



SECTION 4

TEST II SAMPLE QUESTIONS

This section of the Georgia Assessments for the Certification of Educators® (GACE™) Preparation Guide provides sample selected-response questions with an annotated answer key for you to review as part of your preparation for the test. The sample selected-response questions are designed to illustrate the nature of the test questions. Work through the questions carefully before referring to the annotated answer key, which follows the sample selected-response questions. The answer key provides the correct response to each question, describes why each correct response is the best answer, and lists the objective within the test framework to which each question is linked.

Please note that definitions and formulas are provided for this test. Please refer to these materials as needed in responding to the sample test questions and assignments. These materials are located in the Assessment Reference Materials section at the end of this preparation guide.

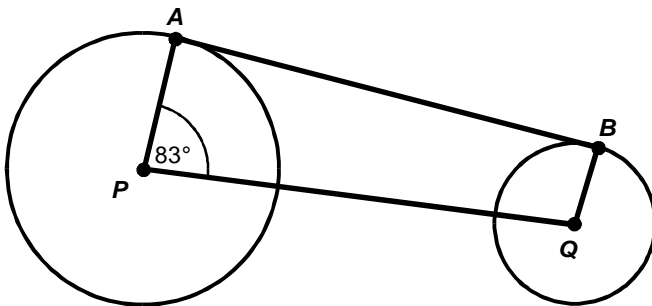
A graphing calculator may be used for this test as needed in responding to the sample test questions and assignments. Please refer to the current GACE registration bulletin for information about the use of calculators at the test administration.

QUESTIONS

- A spherical balloon is inflated to a given diameter. If the diameter is then tripled, what is the ratio of the new volume to the original volume?

 - $\frac{3}{1}$
 - $\frac{9}{1}$
 - $\frac{27}{1}$
 - $\frac{36}{1}$

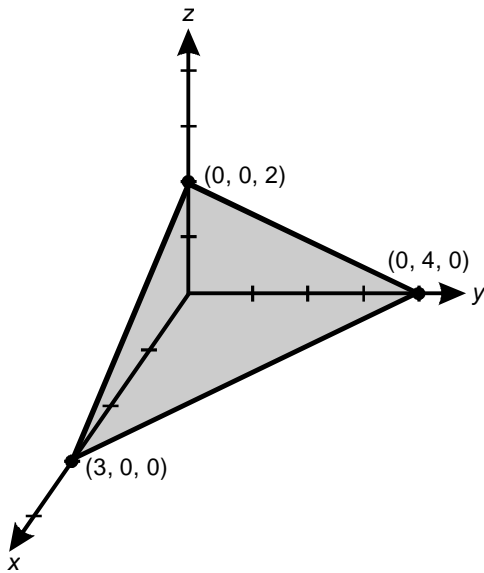
- Use the diagram below to answer the question that follows.



Line segment AB is tangent to circles with centers at P and Q as shown above. $\angle APQ$ measures 83° . Which of the following would be most useful for finding the measure of $\angle BQP$?

- the law of sines
- the properties of parallel lines
- the law of cosines
- the properties of similar triangles

3. Use the graph below to answer the question that follows.



Which of the following equations represents the plane graphed above?

- A. $3x + 4y + 2z = 0$
- B. $4x + 3y + 6z = 12$
- C. $3x + 4y + 2z = 1$
- D. $4x + 3y + 6z = 24$

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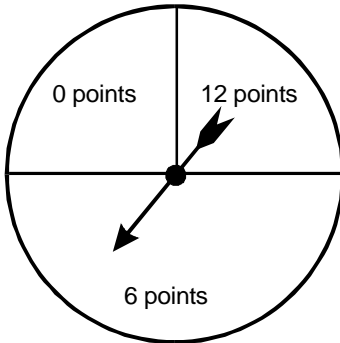
4. Use the table below to answer the question that follows.

Type of Book	Sales
Fiction	31%
Reference	22%
Self-help	44%
Poetry	2%
Other	1%

The table above shows the percentage of various types of books sold at a bookstore. Which of the following formats would be most appropriate for displaying these data?

- A. line plot
- B. tally chart
- C. circle graph
- D. box-and-whisker plot

5. Use the spinner below to answer the question that follows.



The spinner shown above is divided exactly into two quarters and one half. What is the expected value of the average number of points per spin, given a large number of spins?

- A. 6
- B. 7
- C. 8
- D. 9
6. A restaurant chain claims that their hamburgers' weights are approximately normally distributed with a mean of 6 ounces and a standard deviation of 0.48 ounces. A consumer research group weighs 100 random samples of 36 hamburgers each and records the mean hamburger weight for each sample. According to the central limit theorem, if the restaurant's claim is correct, what is the expected standard deviation of the recorded means?
- A. 0.013 ounces
- B. 0.048 ounces
- C. 0.08 ounces
- D. 0.48 ounces

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7. Which of the following types of mathematical representations would be most useful for a photocopying shop when organizing information about the quantities of paper in stock by color and size?
- A. frequency histogram
 - B. system of equations
 - C. circle graph
 - D. matrix
8. **Use the three numerical facts below to answer the question that follows.**

- 1. Any perfect number is equal to the sum of its proper divisors.
- 2. The number 6 is equal to the sum of its proper divisors.
- 3. The number 28 is a perfect number.

Which of the following is a valid conclusion based on the facts above?

- A. The number 6 is a perfect number.
- B. The number 6 is not a perfect number.
- C. The number 28 is equal to the sum of its proper divisors.
- D. The number 28 is not equal to the sum of its proper divisors.

ANNOTATED ANSWER KEY

For question	The correct response is	Reason	Test Objective
1	C	The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Substituting $r = \frac{d}{2}$, where d represents diameter, yields $V = \frac{4}{3}\pi\left(\frac{d}{2}\right)^3$. The ratio of the new volume to the original volume equals $\frac{\frac{4}{3}\pi\left(\frac{3d}{2}\right)^3}{\frac{4}{3}\pi\left(\frac{d}{2}\right)^3} = \frac{\left(\frac{3d}{2}\right)^3}{\left(\frac{d}{2}\right)^3} = \frac{27d^3}{8} \div \frac{d^3}{8} = \frac{27}{1}$. In general, the ratio of volumes is the cube of the ratio of the corresponding linear measurements.	0009
2	B	The tangent to a circle is perpendicular to the radius from the center of the circle to the point of tangency. Therefore, $\overline{PA} \perp \overline{AB}$ and $\overline{QB} \perp \overline{AB}$. Two lines perpendicular to a given line are parallel. Therefore, $\overline{PA} \parallel \overline{QB}$. If two parallel lines are cut by a transversal, then interior angles on the same side are supplementary. Thus, $m\angle BQP + m\angle APQ = 180^\circ$ and $m\angle BQP = 180^\circ - 83^\circ = 97^\circ$.	0010
3	B	The plane contains the line through the points (3, 0, 0) and (0, 4, 0). For $z = 0$, this line can be represented by the equation $4x + 3y = 12$. Similarly, for $y = 0$, the line through the points (3, 0, 0) and (0, 0, 2) can be represented by the equation $4x + 6z = 12$ and for $x = 0$, the line through the points (0, 0, 2) and (0, 4, 0) can be represented by the equation $3y + 6z = 12$. An equation of the form $ax + by + cz = d$, where a , b , c , and d are constants, represents a plane in a three-dimensional coordinate space. The equation $4x + 3y + 6z = 12$ simplifies to each of the three equations above as successive variables are set to zero. Hence, this is the equation of the plane that contains all three lines.	0011
4	C	A circle graph is used for showing the division of a total quantity into its component parts. The circle is divided into wedges with areas proportional to the percentages represented by the associated parts. In this case, the total quantity is the total amount of book sales, and each type of book is a component part with an associated percentage of sales.	0012

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For question	The correct response is	Reason	Test Objective
5	A	By the law of large numbers, out of a large number of spins, approximately $\frac{1}{4}$ are expected to score 0 points, approximately $\frac{1}{4}$ are expected to score 12 points, and approximately $\frac{1}{2}$ are expected to score 6 points. The expected average number of points per spin is approximately $\frac{1}{4}(0) + \frac{1}{4}(12) + \frac{1}{2}(6) = 6$ points per spin. This approximation becomes better as the total number of spins increases.	0013
6	C	According to the central limit theorem, if the population has mean μ and standard deviation σ , then the set of sample means, from samples of size n , will be approximately normally distributed with a mean equal to μ and a standard deviation equal to $\frac{\sigma}{\sqrt{n}}$. The theorem only applies if $n \geq 30$. In this case, $\mu = 6$, $\sigma = 0.48$, and $n = 36$. Therefore, the expected standard deviation of the recorded means is equal to $\frac{0.48}{\sqrt{36}} = 0.08$.	0014
7	D	A matrix is a two-dimensional grid. Each location in the grid has a value and is associated with a uniquely specified row and column. This makes matrices well suited for organizing information based on two parameters such as color and size. For example, if each row represents a different size and each column represents a different color, the values would represent the associated quantities of paper in stock.	0015
8	C	Statement 1 is equivalent to the statement, "If a number is a perfect number, then the number is equal to the sum of its proper divisors." According to statement 3, 28 is a perfect number. Therefore, by statement 1, the number 28 is equal to the sum of its proper divisors.	0016