

**Florida Teacher Certification Examinations
Test Information Guide
for
Mathematics 6–12**



FLORIDA DEPARTMENT OF EDUCATION
www.fdoe.org

Fifth Edition

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Test and Test Information Guide Development

Teacher Certification Testing

Since 1980, Florida teacher certification candidates have been required to pass the Florida Teacher Certification Examinations (FTCE), which has consisted of tests in reading, writing, mathematics, and professional knowledge. The 1986 Florida Legislature modified the testing program by also requiring teacher candidates to pass a test in the subject area in which they wish to be certified. In addition, the Legislature substituted the Florida College-Level Academic Skills Test (CLAST) for the reading, writing, and mathematics portions of the FTCE. The 2000 Florida Legislature replaced the CLAST with the General Knowledge Test, effective July 1, 2002.

The subject area knowledge tested on the Mathematics 6–12 examination was identified and validated by committees of content specialists from within the state of Florida. Committee members included public school teachers, district supervisors, and college faculty with expertise in this field. Committee members were selected on the basis of recommendations by district superintendents, public school principals, deans of education, experts in the field, and other organizations. In developing the test, the committees used an extensive literature review, interviews with selected public school teachers, a large-scale survey of teachers, pilot tests, and their own professional judgment.

Role of the Test Information Guide

The purpose of this test information guide is to help candidates taking the subject area test in Mathematics 6–12 prepare effectively for the examination. The guide was designed to familiarize prospective test takers with various aspects of the examination, including the content that is covered and the way it is represented. The guide should enable candidates to direct their study and to focus on relevant material for review.

This test information guide is intended primarily for use by certification candidates, who may be students in a college or university teacher-preparation program, teachers with provisional certification, teachers seeking certification in an additional subject area, or persons making a career change to public school teaching. Candidates may have studied and worked in Florida or may be from out of state.

College or university faculty may also use the guide to prepare students for certification, and inservice trainers may find the guide useful for helping previously certified teachers prepare for recertification or multiple certification.

This test information guide is not intended as an all-inclusive source of subject area knowledge, nor is it a substitute for college course work in the subject area. The sample questions are representative of the content of the actual test; however, they are not actual test questions from an actual test form. Instead, the guide is intended to help candidates prepare for the subject area test by presenting an overview of the content and format of the examination.

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Preparation for the Test

The following outline may help you to prepare for the examination. Adapt these suggestions to suit your own study habits and the time you have available for review.

Overview

- **Look over the organization of the test information guide.**

Section 1 discusses the development of the test and test information guide.

Section 2 (this section) outlines test preparation steps.

Section 3 offers strategies for taking the test.

Section 4 presents information about the content and structure of the test.

Section 5 lists question formats and includes sample test questions.

Section 6 provides an annotated bibliography of general references you may find useful in your review.

Section 7 identifies a source of further information.

Self-Assessment

- **Decide which content areas you should review.**

Section 4 includes the competencies and skills used to develop this subject area test and the approximate proportion of test questions from each competency area.

Review

- **Study according to your needs.**

Review all of the competencies and concentrate on areas with which you are least familiar.

Practice

- **Acquaint yourself with the format of the examination.**

Section 5 describes types of questions you may find on the examination.

- **Answer sample test questions.**

Section 5 gives you an opportunity to test yourself with sample test questions and provides an answer key and information regarding the competency to which each question is linked.

Final preparation

- **Review test-taking advice.**

Section 3 includes suggestions for improving your performance on the examination.

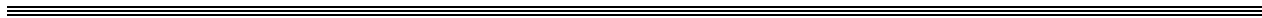
- **Refer to field-specific references.**

Section 6 includes an annotated bibliography listing general references keyed to the competencies and skills used to develop this subject area test.



Test-Taking Advice

- Go into the examination prepared, alert, and well rested.
- Complete your travel arrangements prior to the examination date. Plan to arrive early so that you can locate the parking facilities and examination room without rushing.
- Dress comfortably and bring a sweater or jacket in case the room is too cool.
- Take the following with you to the test site:
 - Admission ticket
 - Proper identification as described in "Identification Policy"
 - Watch
- There are many strategies for taking a test and different techniques for dealing with different types of questions. Nevertheless, you may find the following general suggestions useful.
 - Read each question and all the response options carefully before selecting your answer. Pay attention to all of the details.
 - Go through the entire test once and answer all the questions you are reasonably certain about. Then go back and tackle the questions that require more thought.
 - When you are not certain of the right answer, eliminate as many options as you can and choose the response that seems best. It is to your advantage to answer all the questions on the test, even if you are uncertain about some of your choices.
 - After completing the examination, go back and check every question. Verify that you have answered all of the questions and that your responses are correctly entered.



4

Competencies and Skills and Test Blueprint

The table on the following pages lists the competencies and skills used as the basis for the Mathematics 6–12 examination. These competencies and skills represent the knowledge that teams of teachers, subject area specialists, and district-level educators have determined to be important for beginning teachers. This table could serve as a checklist for assessing your familiarity with each of the areas covered by the test. The competencies and skills should help you organize your review. The test blueprint indicates the approximate percentage of test questions that will cover the specific competency on the exam.

Competencies are broad areas of content knowledge.

Skills identify specific behaviors that demonstrate the competencies.

Percentages indicate the approximate proportion of test questions that represent the competencies on the test.

The following excerpt illustrates the components of the table.

*Approximate percentage of total test questions
(test blueprint)*

<i>Competency</i>	Competency/Skill	Approx. %
	1 Knowledge of algebra	18%
	1 Identify graphs of linear inequalities on a number line.	
	2 Identify graphs of linear equations and inequalities in the coordinate plane.	
	3 Identify or interpret the slope and intercepts of a linear graph or a linear equation.	
	4 Determine the equation of a line, given the appropriate information such as two points, point-slope, slope-intercept, or its graph.	
	5 Solve problems involving the use of equations containing rational algebraic expressions.	
	6 Factor polynomials (e.g., the sum or difference of two cubes).	
	7 Rewrite radical and rational expressions into equivalent forms.	
	8 Perform the four basic operations on rational and radical expressions.	

Skills 1–8

Table of Competencies, Skills, and Approximate Percentages of Questions

Competency/Skill	Approx. %
1 Knowledge of algebra	18%
1 Identify graphs of linear inequalities on a number line.	
2 Identify graphs of linear equations and inequalities in the coordinate plane.	
3 Identify or interpret the slope and intercepts of a linear graph or a linear equation.	
4 Determine the equation of a line, given the appropriate information such as two points, point-slope, slope-intercept, or its graph.	
5 Solve problems involving the use of equations containing rational algebraic expressions.	
6 Factor polynomials (e.g., the sum or difference of two cubes).	
7 Rewrite radical and rational expressions into equivalent forms.	
8 Perform the four basic operations on rational and radical expressions.	
9 Solve equations containing radicals.	
10 Multiply or divide binomials containing radicals.	
11 Solve quadratic equations by factoring, graphing, completing the square, or using the quadratic formula, including complex solutions.	
12 Solve problems using quadratic equations.	
13 Use the discriminant to determine the nature of solutions of quadratic equations.	
14 Determine a quadratic equation from known roots.	
15 Identify the graphs of quadratic inequalities.	
16 Solve real-world problems using direct and inverse variations.	
17 Solve systems of linear equations or inequalities.	
18 Formulate or identify systems of linear equations or inequalities to solve real-world problems.	
19 Solve equations or inequalities involving absolute value.	
20 Expand given binomials to a specified positive integral power.	
21 Determine a specified term in the expansion of given binomials.	
22 Solve polynomial equations by factoring.	
23 Perform vector addition, subtraction, and scalar multiplication on the plane.	
24 Solve real-world problems involving ratio or proportion.	

Competency/Skill	Approx. %
<p>2 Knowledge of functions</p> <ol style="list-style-type: none"> 1 Interpret the language and notation of functions. 2 Determine which relations are functions, given mappings, sets of ordered pairs, rules, and graphs. 3 Identify the domain and range of a given function. 4 Identify the graph of special functions (i.e., absolute value, step, piecewise, identity, constant function). 5 Find specific values of a given function. 6 Estimate or find the zeros of a polynomial function. 7 Identify the sum, difference, product, and quotient of functions. 8 Determine the inverse of a given function. 9 Determine the composition of two functions. 10 Determine whether a function is symmetric, periodic, or even/odd. 11 Determine the graph of the image of a function under given transformations (i.e., translation, rotations through multiples of 90 degrees, dilations, and/or reflections over $y=x$ horizontal or vertical lines). 	<p>8%</p>
<p>3 Knowledge of geometry from a synthetic perspective</p> <ol style="list-style-type: none"> 1 Determine the change in the area or volume of a figure when its dimensions are altered. 2 Estimate measurements of familiar objects using metric or standard units. 3 Determine the relationships between points, lines, and planes, including their intersections. 4 Classify geometric figures (e.g., lines, planes, angles, polygons, solids) according to their properties. 5 Determine the measures of interior and exterior angles of any polygon. 6 Determine the sum of the measures of the interior angles and the sum of the measures of the exterior angles of convex polygons. 7 Identify applications of special properties of trapezoids, parallelograms, and kites. 8 Solve problems using the definition of congruent polygons and related theorems. 	<p>12%</p>

Competency/Skill	Approx. %
<p>9 Solve problems using the definition of similar polygons and solids and related theorems.</p> <p>10 Apply the Pythagorean theorem or its converse.</p> <p>11 Use 30-60-90 or 45-45-90 triangle relationships to determine the lengths of the sides of triangles.</p> <p>12 Calculate the perimeter, circumference, and/or area of two-dimensional figures (e.g., circles, sectors, polygons, composite figures).</p> <p>13 Apply the theorems pertaining to the relationships of chords, secants, diameters, radii, and tangents with respect to circles and to each other.</p> <p>14 Apply the theorems pertaining to the measures of inscribed angles and angles formed by chords, secants, and tangents.</p> <p>15 Identify basic geometric constructions (e.g., bisecting angles or line segments, constructing parallels or perpendiculars).</p> <p>16 Identify the converse, inverse, and contrapositive of a conditional statement.</p> <p>17 Identify valid conclusions from given statements.</p> <p>18 Classify examples of reasoning processes as inductive or deductive.</p> <p>19 Determine the surface area and volume of prisms, pyramids, cylinders, cones, and spheres.</p> <p>20 Identify solids and their related nets.</p>	
4 Knowledge of geometry from an algebraic perspective	6%
<p>1 Solve distance and midpoint problems involving two points, a point and a line, two lines, and two parallel lines.</p> <p>2 Identify the directrix, foci, vertices, axes, and asymptotes of a conic section where appropriate.</p> <p>3 Determine the center and the radius of a circle given its equation, and identify the graph.</p> <p>4 Identify the equation of a conic section, given the appropriate information.</p> <p>5 Use translations, rotations, dilations, or reflections on a coordinate plane to identify the images of geometric objects under such transformations.</p>	

Competency/Skill		Approx. %
5	Knowledge of trigonometry	6%
1	Identify equations of graphs of circular/trigonometric functions and their inverses.	
2	Solve problems involving circular/trigonometric function identities.	
3	Interpret the graphs of trigonometric functions (e.g., amplitude, period, phase shift).	
4	Solve real-world problems involving triangles using the law of sines or the law of cosines.	
5	Use tangent, sine, and cosine ratios to solve right triangle problems.	
6	Knowledge of statistics	6%
1	Interpret graphical data involving measures of location (i.e., percentiles, stanines, quartiles).	
2	Compute the mean, median, and mode of a set of data.	
3	Determine whether the mean, the median, or the mode is the most appropriate measure of central tendency in a given situation.	
4	Interpret the ranges, variances, and standard deviations for ungrouped data.	
5	Interpret information from bar, line, picto-, and circle graphs; stem-and-leaf and scatter plots; and box-and-whisker graphs.	
6	Interpret problems involving basic statistical concepts such as sampling, experimental design, correlation, and linear regression.	
7	Knowledge of probability	6%
1	Determine probabilities of dependent or independent events.	
2	Predict odds of a given outcome.	
3	Identify an appropriate sample space for an experiment.	
4	Make predictions that are based on relative frequency of an event.	
5	Determine probabilities using counting procedures, tables, tree diagrams, and formulas for permutations and combinations.	
8	Knowledge of discrete mathematics	5%
1	Find a specified term in an arithmetic sequence.	
2	Find a specified term in a geometric sequence.	
3	Determine the sum of terms in an arithmetic or geometric progression.	
4	Solve problems involving permutations and combinations.	

Competency/Skill		Approx. %
5	Evaluate matrix expressions involving sums, differences, and products.	
6	Rewrite a matrix equation as an equivalent system of linear equations or vice versa.	
7	Represent problem situations using discrete structures such as sequences, finite graphs, and matrices.	
9	Knowledge of calculus	6%
1	Solve problems using the limit theorems concerning sums, products, and quotients of functions.	
2	Find the derivatives of algebraic, trigonometric, exponential, and logarithmic functions.	
3	Find the derivative of the sum, product, quotient, or the composition of functions.	
4	Identify and apply definitions of the derivative of a function.	
5	Use the derivative to find the slope of a curve at a point.	
6	Find the equation of a tangent line or a normal line at a point on a curve.	
7	Determine if a function is increasing or decreasing by using the first derivative in a given interval.	
8	Find relative and absolute maxima and minima.	
9	Find intervals on a curve where the curve is concave up or concave down.	
10	Identify points of inflection.	
11	Solve problems using velocity and acceleration of a particle moving along a line.	
12	Solve problems using instantaneous rates of change and related rates of change, such as growth and decay.	
13	Find antiderivatives for algebraic, trigonometric, exponential, and logarithmic functions.	
14	Solve distance, area, and volume problems using integration.	
15	Evaluate an integral by use of the fundamental theorem of calculus.	

Competency/Skill	Approx. %
10 Knowledge of number sense and mathematical structure	5%
<ol style="list-style-type: none"> 1 Apply the properties of real numbers: closure, commutative, associative, distributive, identities, and inverses. 2 Distinguish relationships between the complex number system and its subsystems. 3 Apply inverse operations to solve problems (e.g., roots vs. powers, exponents vs. logarithms). 4 Apply number theory concepts (e.g., primes, factors, multiples) in real-world and mathematical problem situations. 5 Identify numbers written in scientific notation, including the format used on scientific calculators and computers. 	
11 Knowledge of mathematics as communication	3%
<ol style="list-style-type: none"> 1 Identify statements that correctly communicate mathematical definitions or concepts. 2 Interpret written presentations of mathematics. 3 Select or interpret appropriate concrete examples, pictorial illustrations, and symbolic representations in developing mathematical concepts. 	
12 Knowledge of mathematics as reasoning	4%
<ol style="list-style-type: none"> 1 Identify reasonable conjectures. 2 Identify a counter example to a conjecture. 3 Identify simple valid arguments according to the laws of logic. 4 Identify proofs for mathematical assertions, including direct and indirect proofs, proofs by mathematical induction, and proofs on a coordinate plane. 5 Identify process skills: induction, deduction, questioning techniques, and observation-inference. 	
13 Knowledge of mathematical connections	3%
<ol style="list-style-type: none"> 1 Identify equivalent representations of the same concept or procedure (e.g., graphical, algebraic, verbal, numeric). 2 Interpret relationships between mathematical topics (e.g., multiplication as repeated addition, powers as repeated multiplication). 3 Interpret descriptions, diagrams, and representations of arithmetic operations. 	

Competency/Skill	Approx. %
14 Knowledge of instruction	6%
<ol style="list-style-type: none"> 1 Select appropriate resources for a classroom activity (e.g., manipulatives, mathematics models, technology, other teaching tools). 2 Identify methods and strategies for teaching problem-solving skills and applications (e.g., constructing tables from given data, guess-and-check, working backwards, reasonableness, estimation). 	
15 Knowledge of assessment	6%
<ol style="list-style-type: none"> 1 Identify students' errors, including multiple errors that result in correct or incorrect answers (e.g., algorithms, properties, drawings, procedures). 2 Identify appropriate alternative methods of assessment (e.g., performance, portfolios, projects). 	

5

Test Format and Sample Questions

The Mathematics 6–12 subject area test consists of approximately 80 multiple-choice questions. You will have two and one-half hours to complete the test.

Each question will contain four response options, and you will indicate your answer by selecting **A**, **B**, **C**, or **D**.

The table below presents types of questions on the examination and refers you to a sample question of each type.

Type of Question	Sample Question
Graphics Examine a question involving a number line, a geometric figure, graphs of lines or curves, a table, or a chart, and select the best response option.	Question 1, page 17
Command Select the best response option.	Question 3, page 18
Direct question Choose the response option that best answers the question.	Question 2, page 17
Selection Choose the response option that contains all the elements needed to correctly answer the question.	Question 8, page 20
Sentence completion Select the response option that best completes the sentence.	Question 23, page 25
Word problem Apply mathematical principles to solve a real-world problem and choose the best response option.	Question 12, page 22
Proofs Select the option that best complete an algebraic or geometric proof.	Question 29, page 28
Scenario Examine a situation, problem, or case study. Then answer a question, make a diagnosis, or recommend a course of action by selecting the best response option.	Question 30, page 29

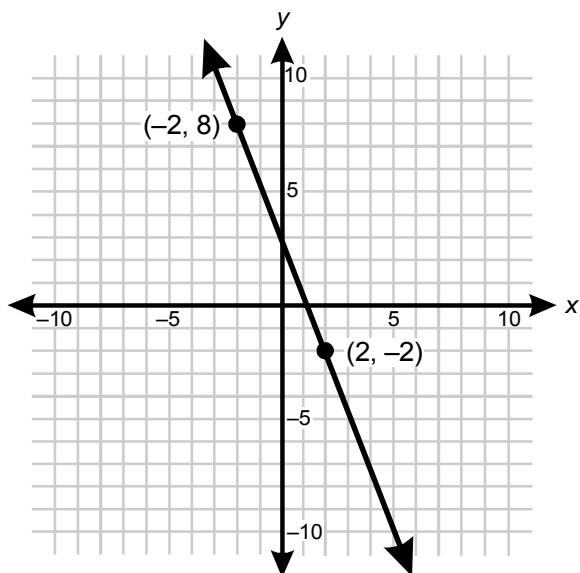
Sample Questions

The following questions represent both the form and content of questions on the examination. These questions will acquaint you with the general format of the examination; however, these sample questions do not cover all of the competencies and skills that are tested and will only approximate the degree of examination difficulty.

An answer key follows at the end of the sample questions. The answer key includes information regarding the competency to which each question is linked.

DIRECTIONS: Read each question and select the best response.

1. Choose the slope of the line on the graph.



- A. $-\frac{5}{2}$
B. $-\frac{3}{2}$
C. $-\frac{2}{5}$
D. $\frac{3}{2}$
2. What is the solution set of this equation?

$$0 = \sqrt{2x+7} + 5$$

- A. $\{9\}$
B. $\{-9\}$
C. $\{-16\}$
D. \emptyset

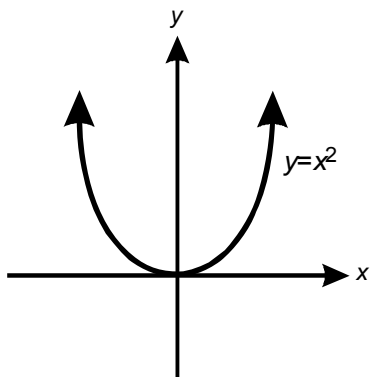
-
-
3. Expand the following expression.

$$(q - 2r)^3$$

- A. $q^3 - 3q^2r + 3qr^2 - 8r^3$
B. $q^3 - 6q^2r - 6qr^2 - 8r^3$
C. $q^3 - 2q^2r + 4qr^2 - 8r^3$
D. $q^3 - 6q^2r + 12qr^2 - 8r^3$
4. For $f(-2) = b$, $f(0) = e$, and $f(2) = t$, find the value of $b + e + t$ for the polynomial function.

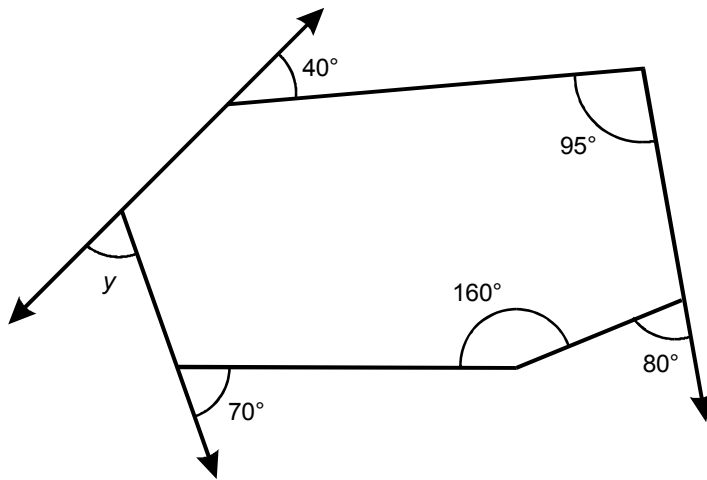
$$f(x) = 3x^3 + x - 17$$

- A. -17
B. -34
C. -49
D. -51
5. Which equation describes the translation of the graph of the parabola so that its vertex is at $(3, -4)$?



- A. $y + 4 = (x - 3)^2$
B. $y - 4 = (x + 3)^2$
C. $y + 3 = (x - 4)^2$
D. $y - 3 = (x + 4)^2$

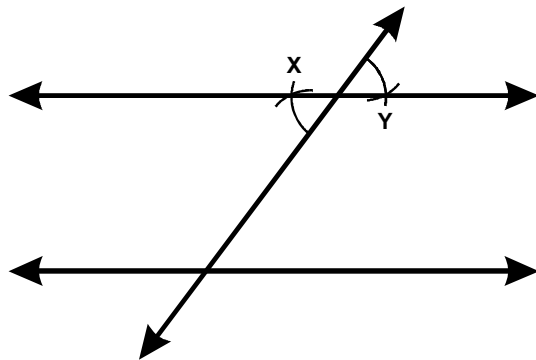
-
-
6. Find the measure of angle y in the figure.



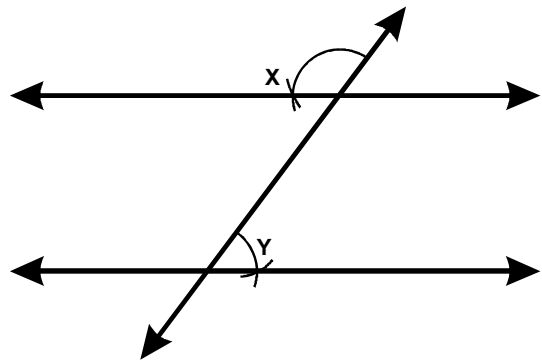
- A. 40°
B. 65°
C. 70°
D. 80°
7. A right triangle has legs of length 5 and $x + 2$ and a hypotenuse of length $x + 3$. What is the perimeter of the triangle?
- A. 12
B. 25
C. 30
D. 34

8. Which of the following is an example of the construction of two parallel lines?

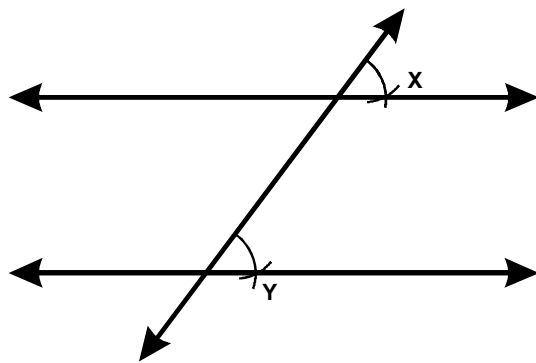
A.



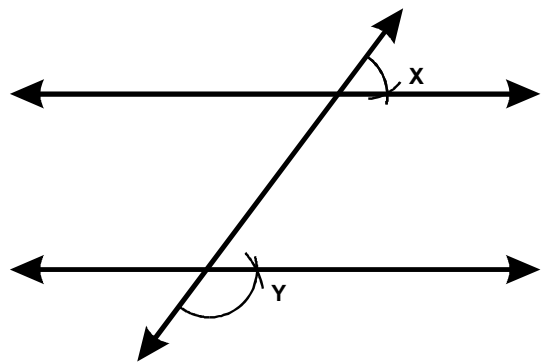
B.



C.



D.



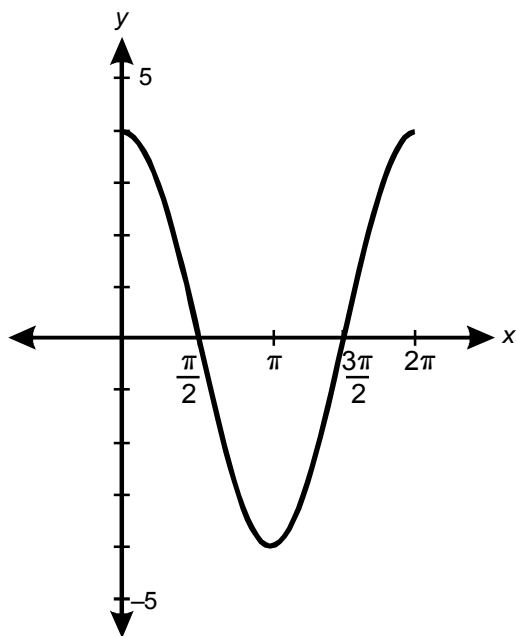
9. M is the midpoint of \overline{AB} . If the coordinates of A are $(-4, 6)$ and the coordinates of M are $(2, -2)$, what are the coordinates of B ?

- A. $(-2, 4)$
- B. $(-1, 2)$
- C. $(6, -8)$
- D. $(8, -10)$

10. Identify the equation of a circle with center $(4, -2)$ and a radius of 6 units.

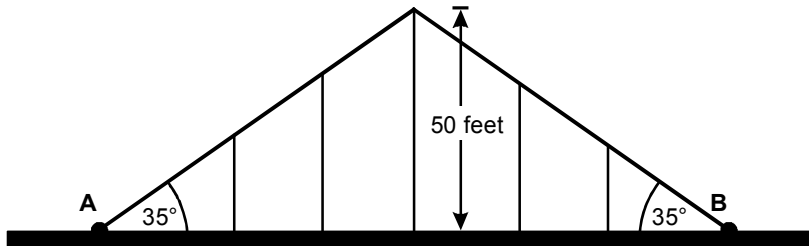
- A. $(x + 4)^2 + (y - 2)^2 = 6$
- B. $(x + 4)^2 + (y - 2)^2 = 36$
- C. $(x - 4)^2 + (y + 2)^2 = 36$
- D. $(x - 4)^2 + (y + 2)^2 = 6$

11. Find the equation represented by this graph.



- A. $y = \sin(4x + \frac{\pi}{2})$
- B. $y = 4 \sin x - \frac{\pi}{2}$
- C. $y = 4 \sin(x + \frac{\pi}{2})$
- D. $y = \sin 4x - \frac{\pi}{2}$

-
-
12. The vertical support in the center of the suspension bridge in the diagram is 50 feet tall. The angle of elevation of the top of the support from either end of the bridge is 35° . Which of the following is the distance across the bridge from point A to point B?



- A. 122.1 ft
B. 142.8 ft
C. 174.3 ft
D. 211.1 ft
13. What is the median of the following list of data points?
- 25, -2, -3, 10, -10, 25, -4, -4, 26, 11, -4, -20, 12, 8
- A. -4
B. 3
C. 5
D. 6
14. Which of the following intervals includes the standard deviation, x , for the set of scores {10, 9, 7, 11, 13}?
- A. $1 < x \leq 3$
B. $3 < x \leq 4$
C. $4 < x \leq 5$
D. $5 < x \leq 7$

15. If two ordinary dice are rolled, what is the probability that the sum of the dots will be 9?

A. $\frac{1}{11}$

B. $\frac{1}{9}$

C. $\frac{1}{6}$

D. $\frac{1}{3}$

16. At a furniture store, the selection of couches consists of three different shapes (A, B, and C), two sizes (small and large), and five colors (red, orange, yellow, green, and blue). When ordering a couch, a customer must choose one shape, one size, and one color. If each of the possible choices is equally likely, what is the probability that a customer will choose a small green couch in shape B?

A. $\frac{1}{180}$

B. $\frac{1}{30}$

C. $\frac{1}{10}$

D. $\frac{1}{5}$

17. Find the 16th term in the geometric sequence 1024, -512, 256, . . .

A. $\frac{1}{32}$

B. $\frac{1}{64}$

C. $-\frac{1}{32}$

D. $-\frac{1}{64}$

18. What is the product of these matrices?

$$\begin{bmatrix} 3 & -2 & 1 \\ 0 & 4 & -5 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & 3 \\ 3 & 4 \end{bmatrix}$$

A. $\begin{bmatrix} 2 & -2 \\ -23 & -8 \end{bmatrix}$

B. $\begin{bmatrix} 10 & -2 \\ -23 & -8 \end{bmatrix}$

C. $\begin{bmatrix} 10 & 1 \\ -7 & 32 \end{bmatrix}$

D. $\begin{bmatrix} 2 & -7 \\ 23 & 32 \end{bmatrix}$

19. Find the derivative of the function $y = \ln x$.

A. e^{-x}

B. x^{-1}

C. x

D. e^x

20. Evaluate $\int_{-1}^3 (x^3 + 1)dx$.

A. 20

B. $22\frac{1}{2}$

C. $23\frac{1}{4}$

D. 24

21. $-\sqrt{64}, \sqrt{\frac{25}{9}}, \sqrt{81}, \sqrt{1}$

The numbers represented in this set can all be classified as

A. whole numbers.

B. integers.

C. rational numbers.

D. irrational numbers.

22. Suppose a and b are odd prime numbers and c and d are even composite numbers. Which statement would always be true?

A. $a + c$ is a prime number.

B. $c + d$ is a prime number.

C. $a + b$ is a composite number.

D. $b + d$ is a composite number.

23. The best meaning of the area of a plane figure is

A. the locus of points enclosed by the figure.

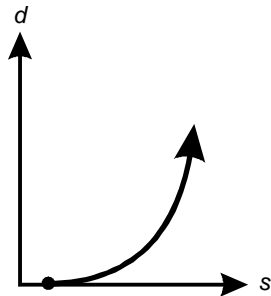
B. the number of unit squares needed to cover the figure.

C. the product of the length of the figure and the width of the figure.

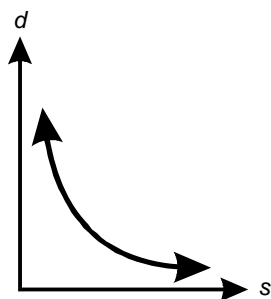
D. the length needed to enclose the figure.

24. The distance (d) needed to stop a car after applying the brakes varies directly with the square of the car's speed (s). Which graph represents this situation?

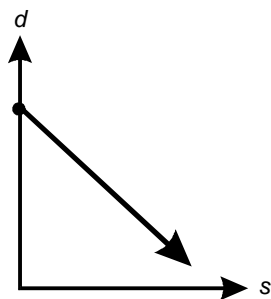
A.



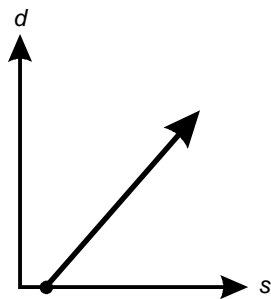
B.



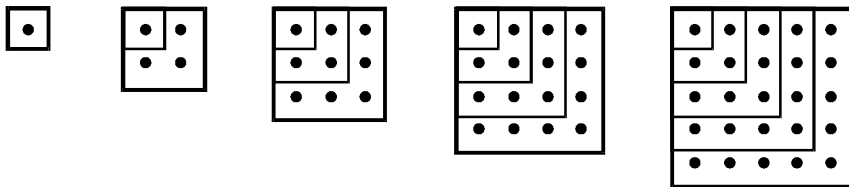
C.



D.



25. Which of the following is a reasonable conjecture based on the diagram?



- A. The product of two odd numbers is an odd number.
- B. The sum of the first n positive integers is $\frac{n(n+1)}{n}$.
- C. The sum of the first n odd positive integers is n^2 .
- D. The product of the first n positive integers is $n!$.

26. ■ represents +1 □ represents -1

The answer to $(\square \square \square) - (\square \square \square \square \square)$ is

- A. □ □
- B. ■ ■
- C. □ □ □ □ □ □ □
- D. ■ ■ ■ ■ ■ ■ ■ ■

27. Which of the following materials would be most appropriate for simulating random selection WITHOUT replacement?

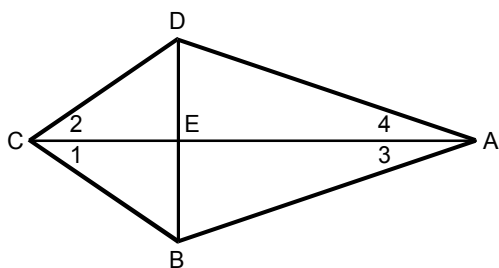
- A. balance scales
- B. fraction bars
- C. playing cards
- D. number cubes

28. The water level in a reservoir increased by 18% in January. In February, the level decreased by 2.5 feet. In March, the water level increased by 12% to a depth of 48.3 feet. What was the water level at the beginning of January?

Which problem-solving strategy would be most effective for solving this problem?

- A. looking for a pattern
 B. making an estimate
 C. working backward
 D. solving a simpler problem
29. Given: Quadrilateral ABCD with $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$
 Prove: $\triangle BCE \cong \triangle DCE$

Evaluate the student's proof below.



Statements

1. $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$
2. $\overline{AC} \cong \overline{AC}$
3. $\triangle ABC \cong \triangle ADC$
4. $\overline{BC} \cong \overline{DC}$
5. $\overline{CE} \cong \overline{CE}$
6. $\triangle BCE \cong \triangle DCE$

Reasons

1. Given
2. Reflexive Property
3. AAS Postulate
4. Corresponding parts of congruent triangles are congruent.
5. Reflexive Property
6. SAS

On which line did the student give an incorrect reason?

- A. line 3
 B. line 4
 C. line 5
 D. line 6

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30. During an interview, a teacher would like to assess a student's conceptual understanding of the significance of the discriminant. Which of the following would be the most appropriate method?
- A. having the student calculate the discriminant of a quadratic equation given in nonstandard form
 - B. having the student identify the terms in the quadratic formula that determine the discriminant
 - C. asking the student to explain why the value of the discriminant determines the nature of the roots of a quadratic equation
 - D. asking the student to derive the quadratic formula by completing the square of the general form of a quadratic equation

Answer Key

Question Number	Correct Response	Competency
1.	A	1
2.	D	1
3.	D	1
4.	D	2
5.	A	2
6.	B	3
7.	C	3
8.	C	3
9.	D	4
10.	C	4
11.	C	5
12.	B	5
13.	B	6
14.	A	6
15.	B	7
16.	B	7
17.	C	8
18.	B	8
19.	B	9
20.	D	9
21.	C	10
22.	C	10
23.	B	11
24.	A	11
25.	C	12
26.	B	13
27.	C	14
28.	C	14
29.	A	15
30.	C	15



Annotated Bibliography

The annotated bibliography that follows includes basic references that you may find useful in preparing for the exam. Each resource is linked to the competencies and skills found in Section 4 of this guide.

This bibliography is representative of the most important and most comprehensive texts pertaining to the competencies and skills. The Florida Department of Education does not endorse these references as the only appropriate sources for review; many comparable texts currently used in teacher preparation programs also cover the competencies and skills that are tested on the exam.

1. Ballman, A.E., Bragg, S.C., Charles, R.I., Handlin, W.G., & Kennedy, D. (2007). *Algebra II*. Upper Saddle River, NJ: Pearson Prentice Hall.
Develops readiness for trigonometry, statistics, and precalculus. Reviews and reinforces key skills throughout the text. Useful for review of competencies 1, 2, 4, 5, 6, 7, 8, 10, 11, 12, and 13.
2. Bennett, J. (2004). *Holt middle school math, course 3*. Austin, TX: Holt, Rinehart and Winston.
The final component in a program to ease the transition from arithmetic into algebra. Contains materials to help teachers plan and pace lessons. Useful for review of competencies 1, 2, 4, 10, 14, and 15.
3. Boyd, C.J. (2004). *Glencoe mathematics: Geometry*. New York: Glencoe/McGraw-Hill.
Familiarizes students with the types of questions and formats they will face on local, state, and national tests. Useful for review of competencies 3, 4, 12, and 14.
4. Burgis, K., & Morford, J. (2006). *Investigating college algebra and trigonometry with technology*. Emeryville, CA: Key College Publishing.
Guides students in using graphing calculators and other technologies to explore patterns and to make, test, and generalize conjectures through investigative, collaborative learning. Useful for review of competencies 1, 2, 4, 10, 11, 14, and 15.

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5. Collins, W., Cuevas, G., Foster, A.G., Gordon, B., Moore-Harris, B., Rath, J., et al. (2001). *Algebra 2: Integration, applications, connections*. New York: Glencoe/McGraw-Hill.
Balances sound skill and concept development with applications, connections, problem solving, critical thinking, and technology. Useful for review of competencies 1, 2, 4, 5, 8, 10, 11, 12, and 13.
 6. Foerster, P.A. (2005). *Calculus: Concepts and applications* (2nd ed.). Berkeley, CA: Key Curriculum Press.
A conceptual understanding of limits, derivatives, and integrals and their uses. Useful for review of competency 9.
 7. Larson, R., Boswell, L., Kanold, T., & Stiff, L. (2004). *Algebra I: Applications, equations, graphs*. Evanston, IL: McDougall Littell.
Helps Algebra I students connect to essential mathematical concepts with integrated print and technology support. Useful for review of competencies 1, 2, 10, and 13.
 8. Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. (2007). *Middle school math course 3*. Evanston, IL: McDougall Littell.
A platform for active learning, flexible lesson planning, and effective assessment. Useful for review of competencies 1, 3, 8, 10, 11, and 12.
 9. Long, C.T., & DeTemple, D. (2005). *Mathematical reasoning for elementary teachers* (4th ed.). Boston: Pearson Addison-Wesley.
Meaningful content and pedagogy to arm education students with the tools they will need to become excellent elementary or middle school teachers. Focuses on professional development and connecting the material to the classroom. Useful for review of competencies 1, 2, 4, 10, 14, and 15.

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- 10.** Mandery, M., & Schneider, M. (2000). *Achieving proficiency in mathematics*. New York: AMSCO School Publications.
Promotes mathematical mastery through critical thinking and applied strategies, including use of the calculator as a tool for exploration and implementation. Emphasizes data reading and interpreting statistical information summarized in tables, bar graphs, and line graphs. Useful for review of competencies 1, 2, 3, 4, 6, 7, 11, 12, 13, 14, and 15.
 - 11.** Moore, D. (2007). *The basic practice of statistics*. (4th ed.). New York: W.H. Freeman.
Introduces to students with limited mathematical backgrounds the same tools, techniques, and interpretive skills that working statisticians rely on daily. Useful for review of competencies 6 and 7.
 - 12.** Musser, G.L., Burger, W.F., & Peterson, B.E. (2004). *Essentials of mathematics for elementary teachers* (6th ed.). Hoboken, NJ: Wiley.
Incorporates the many facets of elementary and middle school mathematics in one concise volume. Provides an understanding of mathematics that translates immediately into the classroom. Useful for review of competency 13.
 - 13.** Perkowski, D., & Perkowski, M. (2007). *Data analysis and probability connections: Mathematics for middle school teachers*. Upper Saddle River, NJ: Pearson Prentice Hall.
Uses illustrations to assist in making explicit connections between a typical college elementary statistics course and the statistical concepts taught by middle school teachers. Useful for review of competencies 6, 7, 11, 12, and 13.
 - 14.** Posamentier, A.S., Smith, B.S., & Stepelman, J. (2006). *Teaching secondary mathematics: Techniques and enrichment units* (7th ed.). Upper Saddle River, NJ: Pearson Merrill Prentice Hall.
Discusses current methods of teaching mathematics, beginning with a brief overview of the history of mathematics education. Includes standards for teaching and assessment. Useful for review of competencies 14 and 15.

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15. Serra, M. (2008). *Discovering geometry: An investigative approach* (4th ed.). Berkeley, CA: Key Curriculum Press.
Enables students to learn theorems and definitions by performing constructions, measuring figures, relating patterns and properties, and discussing their findings. Uses real-world applications, puzzles, and extensions to keep students involved and thinking. Useful for review of competencies 3, 4, 12, and 13.
16. Smith, K.J. (1991). *Problem solving (Brooks/Cole one-unit series in precalculus mathematics)*. Belmont, CA: Thomson Brooks/Cole.
Covers many areas in algebra, trigonometry, some calculus, statistics, and probability. Useful for review of competencies 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13.
17. Van de Walle, J. (2006). *Elementary and middle school mathematics: Teaching developmentally* (6th ed.). Boston: Pearson Allyn & Bacon.
Reviews four key aspects of teaching mathematics: the nature of mathematics as a science of pattern and order, an understanding of how children learn mathematics, a problem-solving view of teaching mathematics, and specific methods for integrating assessment with instruction. Useful for review of competencies 1, 3, 8, 10, 11, and 12.
18. Wheeler, R., & Wheeler, E. (2005). *Modern mathematics: Fundamentals and concepts* (12th ed.). Dubuque, IA: Kendall/Hunt Publishing Co.
Addresses selected topics without compromising coverage of critical prerequisites. Useful for review of competencies 1, 3, 8, 10, 11, and 12.



Additional Information

Please visit the following Web site to review FTCE registration details and to find additional FTCE information, including test locations and passing scores.

<http://www.fldoe.org/asp/ftce>

