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Georgia Assessments for the Certification of Educators® (GACE®) Program Admission Assessment – Test II Mathematics

Khan Academy Instructional Support Videos and Exercises

The Georgia Assessments for the Certification of Educators® (GACE®) program has identified videos and exercises available at www.khanacademy.org to support test preparation for the Program Admission Assessment – Test II Mathematics. Each subarea included in the test is mapped to a video or exercise that may help you prepare to answer questions related to that topic.

GACE Program Admission – Test II Mathematics (201)	Khan Academy videos
Subarea I: Number and Quantity	
• **Ratios and Proportional Relationships**	
– Understand ratio concepts and use ratio reasoning to solve problems	**Intro to ratios** **Ratio word problems** **Intro to rates** **Ratio word problem: centimeters to kilometers**
– Analyze proportional relationships and use them to solve real-world and mathematical problems	**Intro to percents** **Percent, fraction, decimal conversions** **Percent problems** **Percent word problems** **Identifying proportional relationships** **Average rate of change** **Average rate of change word problems** **Writing & solving proportions**

	Writing & solving proportions
• **The Real Number System**	
– Apply understanding of multiplication and division to divide fractions by fractions	**Fractions intro** **Fractions on the number line** **Equivalent fractions** **Comparing fractions** **Common denominators** **Decomposing fractions** **Adding and subtracting fractions with like denominators** **Mixed numbers** **Adding and subtracting fractions with unlike denominators** **Adding and subtracting mixed number with unlike denominators** **Adding and subtracting fractions word problems** **Multiplying whole numbers and fractions** **Multiplication as scaling** **Multiplying fractions** **Multiplying mixed numbers** **Multiplying fractions word problems** **Fractions as division** **Dividing unit fractions and whole numbers** **Dividing fractions by fractions** **Dividing fractions word problems** **Fractions**
– Compute fluently with multi-digit numbers and find common factors and multiples	**Place value** **Rounding whole numbers** **Regrouping whole numbers** **Divisibility tests** **Factors and multiples** **Prime numbers** **Prime factorization** **Least common multiple** **Greatest common factor**

	Intro to decimals **Decimals on the number line** **Rounding decimals** **Comparing decimals** **Rewriting decimals as fractions** **Adding decimals** **Subtracting decimal** **Adding and subtracting decimals word problems** **Multiplying decimals** **Dividing decimals** **Operations with decimals** **Intro to negative numbers** **Order negative numbers** **Number opposites** **Negative numbers** **Intro to adding negative numbers** **Intro to subtracting negative numbers** **Adding & subtracting negative numbers** **Multiplying & dividing negative numbers** **Absolute value** **Decimals, fractions and percentages**
– Apply understanding of operations with fractions to add, subtract, multiply, and divide rational numbers	**Order of operations** **Arithmetic properties** **Distributive property** **Number patterns**
– Know that there are numbers that are not rational, and approximate them by rational numbers	**Rational and irrational numbers**
– Work with radicals and integer exponents	**Exponents** **Square roots** **Cube roots** **Exponent properties** **Negative exponents** **Scientific notation** **Orders of magnitude**

	Computing with scientific notation **Negative exponents** **Exponent properties** **Scientific notation intro** **Scientific notation word problems**
• **Quantities**	
– Reason quantitatively and use units to solve problems	**Intro to dimensional analysis** **Dimensional analysis for converting** **Dimensional analysis for proportional reasoning** **Word problems with multiple units** **Determining precision in descriptive modeling**
Subarea II: Algebra and Functions	
• **See Structure in Expressions**	
– Apply understanding of arithmetic to algebraic expressions	**Intro to variables** **Introduction to variables** **Substitution & evaluating expressions** **Substitution & evaluating expressions** **Expression value intuition** **Constructing numeric expressions** **Evaluating expressions word problems** **Introduction to sequences** **Introduction to arithmetic sequences** **Constructing arithmetic sequences** **Introduction to geometric sequences** **Constructing geometric sequences** **Modeling with sequences**
– Solve real-life and mathematical problems using numerical and algebraic expressions	**Writing algebraic expressions introduction** **Writing basic algebraic expressions word problems** **Writing algebraic expressions**

– Use properties of operations to generate equivalent expressions	**Combining like terms** **Distributive property** **Equivalent algebraic expressions** **Nested fractions** **Adding & subtracting polynomials** **Multiplying binomials** **Special products of binomials**
• **Reasoning with Equations and Inequalities**	
– Understand the connections between proportional relationships, lines, and linear equations	**Slope** **Slope-intercept form intro** **Writing slope-intercept equations** **Interpreting linear functions and equations** **Comparing linear functions** **Constructing linear models for real-world relationships** **Linear models word problems** **Graphing proportional relationships**
– Understand solving equations as a process of reasoning and explain the reasoning	**Algebraic equations basics** **One-step equations intuition**
– Reason about and solve one-variable equations and inequalities	**One-step addition & subtraction equations** **One-step multiplication and division equations** **One-step equations** **One-step equation word problems** **Inequalities: Greater than and less than basics** **One-step inequalities**
– Solve equations and inequalities in one variable	**Two-step equations intro** **Multi-step equations** **Two-step inequalities** **Multi-step inequalities** **Solutions to two-variable linear equations** **Linear equations with unknown coefficients** **Compound inequalities**

– Analyze and solve linear equations and pairs of simultaneous linear equations	**Coordinate plane** **Solutions to two-variable linear equations** **x-intercepts and y-intercepts** **Systems of equations intro** **Graphical representation of systems of equations** **Elimination method for systems of equations** **Substitution method for systems of equations** **Solving any system of linear equations**
– Represent and solve equations and inequalities graphically	**Graphing two-variable inequalities** **Point-slope form** **Standard form**
• **Functions**	
– Interpreting Functions	**Introduction to functions** **Evaluating functions** **Inputs and outputs of a function** **Functions and equations** **Interpreting function notation** **Introduction to the domain and range of a function** **Determining the domain of a function**
– Building Functions	**Recognizing functions** **Intervals where a function is positive, negative, increasing, or decreasing** **Interpreting features of graphs**
Subarea III: Geometry	
• **Congruence**	
– Draw, construct, and describe geometrical figures and describe the relationships between them	**Lines, line segments, and rays** **Measuring segments**

	Parallel and perpendicular **Points, lines, & planes** **Geometric definitions** **The golden ratio** **Properties of shapes** **Classifying geometric shapes** **Triangle types** **Triangle inequality theorem** **Quadrilateral types**
– Experiment with transformations in the plane	**Coordinate plane** **Triangle similarity intro** **Solving similar triangles** **Coordinate plane: quadrant 1** **Coordinate plane: 4 quadrants** **Quadrants on the coordinate plane** **Reflecting points on coordinate plane** **Quadrilaterals on the coordinate plane** **Drawing polygons in the coordinate plane** **Introduction to rigid transformations** **Translations** **Rotations** **Reflections** **Dilations or scaling around a point** **Sequences of transformations** **Properties and definitions of transformations** **Symmetry**
• **Similarity, Right Triangles, and Trigonometry**	
– Understand and apply the Pythagorean theorem	**Pythagorean theorem** **The Pythagorean theorem**
• **Circles**	

– Understand and apply theorems about circles	**Circumference and area of circles** **Area and circumference of circles** **Circle basics** **Arc measure** **Arc length (degrees)** **Sectors**
• **Geometric Measurement and Dimension**	
– Solve real-life and mathematical problems involving angle measure, area, surface area, and volume	**Angle introduction** **Measuring angles** **Constructing angles** **Angles in circles** **Angle types** **Vertical, complementary, and supplementary angles** **Angles between intersecting lines** **Triangle angles** **Angles with polygons** **Area of triangles** **Area of rectangles** **Count unit squares to find area** **Area of rectangles** **Area of parallelograms** **Area of triangles** **Perimeter** **Perimeter** **Volume of a rectangular prism** **Volume of rectangular prisms** **Volume with fractions**

	Surface area
– Explain volume formulas and use them to solve problems	**Area of shapes on grids** **Area of trapezoids & composite figures** **Volume of cones, cylinders, and spheres** **Cross sections of 3D objects**
• **Modeling with Geometry**	
– Apply geometric concepts in modeling situations	**Surface and volume density**
Subarea IV: Statistics and Probability	
• **Basic Statistics and Probability**	
– Develop understanding of statistical variability	**Representing data** **Stem and leaf plots** **Picture graphs, bar graphs, and histograms** **Frequency tables and dot plots** **Statistics overview** **Categorical data displays** **Population variance and standard deviation**
– Summarize and describe distributions	**Comparing features of distributions** **Mean and median: The basics** **More on mean and median**
– Use random sampling to draw inferences about a population	**Sampling and surveys** **Samples and surveys**

– Investigate chance processes and develop, use, and evaluate probability models	**Basic theoretical probability** **Probability using sample spaces**
– Investigate patterns of association in bivariate data	**Two-way tables for categorical data** **Dot plots and frequency tables** **Scatterplots and correlation** **Introduction to scatter plots** **Interpreting scatter plots** **Estimating lines of best fit** **Two-way tables**
• **Interpret Categorical and Quantitative Data**	
– Summarize, represent, and interpret data on a single count or measurement variable	**Histograms** **Stem-and-leaf plots** **Line graphs**
– Interpret linear models	**Correlation and causality**
• **Make Inferences and Justify Conclusions**	
– Understand and evaluate random processes underlying statistical experiments	**Population variance and standard deviation**
• **Use Probability to Make Decisions**	
– Use probability to evaluate outcomes of decisions	**Experimental probability** **Count outcomes using tree diagram**