

Florida Teacher Certification Examinations
Test Information Guide
for
Middle Grades Mathematics 5–9



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 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 Middle Grades Mathematics 5–9 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 Middle Grades Mathematics 5–9 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.

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.

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.

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 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 Middle Grades Mathematics 5-9 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 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)*

<i>Competency</i>	Competency/Skill	Approx. %
	1 Knowledge of problem-solving and reasoning skills	13%
	1 Analyze realistic situations and identify the appropriate mathematical expression or equation.	
	2 Apply strategies to solve nonroutine problems with multiple steps.	
	3 Evaluate the reasonableness of results from the original problem.	
	4 Apply appropriate mathematical concepts and procedures to solve problems in various contexts.	
	5 Evaluate the validity of mathematical arguments (e.g., a justification that the sum of two odd numbers is always even).	
	6 Predict logical conclusions from given statements.	
	7 Identify appropriate instructional strategies to facilitate student understanding of problem solving.	
	8 Distinguish between deductive and inductive reasoning in a given situation.	
<i>Skills 1–8</i>		

Table of Competencies, Skills, and Approximate Percentages of Questions

Competency/Skill		Approx. %
1	Knowledge of problem-solving and reasoning skills	13%
1	Analyze realistic situations and identify the appropriate mathematical expression or equation.	
2	Apply strategies to solve nonroutine problems with multiple steps.	
3	Evaluate the reasonableness of results from the original problem.	
4	Apply appropriate mathematical concepts and procedures to solve problems in various contexts.	
5	Evaluate the validity of mathematical arguments (e.g., a justification that the sum of two odd numbers is always even).	
6	Predict logical conclusions from given statements.	
7	Identify appropriate instructional strategies to facilitate student understanding of problem solving.	
8	Distinguish between deductive and inductive reasoning in a given situation.	
2	Knowledge of mathematical manipulatives and models and instructional technology	6%
1	Identify appropriate mathematical representations (e.g., verbal statements, manipulatives, pictures, graphs, algebraic expressions).	
2	Interpret concepts with multiple representations (e.g., manipulatives, tables, graphs, symbolic expressions, technology).	
3	Select appropriate manipulatives and technology for teaching specific mathematical concepts (e.g., graphing calculators, dynamic software, virtual and physical manipulatives).	
4	Use appropriate manipulatives and technology for teaching diverse groups of students (e.g., varied learning styles and exceptionalities).	
3	Knowledge of assessment in mathematics	9%
1	Assess student learning through various methods (e.g., informal, formative, summative).	
2	Analyze student work samples to assess and diagnose student learning needs.	
3	Analyze student performance using technology (e.g., online resources, audience-response systems, instructor software).	
4	Interpret student performance data to drive instruction.	
5	Recognize cognitive complexity in various questioning strategies.	

Competency/Skill		Approx. %
6	Evaluate appropriate alternative assessments (e.g., projects, portfolios) that utilize various cognitive complexity levels.	
4	Knowledge of connections among mathematical concepts	7%
1	Identify prerequisite skills for a given topic (e.g., ratio, slope).	
2	Predict common misconceptions in mathematics (e.g., area and perimeter, box plot).	
3	Connect interrelated mathematical concepts (e.g., scale factor and proportional reasoning).	
4	Analyze mathematical errors (e.g., computational, algebraic, statistical, geometric).	
5	Identify fundamental concepts that connect middle grades mathematics to high school and postsecondary mathematics (e.g., trigonometry, number theory, calculus).	
5	Knowledge of number sense, operations, and proportionality	9%
1	Compare the relative size of real numbers expressed in a variety of forms (e.g., fractions, decimals, percents, absolute value).	
2	Apply mental computation and estimation strategies.	
3	Apply prime factorization of composite numbers to other operations (e.g., cube roots, polynomials).	
4	Compute fluently with rational numbers using the greatest common factor (GCF) and least common multiple (LCM).	
5	Apply ratios and proportions to similar figures and to solve realistic problems.	
6	Select the appropriate operation(s) to solve realistic problems that involve real numbers.	
6	Knowledge of foundations of algebra	14%
1	Predict missing terms in numerical, algebraic, and pictorial patterns.	
2	Analyze relationships between tables, graphs, or equations.	
3	Simplify rational and irrational expressions.	
4	Simplify expressions involving radicals and rational exponents using the properties of exponents.	
5	Solve equations or inequalities with one variable (e.g., number line).	
6	Identify graphs of inequalities involving one variable on a number line.	
7	Identify graphs of linear equations or inequalities involving two variables on the coordinate plane.	

Competency/Skill		Approx. %
8	Identify and interpret the slope and intercepts using a graph, table, or an equation.	
9	Determine the equation of a line.	
10	Find and estimate square roots.	
11	Apply properties of operations (e.g., commutative, associative, distributive) to generate equivalent expressions.	
7	Knowledge of algebraic thinking	11%
1	Determine the impact when changing values of given linear and nonlinear functions (e.g., change of y-intercept or coefficients).	
2	Identify the equation of a line that is perpendicular or parallel to a given line.	
3	Apply operations to analyze polynomials (e.g., finding zeros, factoring, arithmetic operations).	
4	Solve systems of linear equations involving two variables using graphing, substitution, or elimination.	
5	Determine the solution set of a system of linear inequalities involving two variables.	
6	Use quadratic equations to solve abstract and realistic problems.	
7	Identify the graph of quadratic functions.	
8	Solve equations involving radicals, limited to square roots.	
9	Apply the laws of exponents.	
8	Knowledge of data analysis, statistics, and probability	7%
1	Determine which measure of center (i.e., central tendency) is the most appropriate in a given situation.	
2	Find and interpret the range and distribution of data.	
3	Interpret information and patterns from various graphical representations using univariate (e.g., a line plot) and bivariate data (e.g., scatterplot).	
4	Identify appropriate graphical representations for a given data set.	
5	Identify an appropriate sample to draw inferences about a population.	
6	Make predictions based on experimental or theoretical probabilities.	
9	Knowledge of two-dimensional geometry	15%
1	Identify precise definitions of symbols for lines, segments, rays, and distances based on point, line, and plane as undefined terms.	

Competency/Skill	Approx. %
<p>2 Identify and apply properties of the relationships of angles or pairs of angles.</p> <p>3 Identify and apply properties of polygons to determine the measure(s) of interior angles and/or exterior angles.</p> <p>4 Evaluate proofs and apply the properties of triangles (e.g., isosceles, scalene, equilateral).</p> <p>5 Evaluate proofs and apply triangle inequality theorems (e.g., opposite the largest angle is the longest side, the sum of two sides is greater than the third side).</p> <p>6 Use the SAS, ASA, and SSS postulates to show pairs of triangles congruent, including the case of overlapping triangles.</p> <p>7 Apply theorems and postulates that apply to right triangles to solve mathematical and realistic problems (e.g., Pythagorean theorem, special right triangles).</p> <p>8 Apply trigonometric ratios to solve right triangle problems.</p> <p>9 Apply the specific properties of quadrilaterals (e.g., parallelograms, rectangles, rhombuses, squares, kites, trapezoids).</p> <p>10 Apply the formulas for distance and midpoint on the coordinate plane.</p> <p>11 Classify and apply the types of transformations of geometric figures including similar figures.</p> <p>12 Apply properties and theorems about circles.</p>	
10 Knowledge of measurement and spatial sense	9%
<p>1 Convert units of measure within and between given measurement systems, including derived units.</p> <p>2 Solve realistic and mathematical problems involving perimeter, circumference, area, surface area, and volume.</p> <p>3 Determine how a change in dimensions (e.g., length, width, height, radius) affects other measurements (e.g., perimeter, area, surface area, volume).</p> <p>4 Identify characteristics of three-dimensional figures (e.g., faces, edges, vertices).</p> <p>5 Identify the net of a three-dimensional figure.</p> <p>6 Identify the two-dimensional view of a three-dimensional object.</p>	



5

Test Format and Sample Questions

The Middle Grades Mathematics 5-9 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
Word Problem Apply mathematical principles to solve a real-world problem and choose the best response option.	Question 2, page 15
Direct Question Choose the response option that best answers the question.	Question 15, page 20
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 19, page 21
Command Select the best response option.	Question 20, page 22
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 4, page 16

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. Use the given number game to answer the following question.

Pick a number.
Add 5 to the number.
Next, multiply 4.
Subtract 12.
Divide by 4.

If x represents the starting number, and y represents the final number, which equation is equivalent to the number game?

- A. $y = 2$
B. $y = 2x$
C. $y = x - 2$
D. $y = x + 2$
2. John knows that he can mow a rectangular lawn that measures 20 yards by 40 yards in 2 hours. He estimates that it should take him about 4 hours to mow a rectangular lawn that measures 40 yards by 80 yards. Is John's estimate reasonable?
- A. Yes, because doubling the size of the field will double the amount of mowing time.
B. No, because John will be able to mow a longer distance without changing direction, resulting in a shorter mowing time.
C. Yes, because when the perimeter of the field is doubled, the total distance that the mower will need to travel is doubled.
D. No, because doubling the dimensions of the field will increase the area of the field by 4, resulting in a mowing time of about 8 hours.
3. In general, division can be defined by which equation, assuming $b \neq 0$?
- A. $a \div b = c$ if and only if $c \cdot b = a$
B. $a \div b = c$ if and only if $c \cdot a = b$
C. $a \div b = c$ if and only if $c = a - b$
D. $a \div b = c$ if and only if $b = c \div a$

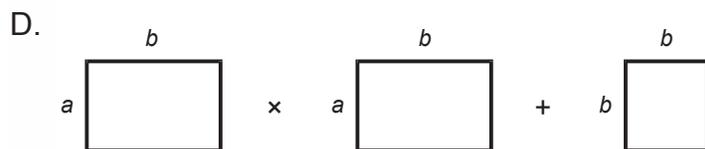
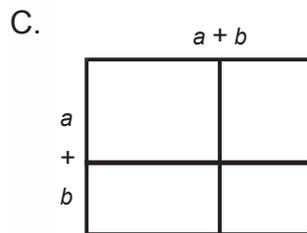
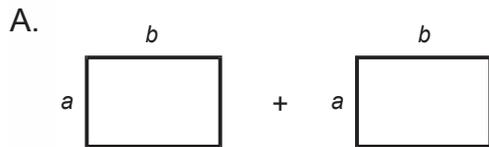
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4. A number cube is rolled 50 times with the results shown in the table.

Results of Number Cube Rolling Experiment						
Outcome	1	2	3	4	5	6
Frequency	10	9	11	12	8	0

What is the experimental probability of rolling a 4?

- A. $\frac{4}{12}$
- B. $\frac{4}{5}$
- C. $\frac{12}{50}$
- D. $\frac{10}{50}$

-
-
5. A teacher is going to develop the concept of squaring a binomial expression. Which of the following models would be the most appropriate to use?



6. Which of the following is LEAST likely to be used as a formative assessment for teaching students about decimals?
- A. students taking a semester exam which includes concepts on decimals
 - B. students listing numbers between 3.4 and 3.5 as a warm-up activity at the board
 - C. students participating in individual student-teacher interviews on decimal concepts
 - D. students writing an explanation of why there are many values between two numbers

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-
7. In solving the linear equation $5x - 9 = 3x + 3$, a student wrote $5x + 3x - 9 = 3x - 3x + 3$ as the next step. Which of the following statements identifies the error the student made?
- A. The student added and subtracted the same amount on both sides of the equation.
 - B. The student multiplied the same amount on both sides of the equation.
 - C. The student subtracted the same amount on both sides of the equation.
 - D. The student added the same amount on both sides of the equation.
8. Identify the primary goal of formative assessments.
- A. ranking students
 - B. evaluating teachers
 - C. making instructional decisions
 - D. measuring student achievement
9. Which of the following concepts would students need to understand before starting a lesson on simplifying fractions?
- A. least common multiple
 - B. order of operations
 - C. greatest common factor
 - D. solving proportions
10. A student wants to purchase a wallpaper border for a bedroom. The border is sold in rolls 8 yards long and 10 inches wide. The room measures 12 feet by 13 feet. By performing the following operations, the student determines that 6 rolls of border are needed.

$$\frac{2(13 + 12)}{8} = 6.25$$

Which statement best explains the student's mathematical error?

- A. The student rounded incorrectly and thought only 6 rolls were needed.
- B. The student found the perimeter instead of the area of the room.
- C. The student did not change all of the dimensions to the same units.
- D. The student used an incorrect formula for perimeter.

11. Identify the proportion that would correctly solve the following problem.

Chris and Kelly will divide a profit of \$400 in the ratio 5:3. If Chris receives the smaller amount, how much will Chris receive?

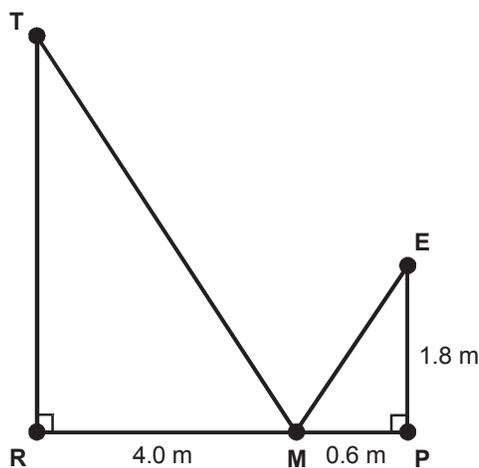
A. $\frac{5}{8} = \frac{400}{x}$

B. $\frac{3}{8} = \frac{x}{400}$

C. $\frac{3}{5} = \frac{x}{400}$

D. $\frac{3}{5} = \frac{400}{x}$

12. The height \overline{TR} of a tree may be measured by using similar triangles. A mirror is placed at point M so that the top of the tree is sighted in the mirror by a person standing at point P. The person's eye is at point E. Given the measurements shown in the diagram what is the length of \overline{TR} ?



- A. 5.2 m
B. 7.2 m
C. 9.0 m
D. 12.0 m

13. A school has a total enrollment of 1720 students. One day 129 students were absent. What percent were absent?

- A. 0.075%
- B. 7.5%
- C. 12.9%
- D. 13.3%

14. Which of the following rules represents a function?

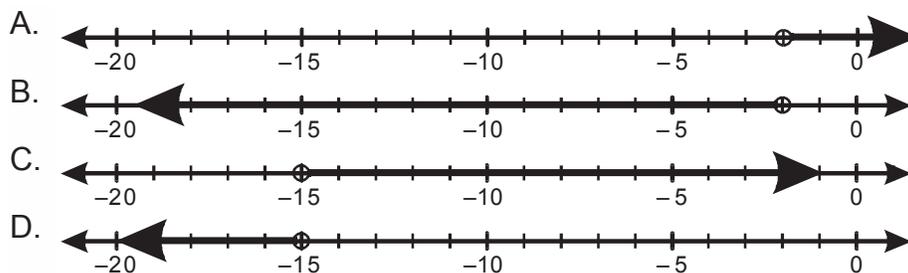
- A. $\{(x, y): y^2 = x^2\}$
- B. $\{(x, y): y = x^2\}$
- C. $\{(x, y): |y| = x^2\}$
- D. $\{(x, y): y^2 = x\}$

15. What is the expression $2^{-3} \times 2^2$ equivalent to?

- A. 4
- B. 2
- C. $\frac{1}{2}$
- D. $\frac{1}{4}$

16. Which graph represents the following inequality?

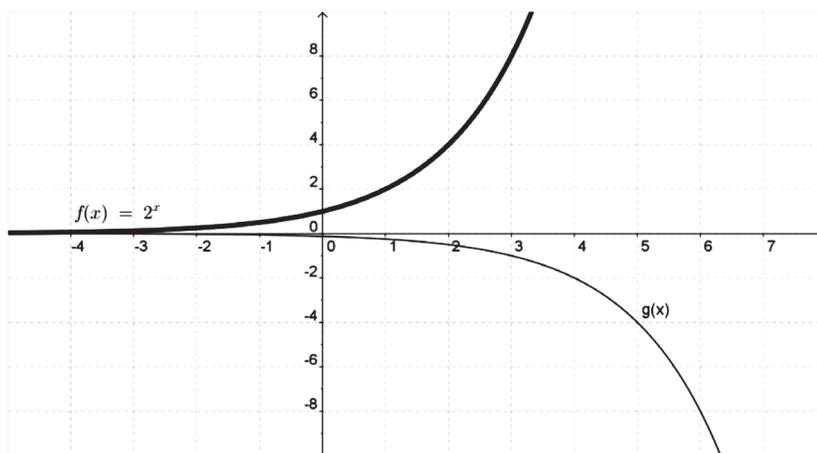
$$5z + 10 > 0$$



17. Which of the following lists of numbers is arranged in ascending order?

- A. $\sqrt{12}$, 5, 6, $\sqrt{31}$
- B. 5, $\sqrt{12}$, 6, $\sqrt{31}$
- C. $\sqrt{12}$, 5, $\sqrt{31}$, 6
- D. 5, $\sqrt{12}$, $\sqrt{31}$, 6

18. The graph of the equation $f(x) = 2^x$ is reflected over the x-axis and translated three units to the right to become $g(x)$, as depicted below.



What is the equation for the graph of $g(x)$?

- A. $g(x) = -2^{(x-3)}$
 - B. $g(x) = -2^x - 3$
 - C. $g(x) = 2^{-(x-3)}$
 - D. $g(x) = 2^{-x} - 3$
19. Two friends decide to join a gym. One friend joins a gym that charges a one time member fee of \$50 and \$20 for each month. The other friend joins a gym that charges a one time member fee of \$80 and \$18 for each month. After how many months will both friends have paid the same total amount?
- A. 15
 - B. 20
 - C. 25
 - D. 30

20. Solve.

$$9 = \sqrt{y - 4} + 7$$

- A. -8
- B. 0
- C. 4
- D. 8

21. Simplify the given expression

$$\left(\frac{-3x^{2n}}{x^{3n}y} \right)^3$$

- A. $\frac{-27}{x^n y}$
- B. $\frac{-27}{x^{3n} y^3}$
- C. $\frac{-9}{x^n y}$
- D. $\frac{-9}{x^{3n} y^3}$

22. To the nearest tenth, find the mean weight of a group of pears with individual weights of 4.7, 4.0, 6.2, 6.5, 6.1, 6.5, 4.7, and 6.0 ounces.

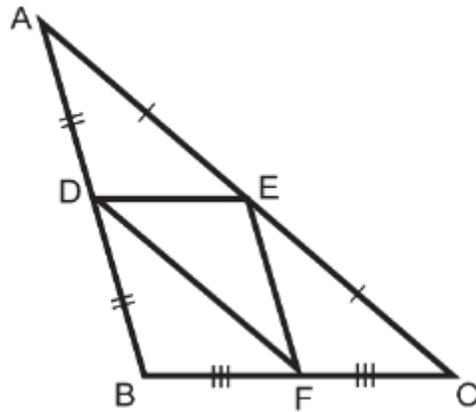
- A. 4.7 oz
- B. 5.6 oz
- C. 6.1 oz
- D. 6.2 oz

-
-
23. Choose the most appropriate way to represent the given data to determine if the speed is constant.

Time (minutes)	Distance (meters)
0	0
1	13
2	26
3	39
4	52
5	65
6	78

- A. box-and-whisker plot
B. circle plot
C. line plot
D. double line plot
24. In a random poll of shoppers at a mall, 32 out of 40 shoppers surveyed live in the same town where the mall is located. On average, 3250 shoppers visit the mall each day. Estimate the number of out-of-town shoppers that visit the mall each day.
- A. 100
B. 256
C. 320
D. 650

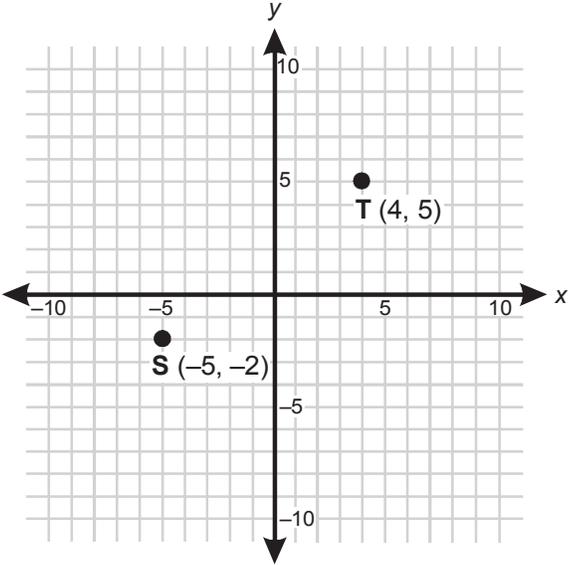
25. Use the diagram to answer the following question.



If $AB = 3x - 2$ and $EF = x + 1$, find AB .

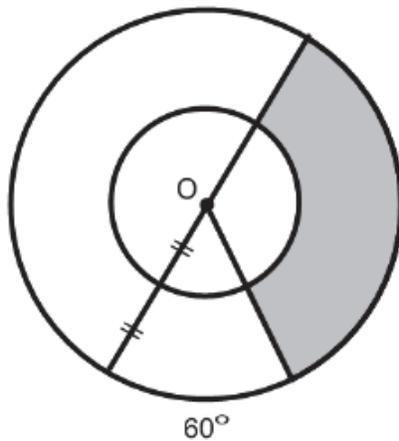
- A. 1
 - B. 4
 - C. 7
 - D. 10
26. Two sides of a triangle measure 4 feet and 9 feet. What must be true of the length of the third side?
- A. It is greater than 4 ft but less than 9 ft.
 - B. It is greater than 5 ft but less than 9 ft.
 - C. It is greater than 4 ft but less than 13 ft.
 - D. It is greater than 5 ft but less than 13 ft.

27. What is the distance from point S to point T ?



- A. 4
- B. 10
- C. $\sqrt{130}$
- D. $\sqrt{136}$

28. The radius of the largest circle is 8 inches. Find the area of the shaded region.



- A. $\frac{4\pi}{3}$ in²
B. $\frac{8\pi}{3}$ in²
C. 4π in²
D. 16π in²
29. The scale on a blueprint drawing is $\frac{1}{4}$ inch = 1 foot. If on the blueprint a living room is $3\frac{3}{4}$ inches wide, what is the actual width of the room?

- A. $3\frac{3}{4}$ ft
B. 4 ft
C. $12\frac{3}{4}$ ft
D. 15 ft

30. A gardener uses a piece of wire fencing 6 meters long to enclose a circular region for a garden. What is the radius of the garden?

- A. $\frac{3}{\pi}$ meters
- B. $\frac{6}{\pi}$ meters
- C. 9π meters
- D. 36π meters

Answer Key

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



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 Middle Grade Mathematics 5-9. 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 and 5–10.
2. Beem, J.K. (2005). *Geometry connections: Mathematics for middle school teachers*. Upper Saddle River, NJ: Prentice Hall.
Presents a rigorous review of college-level geometry, designed to equip middle grades mathematics teachers with the skills needed for teaching. Demonstrates the presentation and use of geometry in the middle school to assist students in linking the typical college geometry course with the standards-based concepts taught by middle school teachers. Includes a variety of activities designed to deepen the connections between the geometry students are presently studying and the geometry they will teach. Useful for review of competencies 9 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 1–5 and 10.

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4. Billstein, R., Shlomo, L., & Lott, J. (2007). *A problem solving approach to mathematics for elementary school teachers* (9th ed.). Boston: Pearson Addison-Wesley.
A comprehensive, skills-based resource emphasizing active and collaborative learning. Useful for review of competencies 1– 5.
 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 1– 7.
 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 2, 6, 8, and 9.
 7. 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, and 5–9.
 8. 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 mathematics concepts with integrated print and technology support. Useful for review of competencies 1, 3, and 5–9.
 9. Larson, R., Boswell, L., Kanold, T.D., & Stiff, L. (2007). *Middle school math course 3*. Evanston, IL: McDougal Littell.
A platform for active learning, flexible lesson planning, and effective assessment. Useful for review of competencies 1, 3, and 5–9.

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10. 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 1–5.

 11. 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 1–5.

 12. Moore, D. (2007). *The basic practice of statistics* (4th 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. Useful for review of competencies 1, 2, and 7.

 13. 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 competencies 1–5.

 14. Papick, I.J. (2005). *Algebra connections: Mathematics for middle school teachers*. Upper Saddle River, NJ: Prentice Hall.
Introduces some basic concepts of number theory and modern algebra that underlie middle grades arithmetic and algebra, with a focus on collaborative learning combined with extensive in-class and out-of-class assignments. Connects college-level abstract algebra and number theory to standards-based middle grades mathematics curricula. Useful for review of competencies 5–7.

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15. 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 1–5, 7, and 8.
 16. 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 1, 3, and 5–9.
 17. 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 findings. Uses real-world applications, puzzles, and extensions to keep students involved and thinking. Useful for review of competencies 1, 3, and 5–9.
 18. Smith, K.J. (1991). *Problem solving (Brooks/Cole one-unit series in precalculus mathematics)*. Belmont, CA: Brooks/Cole.
Covers many areas under algebra, trigonometry, calculus, statistics, and probability. Useful for review of competencies 1, 3, and 5–9.
 19. Van de Walle, J. (2006). *Elementary and middle school mathematics: Teaching developmentally* (6th ed.). Boston: Pearson Allyn & Bacon.
Presents 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 1–5 and 7.

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20. 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– 5 and 7.





Additional Information

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

www.fldoe.org/accountability/assessments/postsecondary-assessment/ftce/

