

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



FLORIDA DEPARTMENT OF EDUCATION  
[www.fdoe.org](http://www.fdoe.org)

**Sixth 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 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 assist examinees in preparing for the subject area test in Mathematics 6–12 and identifying areas in need of further study. 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. An annotated bibliography of related subject matter materials is available at the end of the test information guide to provide further guidance in identifying additional areas in need of study.

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.

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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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## 2

### Preparation for the Test

The following outline may help you 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.

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### **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.

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### 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 for your comfort.
- Take the following with you to the test site:
  - Admission ticket
  - Proper identification as described in "Identification Policy"
- 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 work through the questions that require more thought.
  - When you are not certain of the correct 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. 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 can 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 each 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)*

*Competency*

Competency/Skill	Approx. %
<b>1 Knowledge of algebra</b>	<b>13%</b>
1 Apply the properties of real numbers: closure, commutative, associative, distributive, transitive, identities, and inverses.	
2 Solve linear equations and inequalities in one or two variables, symbolically or graphically.	
3 Relate the graphical and algebraic representations of linear equations or inequalities on a number line or in the coordinate plane.	
4 Determine the slope, intercepts, or equation of a line, given appropriate information.	
5 Formulate and solve systems of linear equations or inequalities, including models of real-world situations.	
6 Solve equations or inequalities involving absolute value.	
7 Solve or identify models of real-world problems involving ratio, proportion, or direct, inverse, and joint variations.	
8 Solve or identify equations containing rational or radical expressions including models of real-world situations.	
9 Solve quadratic equations using factoring, graphing, completing the square, or applying the quadratic formula, including complex solutions.	
10 Solve or identify models of real-world problems using quadratic equations.	

*Skills 1–10*

**Table of Competencies, Skills, and Approximate Percentages of Questions**

Competency/Skill		Approx. %
<b>1</b>	<b>Knowledge of algebra</b>	<b>13%</b>
1	Apply the properties of real numbers: closure, commutative, associative, distributive, transitive, identities, and inverses.	
2	Solve linear equations and inequalities in one or two variables, symbolically or graphically.	
3	Relate the graphical and algebraic representations of linear equations or inequalities on a number line or in the coordinate plane.	
4	Determine the slope, intercepts, or equation of a line, given appropriate information.	
5	Formulate and solve systems of linear equations or inequalities, including models of real-world situations.	
6	Solve equations or inequalities involving absolute value.	
7	Solve or identify models of real-world problems involving ratio, proportion, or direct, inverse, and joint variations.	
8	Solve or identify equations containing rational or radical expressions including models of real-world situations.	
9	Solve quadratic equations using factoring, graphing, completing the square, or applying the quadratic formula, including complex solutions.	
10	Solve or identify models of real-world problems using quadratic equations.	
<b>2</b>	<b>Knowledge of advanced algebra</b>	<b>12%</b>
1	Relate graphical and algebraic representations of nonlinear inequalities.	
2	Perform arithmetic operations of complex numbers algebraically or geometrically.	
3	Solve equations involving radicals (index greater than two), powers, exponents, and logarithms.	
4	Solve polynomial equations (third degree or higher).	
5	Expand binomials to a positive integral power or determine a specified term in the expansion.	
6	Perform and model vector addition, subtraction, and scalar multiplication on the plane.	
7	Determine a specified term or a rule for an arithmetic or geometric sequence.	

Competency/Skill	Approx. %
8 Determine the sum of terms in an arithmetic or geometric sequence. 9 Perform operations on matrices. 10 Solve and interpret models of real-world problems using discrete structures (e.g., sequences, finite graphs, matrices).	
<b>3 Knowledge of functions</b>	<b>8%</b>
1 Determine which relations are functions, given mappings, sets of ordered pairs, rules, and graphs. 2 Determine the domain and range of a given function. 3 Relate graphs and equations of functions (e.g., absolute value, step, piecewise, polynomial, exponential, periodic). 4 Determine the inverse of a given function or the composition of two functions and their related properties. 5 Determine or prove whether a function is symmetric, periodic, or even/odd. 6 Determine the graph or equation of a transformed function.	
<b>4 Knowledge of geometry</b>	<b>15%</b>
1 Identify or apply the relation between the perimeter, area, or volume of similar figures. 2 Determine the relationships between points, lines, and planes, including their intersections with other two and three dimensional figures. 3 Differentiate and relate geometric figures or solids according to their properties. 4 Derive or apply formulas to find the measures of interior and exterior angles of convex polygons including their sum. 5 Prove or apply properties of quadrilaterals, including models of real-world situations. 6 Prove theorems or solve problems with similar or congruent polygons or solids. 7 Apply the Pythagorean theorem or its converse, including models of real-world situations. 8 Apply 30-60-90 or 45-45-90 triangle relationships to solve problems. 9 Derive or apply formulas for perimeter, circumference, or area of two-dimensional figures (e.g., circles, sectors, segments, arc lengths, polygons, composite figures).	

Competency/Skill	Approx. %
<p>10 Apply theorems pertaining to the relationships of chords, secants, diameters, radii, and tangents with respect to circles and to each other.</p> <p>11 Prove or apply theorems pertaining to the measures of inscribed angles and angles formed by chords, secants, and tangents.</p> <p>12 Analyze basic geometric constructions (e.g., bisecting angles or line segments, constructing parallels or perpendiculars).</p> <p>13 Derive or apply formulas for surface area and volume of prisms, pyramids, cylinders, cones, and spheres.</p>	
<b>5 Knowledge of coordinate geometry</b>	<b>6%</b>
<p>1 Apply distance or midpoint formulas involving two points, a point and a line, or two parallel lines.</p> <p>2 Determine the equation or graph of parabolas, ellipses, and hyperbolas, and the directrix, foci, vertices, axes, and asymptotes, given appropriate information.</p> <p>3 Determine the equation, graph, center, or radius of a circle, given appropriate information.</p> <p>4 Determine the images of geometric objects on a coordinate plane under translations, rotations, dilations, or reflections, and analyze appropriate properties of images and preimages.</p> <p>5 Determine the equation of a conic section to model real-world situations.</p>	
<b>6 Knowledge of trigonometry</b>	<b>7%</b>
<p>1 Determine equations of graphs of circular/trigonometric functions and their inverses.</p> <p>2 Prove circular/trigonometric function identities or apply them to solve problems.</p> <p>3 Analyze the graphs of trigonometric functions (e.g., amplitude, period, phase shift).</p> <p>4 Solve real-world problems involving triangles using the law of sines or the law of cosines.</p> <p>5 Apply trigonometric ratios to solve right triangle problems.</p> <p>6 Determine an equation to model real-world periodic phenomenon.</p>	
<b>7 Knowledge of statistics and probability</b>	<b>10%</b>
<p>1 Interpret data on a single categorical or quantitative variable (e.g., measures of central tendency, spread, location).</p>	

Competency/Skill	Approx. %
<p>2 Interpret data on two categorical or quantitative variables (e.g., correlation, linear regression, two-way tables) or identify an appropriate representation.</p> <p>3 Interpret information from bar graphs, histograms, circle graphs, stem-and-leaf plots, scatter plots, and box-and-whisker graphs or identify an appropriate representation for given data.</p> <p>4 Identify the processes used to design and conduct statistical experiments including possible sources of bias.</p> <p>5 Infer and justify conclusions from sample surveys, experimental data, and observational studies.</p> <p>6 Solve problems using the Fundamental Counting Principle, permutations, and combinations.</p> <p>7 Determine probabilities of independent, dependent (i.e., conditional probability), or compound events using a variety of procedures (e.g., counting procedures, tables, sample spaces, tree diagrams, permutations, combinations).</p> <p>8 Use probability to evaluate outcomes of decisions, including the use of expected value.</p>	
<b>8 Knowledge of calculus</b>	<b>9%</b>
<p>1 Determine limits using theorems concerning sums, products, and quotients of functions.</p> <p>2 Determine the derivatives of algebraic, trigonometric, exponential, and logarithmic functions.</p> <p>3 Determine the derivative of the sum, product, quotient, or the composition of functions.</p> <p>4 Determine the slope or equation of a tangent line at a point on a curve.</p> <p>5 Use the first derivative of a given function in various representations to determine increasing and decreasing intervals or extrema.</p> <p>6 Use the second derivative of a given function in various representations to determine intervals of concavity or points of inflection.</p> <p>7 Solve problems using velocity and acceleration.</p> <p>8 Solve problems using instantaneous rates of change and related rates of change.</p> <p>9 Determine antiderivatives for algebraic, trigonometric, exponential, and logarithmic functions.</p>	

Competency/Skill	Approx. %
10 Solve distance, area, and volume problems using integration.	
11 Relate functions and their derivatives through the use of graphs or tables.	
<b>9 Knowledge of mathematical reasoning</b>	<b>5%</b>
1 Evaluate arguments or conjectures using laws of logic or counterexamples.	
2 Identify or compare the converse, inverse, and contrapositive of a conditional statement.	
3 Analyze mathematical assertions within proofs (e.g., direct, indirect, mathematical induction, algebraic).	
4 Classify examples of reasoning as inductive or deductive.	
<b>10 Knowledge of instruction and assessment</b>	<b>15%</b>
1 Analyze students' misconceptions and choose instructional approaches to address the misconceptions with particular focus on number operations, algebra, advanced algebra, functions, and geometry.	
2 Identify or evaluate diagnostic, formative, or summative assessment items that measure conceptual or procedural understanding.	
3 Determine the appropriate sequence of lessons for a specific mathematical concept.	
4 Evaluate student responses to identify misconceptions or gaps in knowledge and provide specific feedback to promote student achievement, including the use of a rubric.	
5 Analyze a given instructional segment which may include the selection or use of available tools and resources (e.g., mathematical models, manipulatives, dynamic grapher, interactive geometry drawing tool, computer algebra system, appropriate calculators).	
6 Develop and interpret appropriate models for mathematical concepts including real-world models, and equivalent representations (e.g., graphical, symbolic, verbal, numeric).	
7 Identify or apply methods, strategies, and questioning techniques for teaching problem-solving skills and applications (e.g., constructing tables from given data, guess-and-check, working backwards, reasonableness, estimation).	
8 Differentiate among various learning environments, including alternative methods of assessment (e.g., performance, portfolios, projects) to accommodate the needs and diversity of students.	

## 5

## Test Format and Sample Questions

The Mathematics 6–12 subject area test consists of approximately 75 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 test center will provide a scientific calculator.

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
<b>Graphics</b> 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 2, page 15
<b>Command</b> Select the best response option.	Question 5, page 16
<b>Direct question</b> Choose the response option that best answers the question.	Question 3, page 16
<b>Selection</b> Choose the response option that contains all the elements needed to correctly answer the question.	Question 25, page 29
<b>Sentence completion</b> Select the response option that best completes the sentence.	Question 4, page 16
<b>Word Problem</b> Apply mathematical principles to solve a real-world problem and choose the best response option.	Question 16, page 20

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## **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.

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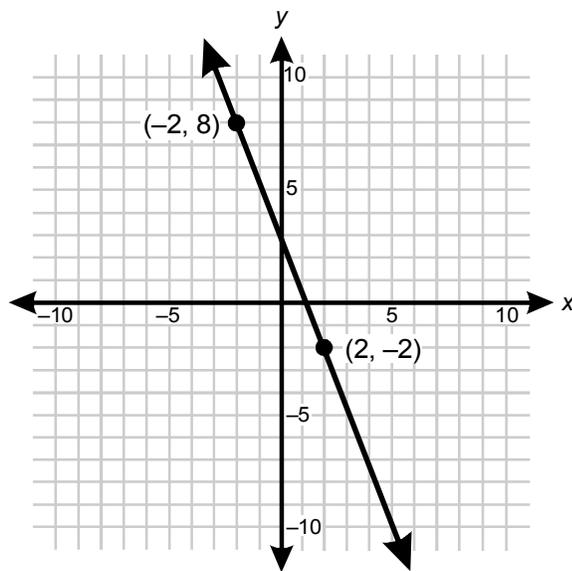
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**DIRECTIONS:** Read each question and select the best response.

1. Which of the following is a solution of the given equation?

$$3(n + 2) - 4(n - 1) = n + 13$$

- A.  $-\frac{11}{2}$
- B.  $-3$
- C.  $-\frac{3}{2}$
- D.  $2$
2. Which of the following is the slope of the given graph?



- A.  $-\frac{5}{2}$
- B.  $-\frac{3}{2}$
- C.  $-\frac{2}{5}$
- D.  $\frac{3}{2}$

- 
- 
3. What is the solution set of the given equation?

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

- A. {9}  
B. {-9}  
C. {-16}  
D.  $\emptyset$
4. The numbers represented in the given set

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

can all be classified as

- A. whole numbers.  
B. integers.  
C. rational numbers.  
D. irrational numbers.
5. Expand the given 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.  $q^3 - 6q^2r + 12qr^2 - 8r^3$

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6. Find the 16<sup>th</sup> term in the geometric sequence 1024, -512, 256, ...

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

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

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

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

7. What is the product of the given 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.  $\begin{bmatrix} 2 & -7 \\ 23 & 32 \end{bmatrix}$

8. Which of the following specifies an even function?

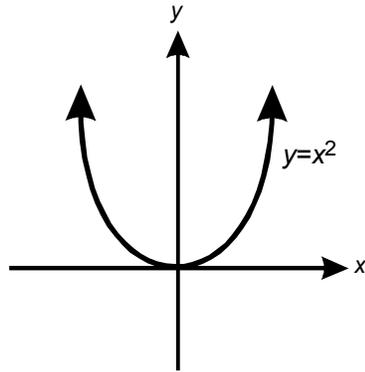
A.  $\{(x,y): y = -x^3\}$

B.  $\{(x,y): y = (x-1)^2\}$

C.  $\{(x,y): y = \sqrt{x^2 - 1}\}$

D.  $\{(x,y): y = \frac{1}{x}\}$

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- 
9. Which equation describes the translation of the graph of the given parabola so that its vertex is at  $(3, -4)$ ?

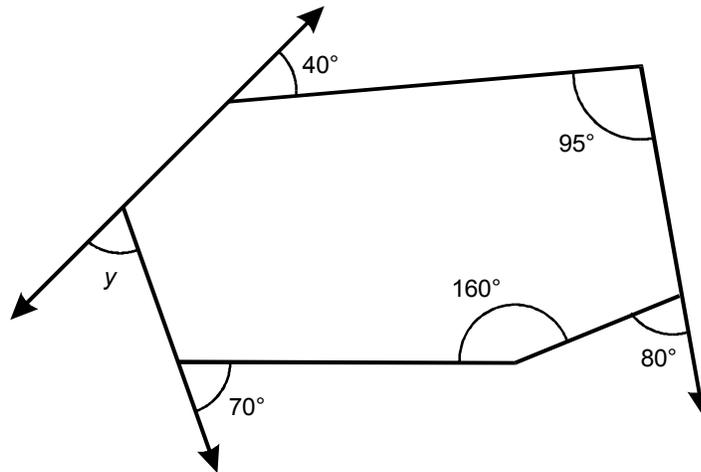


- A.  $y + 4 = (x - 3)^2$   
B.  $y - 4 = (x + 3)^2$   
C.  $y + 3 = (x - 4)^2$   
D.  $y - 3 = (x + 4)^2$
10. Two similar right circular cylinders have a scale factor of 2:3. The larger cylinder has a surface area of  $252\pi$  square feet. Find the surface area of the smaller right circular cylinder.
- A.  $112 \text{ ft}^2$   
B.  $168 \text{ ft}^2$   
C.  $112\pi \text{ ft}^2$   
D.  $567\pi \text{ ft}^2$
11. 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

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12. Find the measure of angle  $y$  in the given figure.



- A.  $40^\circ$
- B.  $65^\circ$
- C.  $70^\circ$
- D.  $80^\circ$

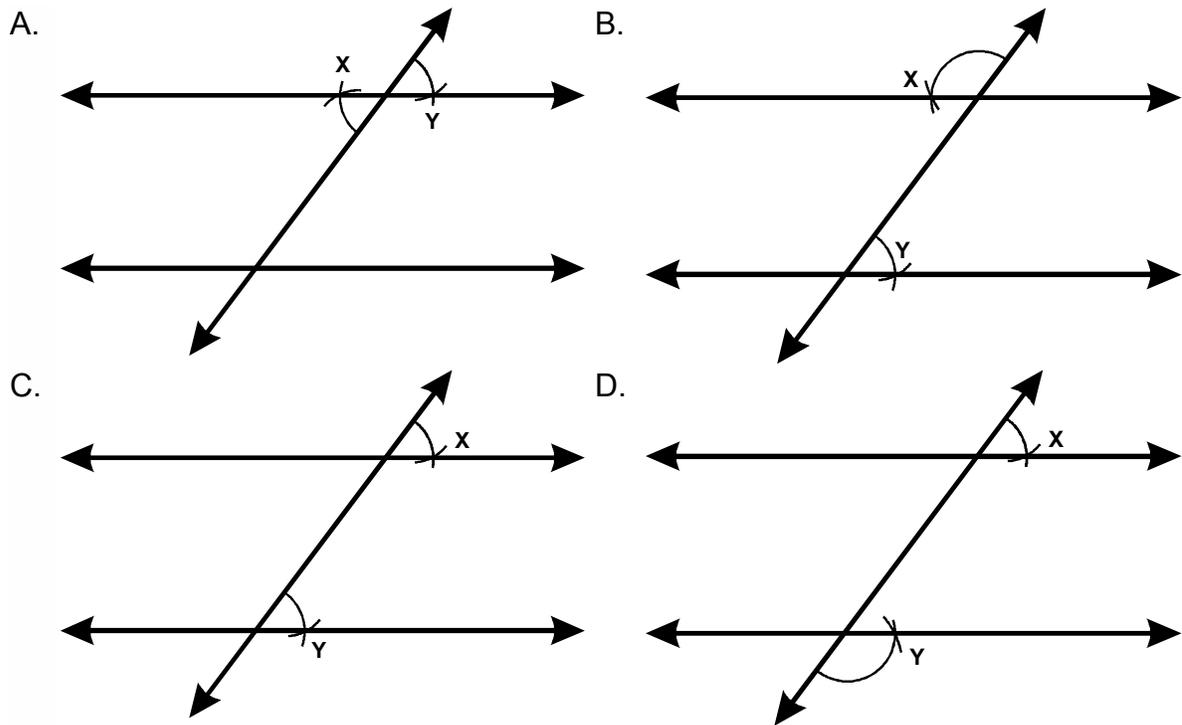
13. M is the midpoint of  $\overline{AB}$ . If the coordinates of A are  $(-4, 6)$  and the coordinates of M are  $(2, -2)$ , what are the coordinates of B?

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

14. 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.  $(x - 4)^2 + (y + 2)^2 = 6$

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



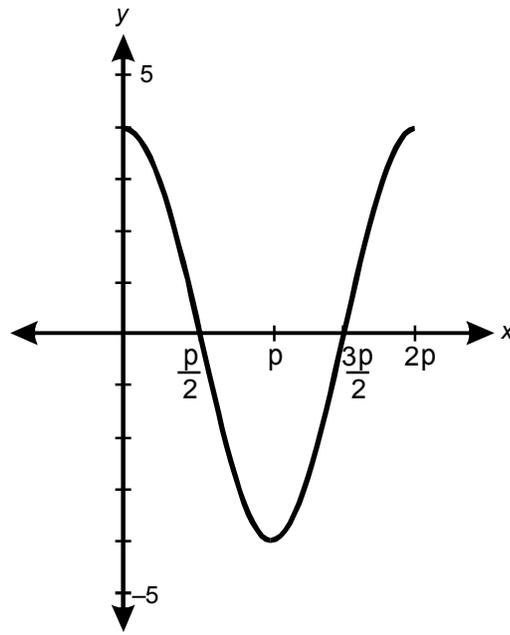
16. Suppose that an object attached to a coiled spring is pulled down 6 inches from its equilibrium position and released. It takes 4 seconds for it to complete one oscillation. Which of the following equations models the position of the object at time  $t$ ?

- A.  $s(t) = -6 \cos\left(\frac{\pi}{2}t\right)$
- B.  $s(t) = 6 \cos\left(\frac{\pi}{2}t\right)$
- C.  $s(t) = -6 \sin\left(\frac{\pi}{2}t\right)$
- D.  $s(t) = 6 \sin\left(\frac{\pi}{2}t\right)$

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17. Find the equation represented by the given 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.  $y = \sin 4x - \frac{\pi}{2}$

18. What is the median of the given list of data points?

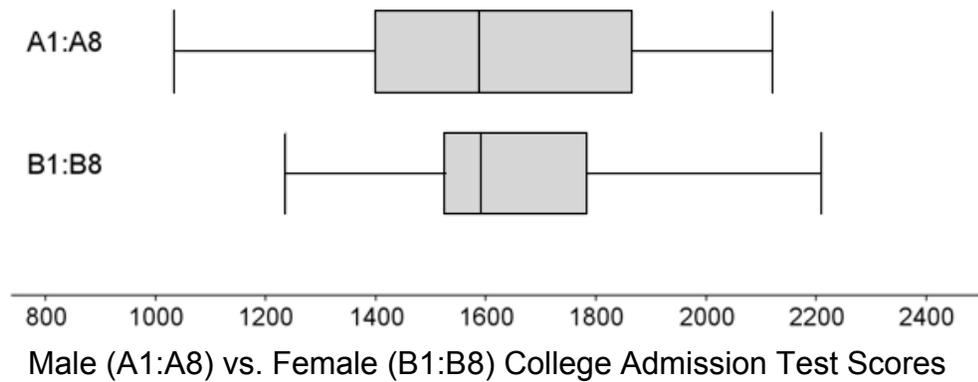
25, -2, -3, 10, -10, 25, -4, -4, 26, 11, -4, -20, 12, 8

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

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19. Which of the following could be inferred from the given box plot?



- A. The males have outscored the females for this set of scores.
  - B. The males have more variance in their scores.
  - C. The lowest score for this set of scores belongs to a female tester.
  - D. The females have more variance in their scores.
20. 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, 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.  $\frac{1}{5}$

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

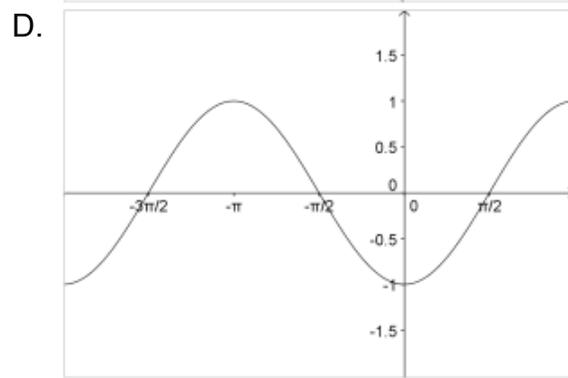
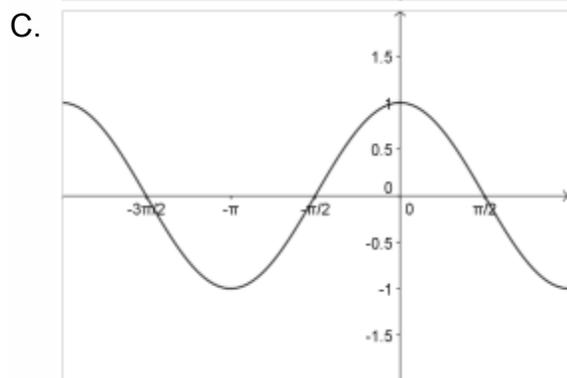
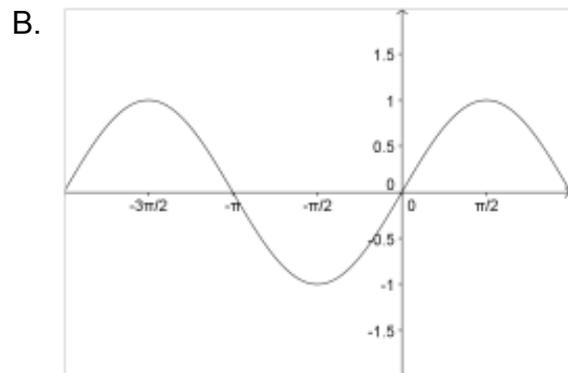
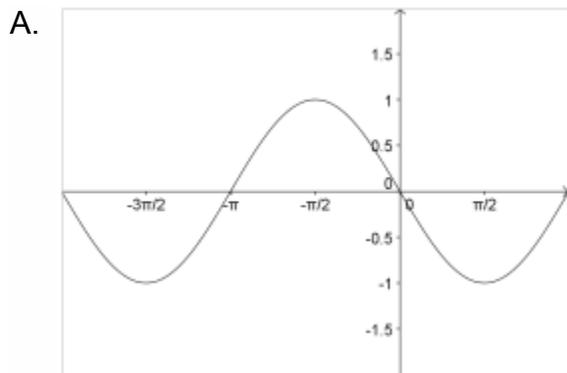
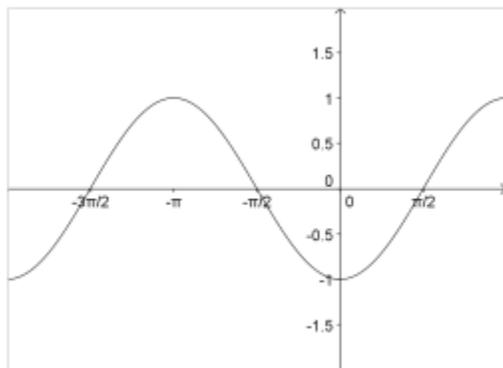
A. 20

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

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

D. 24

22. The graph of the derivative of a function is given. Identify the graph of the function.



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

- A.  $e^{-x}$
- B.  $x^{-1}$
- C.  $x$
- D.  $e^x$

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24. Suppose  $a$  and  $b$  are odd prime numbers and  $c$  and  $d$  are even composite numbers. Which of the following statements 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

25. Which of the following is the inverse of this statement?

If you are a pianist, then you are a musician.

- A. If you are a musician, then you are a pianist.
- B. If you are not a pianist, then you are not a musician.
- C. If you are not a musician, then you are not a pianist.
- D. If you are a pianist, then you are not a musician.

26. While checking student work during class, a teacher noticed the following examples on a student paper.

Directions: Simplify completely.

1.  $\sqrt{200}$     ANS:  $2\sqrt{10}$

2.  $\sqrt{75}$     ANS:  $3\sqrt{5}$

3.  $\sqrt{52}$     ANS:  $13\sqrt{2}$

Which of the following is the most appropriate way to remediate the student's misconception?

- A. interviewing the student
- B. telling the student to work the problems again
- C. assigning a remediation worksheet for homework
- D. providing the correct answers

27. Students are given a checklist to use for problem solving. This is a form of which type of assessment?

- A. performance assessment
- B. formative assessment
- C. objective assessment
- D. summative assessment

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28. 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

29. Which problem solving strategy would be most effective for solving the given problem?

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?

- A. looking for a pattern
- B. making an estimate
- C. working backwards
- D. solving a simpler problem

30. When assessing students' knowledge of factoring, which of the following is an accommodation a teacher might use for an ESE student?

- A. having students work in a group on a worksheet
- B. telling the student how to factor
- C. giving the student extended time to complete the task
- D. providing a take home test for the student

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### Answer Key

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



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## Annotated Bibliography

The annotated bibliography in this section 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 for Mathematics 6–12. 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. Ashlock (2005). *Error patterns in computation* (9<sup>th</sup> ed.). Upper Saddle River, NJ: Prentice Hall.  
Focuses on providing educators with the instructional tools to recognize and address common errors in order to assist students. Useful for review of competency 10.
2. 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 1–3, 5–7, and 10.
3. 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 4, 5, 9, and 10.

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4. Blitzer, R. (2008). *Thinking mathematically* (4<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson Prentice Hall.  
Includes strategies for problem-solving. Useful for review of all competencies.
  5. 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 4, 5, 9, and 10.
  6. 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– 3, 5, 6, and 10.
  7. Cangelosi, J.S. (2003). *Teaching mathematics in secondary and middle school: An interactive approach* (3<sup>rd</sup> ed.). Upper Saddle River, NJ: Prentice Hall.  
Guides teachers in instructional practices. Useful for review of all competencies.
  8. Cohen, D. (1993). *Precalculus* (4<sup>th</sup> ed.). St. Paul, MN: West Publishing.  
Provides students a graphical perspective to develop visual understanding of college algebra and trigonometry. Useful for review of competencies 2 and 8.
  9. 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– 3, 5, 6, 9, and 10.
  10. Foerster, P.A. (2005). *Calculus: Concepts and applications* (2<sup>nd</sup> ed.). Berkeley, CA: Key Curriculum Press.  
A conceptual understanding of limits, derivatives, and integrals and their uses. Useful for review of competency 8.

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11. 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, 3, and 10.
  12. 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, 2, 3, and 10.
  13. Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. (2012). *Larson geometry common core edition*. Orlando, FL: Houghton Mifflin Harcourt.  
Offers instruction in geometry aligned closely with the Common Core State Standards. Useful in review of competencies 4 and 5.
  14. Larson, R., & Edwards, B. (2006). *Calculus* (9<sup>th</sup> ed.). Belmont, CA: Brooks Cole.  
Presents effective pedagogy that addresses the needs of a broad range of teaching and learning styles and environments. Useful for review of competency 8.
  15. Long, C.T., & DeTemple, D. (2005). *Mathematical reasoning for elementary teachers* (4<sup>th</sup> ed.). Boston: Pearson Addison-Wesley.  
Provides content and pedagogy to provide 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, 3, 5, and 10.
  16. 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 all competencies.

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17. Moore, D. (2007). *The basic practice of statistics*. (4<sup>th</sup> ed.). New York: W.H. Freeman.  
Introduces students with limited mathematical backgrounds to the same tools, techniques, and interpretive skills that working statisticians rely on daily. Useful for review of competency 7.
18. Musser, G.L., Burger, W.F., & Peterson, B.E. (2004). *Essentials of mathematics for elementary teachers* (6<sup>th</sup> 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 10.
19. 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 7 and 10.
20. Posamentier, A.S., Smith, B.S., & Stepelman, J. (2006). *Teaching secondary mathematics: Techniques and enrichment units* (7<sup>th</sup> 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 competency 10.
21. Serra, M. (2008). *Discovering geometry: An investigative approach* (4<sup>th</sup> 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 4, 5, 9, and 10.
22. 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, calculus, statistics, and probability. Useful for review of all competencies.

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- 23.** Stewart, J. (1999). *Single variable calculus early transcendentals* (4<sup>th</sup> ed.). Pacific Grove, CA: Brooks Cole.  
Uses examples and built-in learning aids to help develop technical competence. Useful for review of competency 8.
- 24.** Sullivan, M. (2003). *College algebra enhanced with graphing utilities*. Upper Saddle River, NJ: Prentice Hall.  
Integrates use of graphing calculators, active learning, and technology to foster understanding of key concepts.  
Useful for review of competencies 1 and 2.
- 25.** Van de Walle, J. (2006). *Elementary and middle school mathematics: Teaching developmentally* (6<sup>th</sup> 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, 2, 4, and 9.
- 26.** Wheeler, R., & Wheeler, E. (2005). *Modern mathematics: Fundamentals and concepts* (12<sup>th</sup> ed.). Dubuque, IA: Kendall/Hunt Publishing Co.  
Addresses selected topics without compromising coverage of critical prerequisites. Useful for review of competencies 1, 2, and 9.





## **Additional Information**

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

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

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