Georgia Assessments for the Certification of Educators®

GACE® Study Companion

Middle Grades Mathematics Assessment

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About the Assessment

Assessment Name	Middle Grades Mathematics
Grade Level	4–8
Test Code	013
Testing Time	2 hours 15 minutes
Test Duration	2 hours 45 minutes
Test Format	Computer delivered
Number of Selected-response Questions	50
Question Format	The test consists of a variety of short-answer questions such as selected-response questions, where you select one answer choice or multiple answer choices (depending on what the question asks for), questions where you enter your answer in a text box, and other types of questions. You can review the possible question types in the ***Guide to Taking a GACE Computer-delivered Test***.
Number of Constructed-response Questions	0

The GACE Middle Grades Mathematics assessment is designed to measure the professional knowledge of prospective teachers of middle school Mathematics in the state of Georgia.

The testing time is the amount of time you will have to answer the questions on the test. Test duration includes time for tutorials and directional screens that may be included in the test.

The questions in this assessment assess both basic knowledge across content areas and the ability to apply principles.

The total number of questions that are scored is typically smaller than the total number of questions on the test. Most tests that contain selected-response questions also include embedded pretest questions, which are not used in calculating your score. By including pretest questions in the assessment, ETS is able to analyze actual test-taker performance on proposed new questions and determine whether they should be included in future versions of the test.

Content Specifications

This assessment is organized into content **subareas**. Each subarea is further defined by a set of **objectives** and their **knowledge statements**.

- The objectives broadly define what an entry-level educator in this field in Georgia public schools should know and be able to do.
- The knowledge statements describe in greater detail the knowledge and skills eligible for testing.
- Some tests also include content material at the evidence level. This content serves as descriptors of what each knowledge statement encompasses.

See a breakdown of the subareas and objectives for this assessment on the following pages.

Test Subareas

Subarea	Approx. Percentage of Test
I. Arithmetic and Algebra	65%
II. Geometry and Data	35%

Test Objectives

Subarea I: Arithmetic and Algebra

Objective 1: Understands and applies knowledge of numbers and operations

The beginning Middle Grades Mathematics teacher:

A. Understands operations and properties of the real number system
   - Solves problems using addition, subtraction, multiplication, and division of real numbers
   - Describes the effect that an operation has on a given number; e.g., adding a negative, dividing by a fraction
   - Applies the order of operations
   - Identifies or applies properties of operations on a number system; e.g., commutative, associative, distributive, identity
   - Compares, classifies, and orders real numbers
   - Performs operations involving exponents, including negative exponents
   - Simplifies and approximates radicals
   - Uses scientific notation to represent and compare numbers

B. Understands the relationships among fractions, decimals, and percents
   - Finds equivalent fractions
   - Converts among fractions, decimals, and percents
   - Represents fractions, decimals, and percents with various models

C. Understands how to use ratios and proportional relationships to solve problems
   - Uses ratio language and notation to describe a relationship between two quantities
   - Recognizes and represents proportional relationships between two quantities
   - Uses proportional relationships to solve problems; e.g., rates, scale factors
   - Solves percent problems; e.g., discounts, taxes, tips, simple interest rates

D. Understands how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems
   - Applies characteristics of prime and composite numbers
   - Applies characteristics of odd or even numbers
   - Solves problems involving factors, multiples, and divisibility

E. Knows how to use estimation strategies to determine the reasonableness of results
   - Recognizes the reasonableness of results within the context of a given problem
   - Tests the reasonableness of results using estimation
   - Recognizes appropriate uses of estimation and rounding
   - Estimates absolute and relative error in numerical answers to problems

Objective 2: Understands and applies knowledge of algebra and its processes

The beginning Middle Grades Mathematics teacher:

A. Understands how to evaluate and manipulate algebraic expressions, equations, and formulas
   - Performs arithmetic operations on polynomials
   - Manipulates and performs arithmetic operations on rational expressions
   - Evaluates, manipulates, and compares algebraic expressions involving radicals and exponents, including negative exponents
   - Uses variables to construct and solve equations in real-world contexts
   - Translates verbal relationships into algebraic equations or expressions

B. Understands how to recognize and represent linear relationships algebraically
   - Determines the equation of a line
   - Recognizes and uses the basic forms of linear equations
   - Converts among various forms of linear equations; e.g., slope-intercept, point-slope, standard

C. Understands how to solve equations and inequalities
   - Solves one-variable linear equations and inequalities
   - Solves one-variable nonlinear equations and inequalities; e.g., absolute value, quadratic
   - Represents solutions to inequalities on the number line
   - Represents and solves systems of linear equations and inequalities with two variables

D. Understands how to recognize and represent simple sequences or patterns; e.g., arithmetic, geometric

- Evaluates, extends, or algebraically represents rules involving number patterns
- Describes or extends patterns involving shapes or figures
- Forms rules based on given patterns
- Identifies patterns based on given rules

Objective 3: Understands and applies knowledge of functions and their graphs

The beginning Middle Grades Mathematics teacher:

A. Understands how to identify, define, and evaluate functions

- Determines whether a relation is a function
- Evaluates functions for given values; i.e., algebraically, graphically, tabular
- Recognizes that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers

B. Knows how to determine and interpret the domain and the range of functions represented numerically, graphically, or algebraically

- Determines the domain and range of a given table of values
- Determines the domain and range from a given graph of a function
- Determines the domain and range of a given function that is represented algebraically
- Interprets domain and range in real-world settings

C. Understands basic characteristics of linear functions; e.g., slope, intercepts

- Determines the slope of a given linear function
- Interprets slope as a constant rate of change
- Determines the x- and y-intercepts of a given linear function
- Interprets the x- and y-intercepts of a given linear function

D. Understands the relationships among functions, tables, and graphs

- Determines an equation to best represent a given linear graph
- Sketches a graph, given an equation of a linear function
- Sketches graphs showing key features, given a verbal description of the relationship
- Writes a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function
- Compares properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions

E. Knows how to analyze and represent functions that model given information
    - Develops a model (e.g., graph, equation, table) of a given set of conditions
    - Evaluates whether a particular mathematical model (e.g., graph, equation, table) can be used to describe a given set of conditions
    - Interprets a particular mathematical model; e.g., graph, equation, table

Subarea II: Geometry and Data

Objective 1: Understands and applies knowledge of geometry and measurement

The beginning Middle Grades Mathematics teacher:

A. Understands how to solve problems involving perimeter and area of plane figures
    - Calculates and interprets perimeter and area of plane figures that can be composed of triangles and quadrilaterals
    - Calculates changes in perimeter and area as the dimensions of plane figures change

B. Knows how to solve problems involving surface area and volume of solids
    - Calculates and interprets surface area and volume of solids; e.g., prisms, pyramids, cylinders, spheres
    - Calculates changes in surface area and volume as the dimensions of a solid change
    - Uses two-dimensional representations of three-dimensional objects to visualize and solve problems

C. Understands the concepts of similarity and congruence
    - Determines whether two figures are similar or congruent
    - Uses similarity and congruence to solve problems with two-dimensional and three-dimensional figures
    - Uses congruence and similarity criteria for triangles to prove relationships in geometric figures

D. Knows the properties of lines (e.g., parallel, perpendicular, intersecting) and angles
    - Solves problems involving parallel, perpendicular, intersecting, and skew lines
    - Applies angle relationships (e.g., supplementary, vertical, alternate interior) to solve problems

E. Understands properties of triangles
    - Solves problems involving sides (e.g., Pythagorean theorem) and angles
    - Recognizes characteristics of special triangles; e.g., isosceles, right, 30-60-90
    - Solves problems that involve medians, midpoints, and altitudes

F. Knows properties of quadrilaterals (e.g., rectangle, rhombus, trapezoid) and other polygons

- Identifies geometric properties of various quadrilaterals and the relationships among them; e.g., parallelogram, trapezoid
- Identifies relationships among quadrilaterals
- Solves problems involving sides, angles, or diagonals of polygons
- Identifies the lines of symmetry in a polygon

G. Understands properties of circles

- Solves problems involving circumference and area of a circle
- Solves problems involving diameter and radius of a circle
- Solves basic problems involving central angles, arcs, chords, and sectors

H. Knows how to interpret geometric relationships in the *xy*-plane; e.g., transformations, distance, midpoint

- Identifies the characteristics of ordered pairs located in quadrants and on the axes of the coordinate plane
- Uses coordinate geometry to represent and identify the properties of geometric shapes; e.g., Pythagorean theorem, area of a rectangle
- Determines the distance between two points
- Determines the midpoint of the segment joining two points
- Interprets and solves problems involving transformations; i.e., translations, reflections, rotations, dilations
- Proves the slope criteria for parallel and perpendicular lines and uses them to solve geometric problems
- Uses coordinates to compute perimeters of polygons and areas of triangles and rectangles

I. Understands systems of measurement; e.g., metric, customary

- Solves measurement and estimation problems involving time, length, volume, and mass in standard measurement systems
- Converts units within the United States customary system or the metric system
- Converts units between the United States customary and metric systems
- Uses appropriate units of measurement in a given context

J. Knows how geometric constructions are made

- Identifies formal geometric constructions made with a variety of tools and methods; e.g., copying a segment, bisecting an angle, constructing parallel and perpendicular lines

Objective 2: Understands and applies knowledge of probability, statistics, and discrete mathematics

The beginning Middle Grades Mathematics teacher:

A. Understands how to interpret, analyze, and represent data presented in a variety of displays

- Analyzes and interprets various displays of data; e.g., box plots, histograms, scatterplots, stem-and-leaf plots, two-way tables
- Draws conclusions based on data; e.g., misleading representation of data, line of best fit, interpolation, association
- Chooses appropriate graphs based on data; e.g., represents data accurately, chooses correct types of graphs

B. Understands concepts associated with measures of central tendency and dispersion (spread)

- Solves for the mean and weighted average of given sets of data
- Determines and interprets mean, median, and mode in a variety of problems
- Determines and interprets common features of sets of data; e.g., range and outliers
- Chooses appropriate measures of central tendency to represent given sets of data and justify the measures used
- Identifies correct statements regarding a given numerical data set
- Uses data to draw comparative inferences about two populations
- Distinguishes between random and biased sampling

C. Understands statistical processes and how to evaluate them

- Understands statistics as a process for making inferences about population parameters based on a random sample from that population
- Decides if a specified model is consistent with results from a given data-generating process; e.g., using simulation

D. Understands how to make inferences and justify conclusions from sample surveys, experiments, and observational studies

- Recognizes the purposes of and differences among sample surveys, experiments, and observational studies, and explains how randomization relates to each
- Uses data from a sample survey to estimate a population mean or proportion
- Develops a margin of error through the use of simulation models for random sampling
- Uses data from a randomized experiment to compare two treatments
- Uses simulations to decide if differences between parameters are significant
- Evaluates reports based on data

E. Knows how to develop, use, and evaluate probability models

   - Uses counting techniques (e.g., the counting principle, permutations, combinations) to answer questions involving a finite sample space
   - Solves probability problems involving independent and dependent events
   - Finds the conditional probability of *A* given *B*, and interprets the answer in terms of the model

F. Is familiar with how to use visual representations to model and solve problems

   - Uses and interprets simple diagrams (e.g., Venn diagrams, flowcharts) to solve problems

Practice Questions

The practice questions in this study companion are designed to familiarize you with the types of questions you may see on the assessment. While they illustrate some of the formats and types of questions you will see on the test, your performance on these sample questions should not be viewed as a predictor of your performance on the actual test. Fundamentally, the most important component in ensuring your success is familiarity with the content that is covered on the assessment.

To respond to a practice question, choose one of the answer options listed. Be sure to read the directions carefully to ensure that you know what is required for each question. You may find it helpful to time yourself to simulate actual testing conditions. A correct answer and a rationale for each sample test question are in the section following the practice questions.

Keep in mind that the test you take at an actual administration will have different questions, although the proportion of questions in each subarea will be approximately the same. You should not expect the percentage of questions you answer correctly in these practice questions to be exactly the same as when you take the test at an actual administration, since numerous factors affect a person's performance in any given testing situation.

Directions: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case.

1. Which of the following defines y as a function of x ?

   A. $x - y^2 = 4$
   B. $x^2 + y^2 = 4$
   C. $y = x^2 + 2$
   D. $y < x + 1$

Answer and Rationale

2. The original price of a certain car was 25 percent greater than its cost to the dealer. The actual selling price was 25 percent less than the original price. If c is the cost of the car and p is the selling price, which of the following represents p in terms of c ?

   A. $p = 1.00c$
   B. $p = 1.25c$
   C. $p = 0.25(0.75c)$
   D. $p = 0.75(1.25c)$

Answer and Rationale

x	y
-4	-2
-3	$-\frac{3}{2}$
-2	-1
-1	$-\frac{1}{2}$
0	0

3. Which of the following is true about the data in the table above?

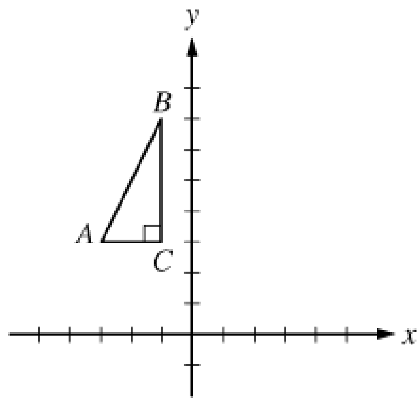
   A. As x decreases, y increases.
   B. As x increases, y does not change.
   C. As x increases, y decreases.
   D. As x increases, y increases.

Answer and Rationale

4. The average number of passengers who use a certain airport each year is 350 thousand. A newspaper mistakenly reported the number as 350 million. The number reported in the newspaper was how many times the actual number?

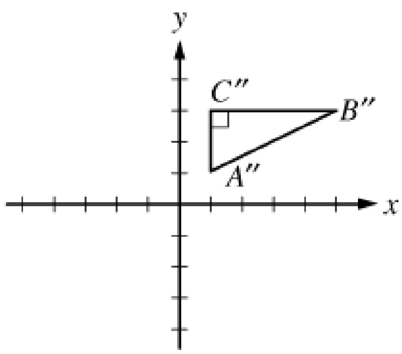
   A. 10
   B. 100
   C. 1,000
   D. 10,000

Answer and Rationale

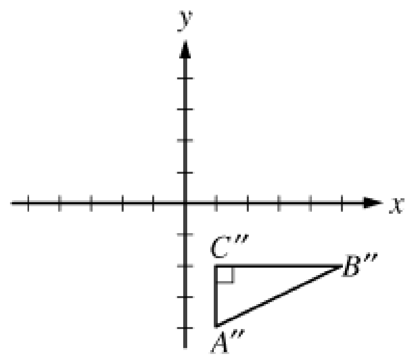


5. Which of the following figures results if right triangle *ABC*, shown in the *xy*-plane above, is flipped (reflected) across the *y*-axis to form triangle *A′B′C′*, and then turned (rotated) clockwise about point *C′* by 90 degrees?

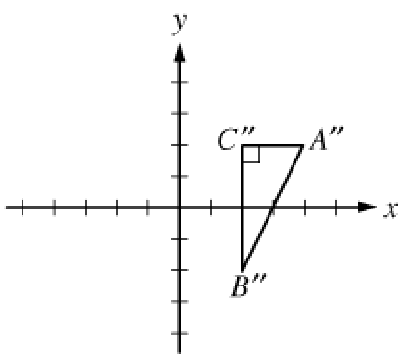
A.



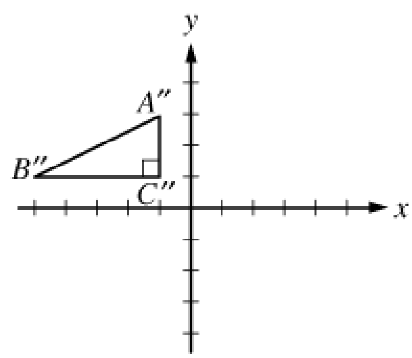
B.



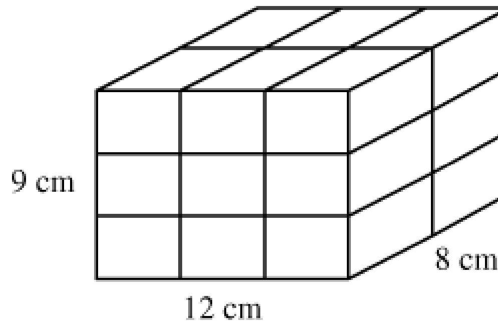
C.



D.



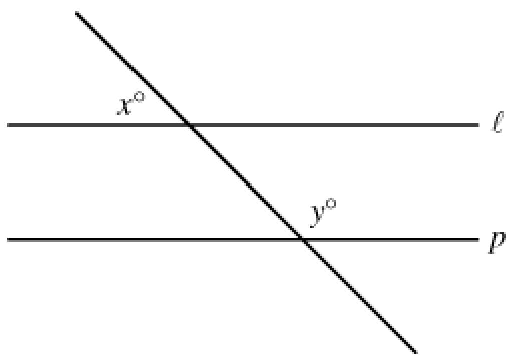
Answer and Rationale



6. The large rectangular block shown above was made by stacking smaller blocks, all of which are the same size. What are the dimensions, in centimeters, of each of the smaller blocks?

A. $3 \times 2 \times 3$
B. $3 \times 3 \times 3$
C. $3 \times 4 \times 3$
D. $4 \times 4 \times 3$

Answer and Rationale



7. In the figure above, line ℓ and line p are parallel and $y = 3x$. What is the value of x ?

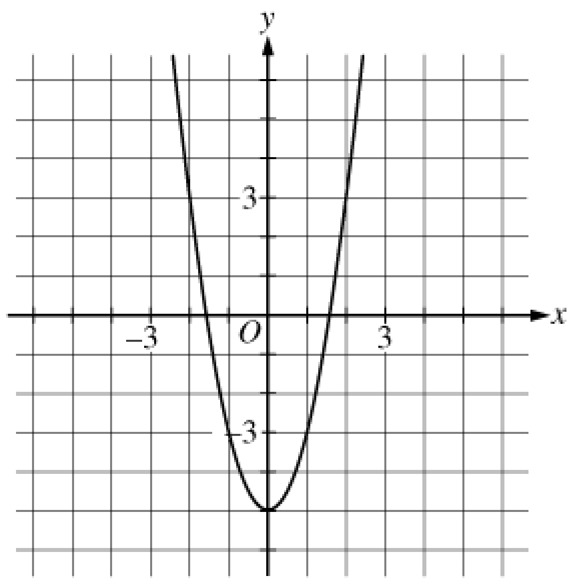
A. 30
B. 45
C. 60
D. 75

Answer and Rationale

8. Ernesto bought 2 sport coats for \$88.95 each. One of the coats needed alterations that cost \$15.50. If a 6% sales tax is applied to the cost of the coats but not to the alterations, which of the following is closest to the total cost to Ernesto for the sport coats and the alterations?

   A. \$190
   B. \$200
   C. \$205
   D. \$215

Answer and Rationale



9. The figure shows the graph of a quadratic equation in the *xy*-plane. Which of the following is an equation of the graph?

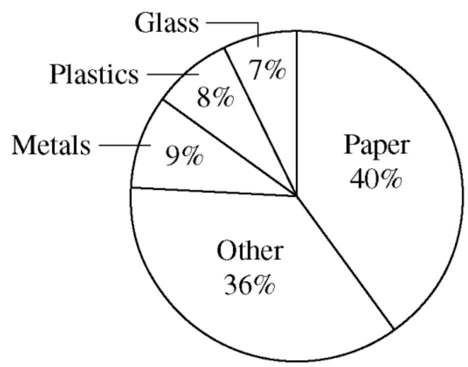
   A. $y = x^2 - 5$
   B. $y = x^2 + 5$
   C. $y = 2x^2 - 5$
   D. $y = 2x^2 + 5$

Answer and Rationale

10. In a class of 29 students, 20 students have dogs and 15 students have cats. How many of the students have both a dog and a cat?

A. None of the students necessarily have both.
B. Exactly 5 students have both.
C. Exactly 6 students have both.
D. At least 6 students and at most 15 students have both.

Answer and Rationale



11. The graph above shows the distribution of the contents, by weight, of a county's trash. If approximately 60 tons of the trash consists of paper, approximately how many tons of the trash consist of plastics?

A. 24
B. 20
C. 15
D. 12

Answer and Rationale

12. On a map, $\frac{1}{2}$ inch corresponds to an actual distance of 5 miles. If a rectangular region on the map measures $1\frac{1}{2}$ inches by 4 inches, how many square miles of actual area does the region represent?

A. 450 square miles
B. 500 square miles
C. 550 square miles
D. 600 square miles

Answer and Rationale

13. If a student takes a test consisting of 20 true-false questions and randomly guesses at all of the answers, what is the probability that all 20 guesses will be correct?

A. 0
B. $\left(\frac{1}{2}\right)^{20}$
C. $\frac{1}{2(20)}$
D. $\frac{1}{2}$

Answer and Rationale

14. 88, 86, 98, 92, 90, 86

In an ordered set of numbers, the median is the middle number if there is a middle number; otherwise, the median is the average of the two middle numbers. If Robin had the test scores given above, what was her median score?

A. 89
B. 90
C. 92
D. 95

Answer and Rationale

15. If there are exactly five times as many children as adults at a show, which of the following CANNOT be the number of people at the show?

A. 102
B. 80
C. 36
D. 30

Answer and Rationale

Answer Key and Rationales

Question Number	Correct Answer	Rationale
1	C	**Option C is correct.** This question asks you to identify a function by applying your understanding of functions to different mathematical statements. In questions such as this that ask "which of the following," you should consider only the answer choices given. There may be other correct answers to the question, as in this case, but you are not asked to consider those. To answer this question, you should recall that if y is a function of x, then each value of x (in the domain of the function) results in only one value of y. In options A and B, most values of x have two different corresponding values of y. You can see this by solving the equations in options A and B for y. In option A, $y = +\sqrt{4-x}$ or $y = -\sqrt{4-x}$. Similarly, in option B, $y = \pm\sqrt{4-x^2}$. So neither option A nor B defines y as a function of x. In option D, for each value of x there is more than one value of y that satisfies the inequality. So option D does not define y as a function of x. However, in option C, for each value of x there is only one value of y that corresponds to that value of x. Thus, the correct answer is option C. ***Back to Question***

Question Number	Correct Answer	Rationale
2	D	**Option D is correct.** This question asks you to apply your knowledge of percent increase or decrease to determine a selling price based on the cost of a car to the dealer, c. Since the original price of the car was 25 percent greater than the cost to the dealer, the original price was $c + 0.25c = 1.25c$. Since the selling price was 25 percent less than this amount, only 75 percent of this amount will be paid, so the selling price of the car was $(1.25c)(0.75)$. Thus, the correct answer is option D. ***Back to Question***
3	D	**Option D is correct.** As x moves from –4 to 0 (i.e., from left to right on the number line), its value increases. Similarly, the value of y increases from –2 to 0. Thus, it can be seen that as x increases, y increases. ***Back to Question***

Question Number	Correct Answer	Rationale
4	C	**Option C is correct.** The number of passengers who use the airport each year, 350 thousand, can be written as 350,000; 350 million can be written as 350,000,000. $350{,}000{,}000 \div 350{,}000 = 1{,}000$, so the correct answer is option C. ***Back to Question***
5	A	**Option A is correct.** When triangle *ABC* is reflected across the *y*-axis, the figure formed is located in quadrant I and is the mirror image of the given figure. Rotating the triangle 90 degrees clockwise about vertex C' yields option A. ***Back to Question***
6	D	**Option D is correct.** The length of the large block, 12 centimeters, is 3 times the length of a small block, so each small block is $12 \div 3 = 4$ centimeters long. Similarly, the width of a small block is $8 \div 2 = 4$ centimeters, and the height of a small block is $9 \div 3 = 3$ centimeters. ***Back to Question***

Question Number	Correct Answer	Rationale
7	B	**Option B is correct**. This question asks you to apply your understanding of angles in a plane and, in particular, properties of angles associated with parallel and transversal lines. You should be able to show, using pairs of alternate interior angles and corresponding angles, that the angle with measure x degrees and the angle with measure y degrees are supplementary angles. Recall that the sum of the measures of supplementary angles is 180°. That is, $x + y = 180$. It is given that $y = 3x$. Substituting for y, you get $4x = 180$. Hence, $x = 45$. Therefore, the correct answer is option B. ***Back to Question***
8	C	**Option C is correct.** Based on the information in the question, calculate the total cost: (\$88.95)(2)(1.06) + \$15.50 = \$204.07. Option C is the option that is closest to the total cost. ***Back to Question***

Question Number	Correct Answer	Rationale
9	C	**Option C is correct.** Since the graph of the equation intersects the y-axis at the point $(0,-5)$, the constant term in the equation must be -5. One method to determine the coefficient of the x^2 term is to substitute the coordinates from another point on the graph into the equation $y = ax^2 - 5$ and solve for a. Then, using the point $(2,3)$, it can be determined that $3 = a(2^2) - 5$, so $4a - 5 = 3$. To solve this equation for a, add 5 to both sides of the equation, and then divide both sides of the equation by 4, which leads to the answer $a = 2$, which means that the equation of the graph is $y = 2x^2 - 5$. ***Back to Question***
10	D	**Option D is correct.** Since the 29 students have a total of 35 dogs and cats, at least 6 must have both a dog and a cat. If there are exactly 6 students with both a dog and a cat, then 14 students have only a dog and 9 students have only a cat. On the other hand, all 15 cat owners could also have a dog; then 5 students have only a dog and 9 students have neither a dog nor a cat. ***Back to Question***

Question Number	Correct Answer	Rationale
11	D	**Option D is correct.** The circle graph shows the distribution of the trash contents *in percents*; the question asks for the *weight* of the plastics contents in tons. From the graph we see that plastics account for 8% of the total weight of the trash. The problem states that 60 tons of the trash consists of paper; the graph shows that this amount equals 40% of the total, so $$60 = 0.4 \times (\text{total weight})$$ and the total weight is $\frac{60}{0.4} = 150$ tons. The weight of plastics equals 8% of 150 tons, or (0.08)(150) = 12 tons. There is another, slightly faster, way to solve this problem. Use the fact that the ratio of plastics to paper in the trash is the same, whether the two amounts are given as percents or in tons. This gives the proportion $$\frac{\text{tons of plastics}}{\text{tons of paper}} = \frac{8\%}{40\%} = \frac{1}{5}$$ or $$\frac{\text{tons of plastics}}{60} = \frac{1}{5}$$ $$\text{tons of plastics} = \frac{60}{5} = 12.$$ ***Back to Question***

Question Number	Correct Answer	Rationale
12	D	**Option D is correct.** It is given that $\frac{1}{2}$ inch on the map corresponds to an actual distance of 5 miles, so 1 inch on the map represents an actual distance of 10 miles. Thus, $1\frac{1}{2}$ inches on the map represents an actual distance of $1\frac{1}{2} \times 10 = 15$ miles, and 4 inches on the map represents an actual distance of $4 \times 10 = 40$ miles. Thus, a rectangular region on the map measuring $1\frac{1}{2}$ inches by 4 inches represents an actual rectangular region measuring 15 miles by 40 miles. To find the actual area, in square miles, multiply the two dimensions, 15 miles and 40 miles. The actual area is 600 square miles. ***Back to Question***
13	B	**Option B is correct.** The probability that the student guesses any one answer correctly is $\frac{1}{2}$, and since the student is randomly guessing, the guesses are independent events. Thus, the probability of guessing all 20 answers correctly is $\left(\frac{1}{2}\right)^{20}$. ***Back to Question***

Question Number	Correct Answer	Rationale
14	A	**Option A is correct.** The problem gives a set of test scores and the definition of the median. The first part of the definition tells you to order the scores — that is, to arrange them in order from smallest to largest. Here are the numbers ordered from smallest to largest: 86, 86, 88, 90, 92, 98. Because there are an even number of scores (6), there are two middle numbers in the set, 88 and 90, and the average of the two middle numbers is $\frac{88+90}{2}=\frac{178}{2}=89$. Thus, the median of Robin's scores is 89. (Notice that the median of a set of numbers need not be one of the numbers in the set.) ***Back to Question***
15	B	**Option B is correct.** If a represents the number of adults, then $5a$ represents the number of children and $6a$ represents the total number of people at the show. Since $6a$ represents a whole number that is a multiple of 6, there cannot be 80 people at the show, because 80 is not a multiple of 6. ***Back to Question***

Preparation Resources

The resources listed below may help you prepare for the GACE assessment in this field. These preparation resources have been identified by content experts in the field to provide up-to-date information that relates to the field in general. You may wish to use current issues or editions of these materials to obtain information on specific topics for study and review.

Calculator Use

An on-screen calculator is part of the testing software for this assessment.
A free tutorial is available so you can practice using the calculator prior to taking the assessment. Access the tutorial in Test Preparation section of the GACE website at ***www.gace.ets.org/prepare/tutorials/calculator***.

Guide to Taking a GACE Computer-delivered Assessment

This guide explains how to navigate through a GACE assessment and how to answer different types of test questions. This free download is available in the Test Preparation Resources section of the GACE website at ***www.gace.ets.org/prepare***.

Reducing Test Anxiety

This guide provides practical help for people who suffer from test anxiety. Designed specifically for GACE test takers, but useful to anyone who has to take tests, this guide reviews the major causes of test anxiety and offers practical advice for how to counter each one. Download this guide for free from the Test Preparation Resources section of the GACE website at ***www.gace.ets.org/prepare***.

Study Tips: Preparing for a GACE Assessment

This document contains useful information on preparing for selected-response and constructed-response tests. The instruction, tips, and suggestions can help you become a better-prepared test taker. See the Test Preparation Resources section of the GACE website at ***www.gace.ets.org/prepare*** for this free download.

Journals

Mathematics Teacher, National Council of Teachers of Mathematics

Mathematics Teaching in the Middle School, National Council of Teachers of Mathematics

Middle Ground, National Middle School Association

Middle School Journal, National Middle School Association

Other Resources

Ball, D. L. (1992). “Magical Hopes: Manipulatives and the Reform of Math Education.” *American Educator*; v16 n2, 14–18, 46–47.

Bittenger, M. L., and Ellenbogen, D. (1997). *Elementary Algebra: Concepts and Applications,* Fifth Edition. Menlo Park, Calif.: Addison-Welsey.

Brahier, D. J. (1999). *Teaching Secondary and Middle School Mathematics*. Needham Heights, Mass.: Allyn and Bacon.

Burns, M. (2000). *About Teaching Mathematics: A K–8 Resource,* Second Edition. Sausalito, Calif: Math Solutions Publications.

Chapin, S. H., et al. (1999). *Middle Grades Math: Tools for Success. Course 3*. Needham, Mass.: Prentice Hall.

Coxford, A., Usiskin, Z., and Hirschhorn, D. (1998). *The University of Chicago School of Mathematics Project: Geometry.* Glenview, Ill.: Scott, Foresman and Company.

Crouse, R. J., and Sloyer, C. W. (1987). *Mathematical Questions from the Classroom — Parts I and II.* Providence, R.I.: Janson Publications.

Danielson, C. (1997). *A Collection of Performance Tasks and Rubrics: Middle School Mathematics*. Larchmont, N.Y.: Eye On Education, Inc.

Demana, F., Waits, B. K., Clemens, S. R., and Foley, G. D. (1997). *Precalculus: A Graphing Approach,* Fourth Edition. Menlo Park, Calif.: Addison-Wesley.

Foerster, P. A. (1998). *Calculus Concepts and Applications*. Berkeley, Calif.: Key Curriculum Press.

Garcia, J., Spaulding, E., and Powell, E. R. (2001). *Contexts of Teaching: Methods for Middle and High School Instruction* (1st ed.). Upper Saddle River, NJ: Prentice Hall.

Gottlieb, R. J. (2001). *Calculus: An Integrated Approach to Functions and Their Rates of Change,* Preliminary Edition. Boston, Mass.: Addison Wesley Longman, Inc.

Harshbarger, R. J., and Reynolds, J. J. (1992). *Mathematical Applications for the Management, Life, and Social Sciences,* Fourth Edition. Lexington, Mass.: D. C. Heath and Company.

Hungerford, T. W. (2001). *Contemporary College Algebra and Trigonometry: A Graphing Approach*. Philadelphia, Pa.: Harcourt College Publishers.

Jackson, A. W., and Davis, G. A. (2000). *Turning Points 2000: Educating Adolescents in the 21st Century*. New York, N.Y.: Carnegie Corporation of New York.

Jaworski, B., and Watson, A. (1994). *Mentoring in Mathematics Teaching*. London: The Felma Press.

Kilpatrick, J., Swafford, J., and Finell, B. (Eds.). (2001). *Adding It Up: Helping Children Learn Mathematics.* Washington, District of Columbia: National Academy Press.

Knowles, T., and Brown, D. F. (2000). *What Every Middle School Teacher Should Know*. Westerville, Ohio: National Middle School Association.

Leitzel, J. R. C. (1991). *A Call for Change: Recommendations for the Mathematical Preparation of Teachers of Mathematics*. Washington, District of Columbia: Mathematics Association of America.

Ma, L. (1999). *Knowing and Teaching Elementary Mathematics: Teachers' Understanding of Fundamental Mathematics in China and the United States.* Mahwah, N.J.: Lawrence Erlbaum.

Merenbloom, E. Y. (1991). *The Team Process: A Handbook for Teachers*. Columbus, Ohio: National Middle School Association.

Morrow, L. J., and Kenney, M. J. (Eds.). (1998). *The Teaching and Learning of Algorithms in School Mathematics.* Reston, Va.: The National Council of Teachers of Mathematics, Inc.

National Council of Teachers of Mathematics. (1995). *Assessment Standards for School Mathematics.* Reston, Va.: The National Council of Teachers of Mathematics, Inc.

National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics*. Reston, Va.: The National Council of Teachers of Mathematics, Inc.

Newmark, J. (1997). *Statistics and Probability in Modern Life,* Sixth Edition. Philadelphia, Pa.: Saunders College Publishing.

Ostebee, A., and Zorn, P. (1997). *Calculus from Graphical, Numerical, and Symbolic Points of View.* Philadelphia, Pa.: Harcourt College Publishers.

Peters, K. H., and March, J. K. (1999). *Collaborative Observation. Thousand Oaks*, Calif.: Corwin Press.

Schultze, J. E., Kennedy, P. A., et al. (2001). *Algebra 1*. Austin, Texas: Holt, Rinehart, and Winston.

Schultze, J. E., Ellis, W., Jr., et al. (2001). *Algebra 2*. Austin, Texas: Holt, Rinehart, and Winston.

Schultze, J. E., Hollowell, K. A., et al. (2001). *Geometry*. Austin, Texas: Holt, Rinehart, and Winston.

Serra, M. (1997). *Discovering Geometry: An Inductive Approach,* Second Edition. Emeryville, Calif.: Key Curriculum Press.

Stein, M., Silbert, J., and Carnine, D. (1997). *Designing Effective Mathematics Instruction: A Direct Instruction Approach.* Upper Saddle River, N.J.: Merrill Prentice Hall.

Swanson, T., Andersen, J., and Keeley, R. (2000). *Precalculus: A Study of Functions and Their Application*. Fort Worth, Texas: Harcourt College Publishers.

Swokowski, E. W., Olinick, M., and Pence, D. D. (1994). *Calculus of a Single Variable,* Second Edition. Stamford, Conn.: Brooks/Cole.

Triola, M. F. (2001). *Elementary Statistics,* Eighth Edition. Boston, Mass.: Addison Wesley Longman, Inc.

Wallace, E. C., and West, S. F. (1998). *Roads to Geometry,* Second Edition. Upper Saddle River, N.J.: Prentice Hall.

Williams, G. (2000). *Applied College Algebra: A Graphing Approach*. Philadelphia, Pa.: Harcourt College Publishers.

Wu, H. (1999). *Basic Skills Versus Conceptual Understanding: A Bogus Dichotomy in Mathematics Education*. American Educator; v23 n3, 14–19, 50–52.

Online Resources

Georgia Department of Education — ***www.doe.k12.ga.us***

National Council of Teachers of Mathematics — ***www.nctm.org***