contribute with ideas, suggestions, and work efforts. |
| Employment | All students will develop job search skills for employment such as completing an application, resume, cover letter, thank you letter, and interviewing techniques. |
| Self-Management | All students should display personal qualities such as responsibility, self-management, self-confidence, ethical behavior, and respect for self and others. |
| Utilizing Resources | All students will learn to identify, organize, plan, and allocate resources (such as time, money, material, and human resources) efficiently and effectively. |

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Using Information	All students will acquire, organize, interpret, and evaluate information in post-secondary, training, or work situations.
Understanding Systems	All students will learn to understand, monitor, and improve complex systems, including social, technical, and mechanical systems, and work with and maintain a variety of technologies.

Mathematical Practices	
MP.1 Building Solution Pathways and Lines of Reasoning	
	Search for and recognize entry points for solving a problem.
	Plan a solution pathway or outline a line of reasoning.
	Select the best solution pathway, according to given criteria.
	Recognize and identify missing information that is required to solve a problem.
	Select the appropriate mathematical technique(s) to use in solving a problem or a line of reasoning.
MP.2. Abstracting Problems	
	Represent real world problems algebraically.
	Represent real world problems visually.
	Recognize the important and salient attributes of a problem.
MP.3 Furthering Lines of Reasoning	
	Build steps of a line reasoning or solution pathway, based on previous step or givens.
	Complete the lines of reasoning of others.
	Improve or correct a flawed line of reasoning.
MP.4 Mathematical Fluency	
	Manipulate and solve arithmetic expressions.
	Transform and solve algebraic expressions.
	Display data or algebraic expressions graphically.

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<p>MP.5 Evaluating Reasoning and Solution Pathways</p> <p>Recognize flaws in others’ reasoning.</p> <p>Recognize and use counterexamples.</p> <p>Identify the information required to evaluate a line of reasoning.</p>
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Quantitative Problem Solving Standards and Content Indicators	
Q.1	Apply number sense concepts, including ordering rational numbers, absolute value, multiples, factors, and exponents
Q.1.a	Order fractions and decimals, including on a number line.
Q.1.b	Apply number properties involving multiples and factors, such as using the least common multiple, greatest common factor, or distributive property to rewrite numeric expressions.
Q.1.c	Apply rules of exponents in numerical expressions with rational exponents to write equivalent expressions with rational exponents.
Q.1.d	Identify absolute value or a rational number as its distance from zero on the number line and determine the distance between two rational numbers on the number line, including using the absolute value of their difference.
Q.2	Add, subtract, multiply, divide, and use exponents and roots of rational, fraction, and decimal numbers
Q.2.a	Perform addition, subtraction, multiplication, and division on rational numbers.
Q.2.b	Perform computations and write numerical expressions with squares and square roots of rational numbers.
Q.2.c	Perform computations and write numerical expressions with cubes and cube roots of rational numbers.
Q.2.d	Determine when a numerical expression is undefined.
Q.2.e	Solve single-step or multistep real-world arithmetic problems involving the four operations with rational numbers, including those involving scientific notation.
Q.3	Calculate and use ratios, percents, and scale factors
Q.3.a	Compute unit rates. Examples include but are not limited to: unit pricing, constant speed, persons per square mile, BTUs (British thermal units) per cubic foot.
Q.3.b	Use scale factors to determine the magnitude of a size change. Convert between actual drawings and scale drawings.
Q.3.c	Solve multistep, real-world arithmetic problems using ratios or proportions including those that require converting units of measure.
Q.3.d	Solve two-step, real-world arithmetic problems involving percents. Examples include but are not limited to: simple interest, tax, markups and markdowns, gratuities and commissions, percent increase and decrease.
Q.4	Calculate dimensions, perimeter, circumference, and area of two-dimensional figures
Q.4.a	Compute the area and perimeter of triangles and rectangles. Determine side lengths of triangles and rectangles when given area or perimeter.

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Q.4.b	Compute the area and circumference of circles. Determine the radius or diameter when given area or circumference.
Q.4.c	Compute the perimeter of a polygon. Given a geometric formula, compute the area of a polygon. Determine side lengths of the figure when given the perimeter or area.
Q.4.d	Compute perimeter and area of 2-D composite geometric figures, which could include circles, given geometric formulas as needed.
Q.4.e	Use the Pythagorean theorem to determine unknown side lengths in a right triangle.
Q.5	Calculate dimensions, surface area, and volume of three-dimensional figures
Q.5.a	When given geometric formulas, compute volume and surface area of rectangular prisms. Solve for side lengths or height, when given volume or surface areas.
Q.5.b	When given geometric formulas, compute volume and surface area of cylinders. Solve for height, radius, or diameter when given volume or surface area.
Q.5.c	Use geometric formulas to compute volume and surface area of right prisms. Solve for side lengths or height, when given volume or surface area.
Q.5.d	When given geometric formulas, compute volume and surface area of right pyramids and cones. Solve for side lengths, height, radius, or diameter when given volume or surface area.
Q.5.e	When given geometric formulas, compute volume and surface area of spheres. Solve for radius or diameter when given the surface area.
Q.5.f	Compute surface area and volume of composite 3-D geometric figures, given geometric formulas as needed.
Q.6	Interpret and create data displays
Q.6.a	Represent, display, and interpret categorical data in bar graphs or circle graphs.
Q.6.b	Represent, display, and interpret data involving one variable plots on the real number line including dot plots, histograms, and box plots.
Q.6.c	Represent, display, and interpret data involving two variables in tables and the coordinate plane including scatter plots and graphs.
Q.7	Calculate and use mean, median, mode, and weighted average
Q.7.a	Calculate the mean, median, mode and range. Calculate a missing data value, given the average and all the missing data values but one, as well as calculating the average, given the frequency counts of all the data values, and calculating a weighted average.
Q.8	Utilize counting techniques and determine probabilities
Q.8.a	Use counting techniques to solve problems and determine combinations and permutations.
Q.8.b	Determine the probability of simple and compound events.
	Algebraic Problem Solving Standards and Content Indicators
A.1	Write, evaluate, and compute with expressions and polynomials
A.1.a	Add, subtract, factor, multiply, and expand linear expressions with rational coefficients.
A.1.b	Evaluate linear expressions by substituting integers for unknown quantities.
A.1.c	Write linear expressions as part of word-to-symbol translations or to represent common settings.
A.1.d	Add, subtract, multiply polynomials, including multiplying two binomials, or divide factorable polynomials.

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A.1.e	Evaluate polynomial expressions by substituting integers for unknown quantities.
A.1.f	Factor polynomial expressions.
A.1.g	Write polynomial expressions as part of word-to-symbol translations or to represent common settings.
A.1.h	Add, subtract, multiply and divide rational expressions.
A.1.i	Evaluate rational expressions by substituting integers for unknown quantities.
A.1.j	Write rational expressions as part of word-to-symbol translations or to represent common settings.
A.2	Write, manipulate, solve, and graph linear equations
A.2.a	Solve one-variable linear equations with rational number coefficients, including equations for which solutions require expanding expressions using the distributive property and collecting like terms or equations with coefficients represented by letters.
A.2.b	Solve real-world problems involving linear equations.
A.2.c	Write one-variable and multi-variable linear equations to represent context.
A.2.d	Solve a system of two simultaneous linear equations by graphing, substitution, or linear combination. Solve real-world problems leading to a system of linear equations.
A.3	Write, manipulate, solve, and graph linear inequalities
A.3.a	Solve linear inequalities in one variable with rational number coefficients.
A.3.b	Identify or graph the solution to a one variable linear inequality on a number line.
A.3.c	Solve real-world problems involving inequalities.
A.3.d	Write linear inequalities in one variable to represent context.
A.4	Write, manipulate, and solve quadratic equations
A.4.a	Solve quadratic equations in one variable with rational coefficients and real solutions, using appropriate methods (e.g., quadratic formula, completing the square, factoring, inspection).
A.4.b	Write one-variable quadratic equations to represent context.
A.5	Connect and interpret graphs and functions
A.5.a	Locate points in the coordinate plane.
A.5.b	Determine the slope of a line from a graph, equation, or table.
A.5.c	Interpret unit rate as the slope in a proportional relationship.
A.5.d	Graph two-variable linear equations.
A.5.e	For a function that models a linear or nonlinear relationship between two quantities, interpret key features of graphs and tables in terms of quantities, and sketch graphs showing key features of graphs and tables in terms of quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries, end behavior, and periodicity.
A.6	Connect coordinates, lines, and equations
A.6.a	Write the equation of a line with a given slope through a given point.
A.6.b	Write the equation of a line passing through two given distinct points.
A.6.c	Use slope to identify parallel and perpendicular lines and to solve geometric problems.
A.7	Compare, represent, and evaluate functions
A.7.a	Compare two different proportional relationships represented in different ways. Examples

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	include but are not limited to: compare a distance-time graph to a distance-time equation to determine which of two moving objects has a greater speed.
A.7.b	Represent or identify a function in a table or graph as having exactly one output (one element in the range) for each input (each element in the domain).
A.7.c.	Evaluate linear and quadratic functions for values in their domain when represented using function notation.
A.7.d.	Compare properties of two linear or quadratic functions each represented in a different way (algebraically, numerically in tables, graphically or by verbal descriptions). Examples include but are not limited to: given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

Notes:

- Information on the GED® test standards is based on the *Assessment Guide for Educators*, GED Testing Service®.