Oklahoma School Testing Program



Oklahoma Core Curriculum Tests
End-of-Instruction
Algebra II

Spring/Summer 2008

Guide for Parents, Students, and Teachers

Oklahoma State Department of Education Oklahoma City, Oklahoma

Testing Dates 2008 School Year

Spring Testing April 10–May 9

Summer Testing June 9–July 18



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SANDY GARRETT STATE SUPERINTENDENT OF PUBLIC INSTRUCTION STATE OF OKLAHOMA

Dear Parents and Guardians:

This school year, your child will be participating in the Algebra II End-of-Instruction Oklahoma Core Curriculum Test. This test is designed to measure knowledge of Algebra II competencies contained in the *Priority Academic Student Skills* (2007 revision), the basis of Oklahoma's core curriculum.

You will receive a report about your child's performance on the test. Your child may request the opportunity to retake the test once prior to graduation.

This guide provides practice questions, objectives covered in the test, and a list of test-taking tips. Discuss these materials with your child ahead of time to encourage test preparedness. During the test week, it is very important for students to get plenty of sleep, eat a good breakfast, and arrive at school on time.

If you have any questions about the Algebra II End-of-Instruction Test, please contact your local school or the State Department of Education.

Sincerely,

Sandy Garrett

State Superintendent

sf

OKLAHOMA STATE DEPARTMENT OF EDUCATION
2500 NORTH LINCOLN BOULEVARD, OKLAHOMA CITY, OK 73105-4599
(405) 521-3301, Fax: (405) 521-6205
http://sde.state.ok.us
FIRST IN THE TWENTY-FIRST

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The Oklahoma Core Curriculum Tests

The Governor, state legislators, and other Oklahoma elected officials have committed themselves to ensuring that all Oklahoma students receive the opportunity to learn the skills required to succeed in school and in the workplace. To achieve this goal, schools must prepare every Oklahoma student for colleges, universities, and jobs that require new and different skills.

Under the direction of the Legislature, Oklahoma teachers, parents, and community leaders met to agree upon the skills that students are expected to master by the end of each grade. The results of their efforts, *Priority Academic Student Skills (PASS)*, provide the basis for Oklahoma's core curriculum.

In addition, the Legislature established the Criterion-Referenced Test component of the Oklahoma School Testing Program to measure students' progress in mastering the *PASS* objectives. Tests have been developed by national test publishers that specifically measure the Oklahoma *PASS* objectives at the End-of-Instruction levels. Teachers from throughout Oklahoma have been involved in the review, revision, and approval of the questions that are included in the tests.

In contrast to a norm-referenced testing program, the Core Curriculum Tests compare student performance with performance standards established by the State Board of Education. The performance standards are based upon recommendations from groups of Oklahoma educators who evaluated the test and recommended the performance standards for the different levels of performance for each test. The Oklahoma Performance Index, or OPI, is a scaled score earned by a student that places the student into one of the four performance levels (Advanced, Satisfactory, Limited Knowledge, Unsatisfactory).

The state statute reads as follows: "Each student who completes the instruction for the specified secondary level competencies, beginning with the school year listed [below*] and each school year thereafter, shall complete an End-of-Instruction test for those competencies in order to graduate from high school. After the End-of-Instruction tests are fully implemented, all students will take the tests prior to graduation, unless otherwise exempted by law. Students shall be afforded the opportunity to retake the test once prior to graduation. In order to provide an indication of the levels of competency attained by the student in a permanent record for potential future employers and institutions of higher education, school districts shall report the highest achieved state test performance index on the End-of-Instruction tests on the student's high school transcript. It is the intent of the Legislature that, following implementation of the secondary End-of-Instruction tests, the performance data and any available research shall be reviewed for consideration of additional consequences, including, but not limited to, high school graduation."

* 2000–2001—English II, U.S. History; 2002–2003—Algebra I, Biology I; 2007–2008—English III, Algebra II, and Geometry.

Beginning with the freshman class of 2008–2009, Oklahoma students will be required to pass Algebra I and English II and two of the other five tests in order to graduate from high school.

This guide provides an opportunity for parents, students, and teachers to become familiar with this test. It presents general test-taking tips, lists the *PASS* objectives that could be assessed in a statewide testing program, and provides practice multiple-choice questions.

Test-Taking Tips

The following tips provide effective strategies for taking the Oklahoma Core Curriculum Tests. Test-taking skills cannot replace study based on the *PASS* objectives, which serve as the foundation for the tests.

General Test-Taking Tips

- **DO...** read this guide carefully and complete the practice test.
- **DO...** make sure you understand all test directions. If you are uncertain about any of the directions, raise your hand to ask questions before testing has started.
- **DO...** underline, mark, make notes, or work problems in your test booklet if needed. There will be scratch paper provided as well.
- **DO...** read each question and every answer choice carefully. Choose the best answer for each question.
- **DO...** check your work if you finish a test session early. Use the extra time to answer any questions that you skipped in that section.
- **DO...** mark all your answers on the answer document. Make sure the question number in the test booklet matches the question number on the answer document.
- **DO...** remember that if you cannot finish the test within the time allotted, you will be given additional time to complete the test.

- **DON'T...** wait until the last minute to study for the test. The test covers a lot of material, and you cannot learn it all in a short amount of time.
- **DON'T . . .** worry about the test. Students who are calm and sure of themselves do better on tests.
- **DON'T...** spend too much time on any one question. If a question takes too long to answer, skip it and answer the other questions. You can return to any questions you skipped after you have finished all other questions in the section.

The Algebra II Test

This multiple-choice test is administered in two sections, each approximately 60 minutes in length, with up to an additional 20 minutes for testing directions. The test is not strictly timed. Testing sessions for students who need more time can be extended. However, some studies have shown that more than one hour of additional time can contribute to a decrease in student scores. This additional time is available as an immediate extension of the testing session; it is not available as a separate session at another time.

Students who finish a test section early should make sure their work is complete and are encouraged to check and verify their answers within that section prior to closing their test booklets. Once a test section has been completed, students will not be allowed to return to that section.

Calculators may be used on the Algebra II Endof-Instruction Assessment.

Subject-specific Requirements

- Algebra I and Geometry:
 - Scientific Calculators meeting general requirements may be used on all/specified sections.
- Algebra II:
 - o Graphing Calculators meeting general requirements may be used on all/specified sections.

General Requirements

- Calculators are permitted but are not required.
- Calculator capabilities described for a specific subject give the *maximum* capabilities allowed; calculators with less capability are acceptable.
- Students may not share calculators.
- Students may use their own calculators or those provided by the school.
- Calculators that make noise must have the sound feature turned off.
- Calculators that have paper tape must have the tape removed.
- Calculators with power cords must have the cord removed.
- All calculators must have the memory cleared before and after the test session.
- Any programs or applications must be removed prior to the test session.

Prohibited Calculators

- Pocket organizers
- Handheld or laptop computers
- Electronic writing pads or pen-input devices
- Calculators built into cellular phones or other electronic communication devices
- Calculators with a typewriter keypad (QWERTY format)
- * Calculators with programs or applications that cannot be removed or disabled (e.g., Polynomial Root-Finder and Simultaneous Equation Solver on TI-86)
 - Calculators with built-in computer algebra systems, such as, but not limited to:
 - o Casio: Algebra fx 2.0, ClassPad 300, and all model numbers that begin with CFX-9970G
 - o Texas Instruments: All model numbers that begin with TI-89 or TI-92
 - Hewlett-Packard: HP-48GII and all model numbers that begin with HP-40G or HP-49G

Test Security and Validity

 Using a calculator that does not meet the above requirements invalidates the test results and is a violation of test security and test validity. Any violation will be reported to the State Superintendent and may result in revocation of teaching and/or administrative certificates.

The following sections of this guide:

- list the *Priority Academic Student Skills* (2007 revision) that are covered on the Algebra II End-of-Instruction test.
- reproduce the student directions.
- present practice test questions.

Priority Academic Student Skills (2007 Revision)

The *Priority Academic Student Skills* (*PASS*) measured in the End-of-Instruction Algebra II multiple-choice test are presented below. They represent Oklahoma Core Curriculum that is applicable to Algebra II course study and that can be assessed in a statewide testing program. The *PASS* for Algebra II are grouped into standards with specific objectives listed under each one. Student performance on the multiple-choice test will be reported at the standard and objective levels.

End-of-Instruction Algebra II

Standard 1: Number Systems and Algebraic Operations – The student will perform operations with rational, radical, and polynomial expressions, as well as expressions involving complex numbers.

1. Rational Exponents

- a. Convert expressions from radical notations to rational exponents and vice versa.
- b. Add, subtract, multiply, divide, and simplify radical expressions and expressions containing rational exponents.
- 2. Polynomial and Rational Expressions
 - a. Divide polynomial expressions by lower degree polynomials.
 - b. Add, subtract, multiply, divide, and simplify rational expressions, including complex fractions.
- 3. Complex Numbers
 - *a. Recognize that to solve certain problems and equations, number systems need to be extended from real numbers to complex numbers.
 - b. Add, subtract, multiply, divide, and simplify expressions involving complex numbers.

Standard 2: Relations and Functions – The student will use the relationships among the solution of an equation, zero of a function, x-intercepts of a graph, and factors of a polynomial expression to solve problems involving relations and functions.

1. Functions and Function Notation

- a. Recognize the parent graphs of polynomial, exponential, and logarithmic functions and predict the effects of transformations on the parent graphs, using various methods and tools which may include graphing calculators.
- b. Use function notation to add, subtract, multiply, and divide functions.
- c. Combine functions by composition.
- d. Use algebraic, interval, and set up notations to specify the domain and range of functions of various types.
- e. Find and graph the inverse of a function, if it exists.

2. Systems of Equations

- a. Model a situation that can be described by a system of equations and inequalities and use the model to answer questions about the situation.
- b. Solve systems of linear equations and inequalities using various methods and tools which may include substitution, elimination, matrices, graphing, and graphing calculators.
- c. Use either one quadratic equation and one linear equation or two quadratic equations to solve problems.

Note: Asterisks (*) have been used to identify standards and objectives that must be assessed by the local school district. All other skills may be assessed by the Oklahoma School Testing Program (OSTP).

- 3. Quadratic Equations and Functions
 - a. Solve quadratic equations by graphing, factoring, completing the square and quadratic formula.
 - b. Graph a quadratic function and identify the x- and y-intercepts and maximum or minimum value, using various methods and tools which may include a graphing calculator.
 - c. Model a situation that can be described by a quadratic function and use the model to answer questions about the situation.
- 4. Identify, graph, and write the equations of the conic sections (circle, ellipse, parabola, and hyperbola).
- 5. Exponential and Logarithmic Functions
 - a. Graph exponential and logarithmic functions.
 - b. Apply the inverse relationship between exponential and logarithmic functions to convert from one form to another.
 - c. Model a situation that can be described by an exponential or logarithmic function and use the model to answer questions about the situation.
- 6. Polynomial Equations and Functions
 - a. Solve polynomial equations using various methods and tolls which may include factoring and synthetic division.
 - b. Sketch the graph of a polynomial function.
 - c. Given the graph of a polynomial function, identify the x- and y-intercepts, relative maximums and relative minimums, using various methods and tools which may include a graphing calculator.
 - d. Model a situation that can be described by a polynomial function and use the model to answer questions about the situation.
- 7. Rational Equations and Functions
 - a. Solve rational equations.
 - b. Sketch the graph of a rational function.
 - c. Given the graph of a rational function, identify the x- and y-intercepts and the asymptotes, using various methods and tools which may include a graphing calculator.
 - d. Model a situation that can be described by a rational function and use the model to answer questions about the situation.

Standard 3: Data Analysis and Statistics - The student will use data analysis and statistics to formulate and justify predictions from a set of data.

- 1. Analysis of Collected Data Involving Two Variables
 - a. Display data on a scatter plot.
 - b. Interpret results using a linear, exponential, or quadratic model/equation.
 - c. Identify whether the model/equation is a curve of best fit for the data, using various methods and tools which may include a graphing calculator.
- *2. Measures of Central Tendency and Variability
 - a. Analyze and synthesize data from a sample using appropriate measures of central tendency (mean, median, mode, weighted average).
 - b. Analyze and synthesize data from a sample using appropriate measures of variability (range, variance, standard deviation).
 - c. Use the characteristics of the Gaussian normal distribution (bell-shaped curve) to solve problems.
 - d. Identify how given outliers affect representations of data.
- 3. Identify and use arithmetic and geometric sequences and series to solve problems.

Note: Asterisks (*) have been used to identify standards and objectives that must be assessed by the local school district. All other skills may be assessed by the Oklahoma School Testing Program (OSTP).

Oklahoma End-of-Instruction Algebra II Alignment Blueprint 2007–2008

The Test Blueprint reflects the degree to which each *PASS* standard and objective is represented on the test. The overall distribution of operational items in a test form is intended to look as follows:

	PASS Standards and Objectives	Ideal Number of Items	Ideal Percentage of Test
Numbe	r Sense and Algebraic Operations (1.0)	15	27%
1.1	Rational Exponents	5–6	
1.2	Polynomial and Rational Expressions	5–6	
1.3	Complex Numbers	4	
Relations and Functions (2.0)		31	56%
2.1	Functions and Function Notation	5	
2.2	System of Equations	5	
2.3	Quadratic Equations and Functions	5	
2.4	Conic Sections	4	
2.5	Exponential and Logarithmic Functions	4	
2.6	Polynomial Equations and Functions	4	
2.7	Rational Equations and Functions	4	
Data Analysis, Probability, and Statistics (3.0)		9	16%
3.1	Analysis of Collected Data	5	
3.3	Arithmetic and Geometric Sequences	4	
Total Te	st	55	100%

- A minimum of four items is required to report results for a standard and objective.
- Percents are approximations and may result in a sum other than 100 due to rounding.
- First column represents the standards and objectives in *PASS* assessed on the Oklahoma Core Curriculum Test (OCCT).
- Second column represents the goal for aligning the OCCT to the PASS standards and objectives.

Algebra II Practice Test

Note for students:

The practice test in the following section is a shortened version of a test similar to the End-of-Instruction Algebra II test you will take.

Follow the instructions below as you take the practice test.

Practice Test Directions

- 1. Mark your answers to the practice test questions on the inside back cover of this guide.
- 2. Look at the Algebra II Practice Test on the next page. Read the directions at the top of the page.
- 3. Look at Sample A in the box. Read it to yourself and think of the answer. Then look at the answer document. The correct answer to Sample A has been filled in. This shows you how to mark your answers.
- 4. Read Sample B of the Algebra II Practice Test.

 Mark your answer to Sample B. Then answer the remaining practice questions. Fill in the circle for each answer completely, as shown in the sample.

 You may underline, mark, make notes, or work out problems in your test booklet. However, make sure you mark your answers on your answer document.
- 5. When you are finished, check your answers against the answer key printed on page 14 of this guide. The standard, objective, and skill for each question are also shown.

Directions

Read each question and choose the best answer. Find the question number on the answer document that matches the question number in the Algebra II Practice Test. Then mark your answer on the answer document.

The correct answer for Sample A has been filled in on the answer document to show you how to mark your answers. Mark your answer for Sample B.

Sample A

$$f(x) = x^3 - 3x^2 - 4x + 12$$

Which of these is a root of f(x)?

- **A** -3
- **B** 3
- **C** 4
- **D** 12

Sample B

Which is equivalent to $49^{\frac{3}{2}}$?

- **F** 21
- **G** 98
- **H** 294
- **J** 343

Profits (P) are equal to sales (S) minus expenses (E). If expenses are equal to travel (T) plus materials (M) which system of equations models this situation?

$$A \quad P = S - E$$

$$E = T + M$$

$$\mathbf{B} \quad P = S + E$$

$$E = T + M$$

C
$$P = S - E$$

$$E = T - M$$

D
$$P = S + E$$

$$E = T - M$$

2

$$(2\sqrt{5} + 3)(\sqrt{5} - 1)$$

What is the simplified form of this expression?

F
$$\sqrt{5} - 3$$

G
$$\sqrt{5} + 7$$

H
$$2\sqrt{5} - 3$$

J
$$2\sqrt{5} + 7$$

3

$$\frac{4x^2y}{8xy^2} \div \frac{12xy^2}{8x^6y^3}$$

Which expression represents the quotient?

A
$$\frac{x^5}{3}$$

B
$$\frac{3}{x^5}$$

c
$$\frac{x^6}{3}$$

D
$$\frac{3}{x^6}$$

A landscape designer has to construct a rectangular flower bed with a perimeter of 100 feet and the maximum possible area. What is the area of the flower bed?

5

Arithmetic Sequences & Series

$$n^{th}$$
 term: $a_n = a_1 + (n-1)d$

Sum:
$$s_n = \frac{n}{2}(a_1 + a_n)$$

Geometric Sequences & Series

$$n^{th}$$
 term: $a_n = a_1 r^{(n-1)}$

Sum:
$$s_n = \frac{a_1(1-r^n)}{(1-r)}$$

Which formula could be used to find the sum of an arithmetic series if the last term is unknown?

A
$$s_n = \frac{n}{2}(2a_1 + (n-1)d)$$

B
$$s_n = \frac{n}{2}(2a_1 + (n+1)d)$$

C
$$s_n = n(2a_1 + (n-1)d)$$

D
$$s_n = n(2a_1 + (n+1)d)$$

6

$$f(x) = 2x + 7$$

$$g(x) = 3x^2 - 1$$

Which expression represents f(g(x))?

F
$$6x^2 + 5$$

G
$$6x^2 + 12$$

H
$$3x^2 - 2x - 8$$

J
$$3x^2 + 2x + 6$$

7

$$2-x-\frac{1}{3-x}$$

What is the simplified form of this expression?

A
$$\frac{1}{3-2x}$$

B
$$\frac{x^2 - x + 3}{3 - x}$$

c
$$\frac{x^2 - 5x + 5}{3 - x}$$

D
$$\frac{x^2 - 5x + 7}{3 - x}$$

What is the equation of a circle with center (-4, 2) and diameter 6?

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

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

H
$$(x-4)^2 + (y+2)^2 = 9$$

J
$$(x+4)^2 + (y-2)^2 = 9$$

9

$$f(x) = \frac{x^2 - 9}{16 - x^2}$$

What are the vertical and horizontal asymptotes of this function?

A
$$x = \pm 4$$
, and $y = -1$

B
$$x = \pm 4$$
, and $y = 1$

C
$$y = \pm 4$$
, and $x = -1$

D
$$y = \pm 4$$
, and $x = 1$

Which function has the fewest domain restrictions for real numbers?

F
$$f(x) = \frac{1}{x-1}$$

G
$$f(x) = \frac{1}{x+1}$$

H
$$f(x) = \frac{1}{x^2 - 1}$$

J
$$f(x) = \frac{1}{x^2 + 1}$$

Which equation represents the solution for *x* in the formula

$$6^{x} = 21?$$

$$\mathbf{A} \quad x = \frac{\log 6}{\log 21}$$

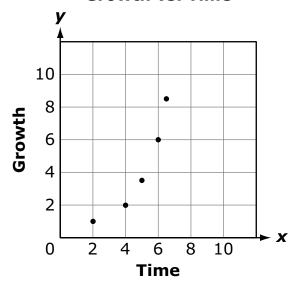
$$\mathbf{B} \quad x = \frac{\log 21}{\log 6}$$

C
$$x = \log 21 - \log 6$$

D
$$x = \log 21 + \log 6$$

12

Growth vs. Time



Which type of function best models the data in the scatter plot?

- **F** exponential
- **G** linear
- **H** logarithmic
- **J** quadratic

What are the solutions of $x^2 + 5x - 3 = 0$?

If
$$ax^2 + bx + c = 0$$
 and $a \ne 0$, then
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- **A** $\frac{-5 + \sqrt{13}}{2}$ and $\frac{-5 \sqrt{13}}{2}$
- **B** $\frac{-5 + \sqrt{37}}{2}$ and $\frac{-5 \sqrt{37}}{2}$
- **c** $\frac{5 + \sqrt{13}}{2}$ and $\frac{5 \sqrt{13}}{2}$
- **D** $\frac{5 + \sqrt{37}}{2}$ and $\frac{5 \sqrt{37}}{2}$

What is the completely simplified equivalent of $\frac{2}{5+i}$?

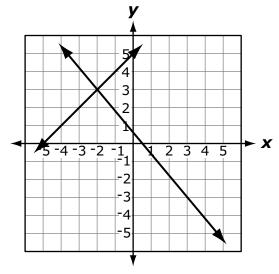
- **F** $\frac{5-i}{12}$
- **G** $\frac{5+i}{12}$
- **H** $\frac{5-i}{13}$
- **J** $\frac{5+i}{13}$

15

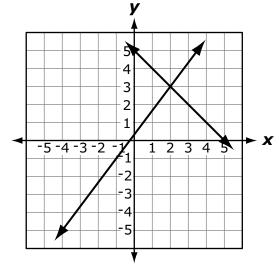
$$\begin{cases} x + y + 5 = 0 \\ x + y + 5 = 0 \end{cases}$$

Which graph shows the solution to this system of equations?

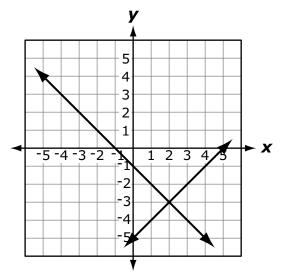
A



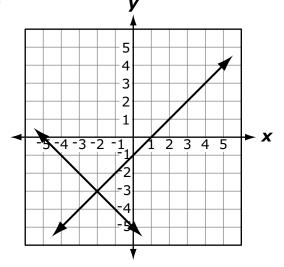
В



C



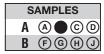
D



Answer Key

q	7	7	D	12
q	8	Ţ	Н	ħΙ
g	8	7	В	13
Э	Ţ	8	Ā	12
q	ç	7	В	II
p	I	7	ſ	10
Э	L	7	A	6
-	₽	7	ſ	8
q	7	Ţ	С	L
Э	Ţ	7	Я	9
-	8	8	Y	Ğ
р	9	7	Н	₽
ន	7	Ţ	C	8
q	Ţ	Ţ	G	7
q	2	7	A	Ţ
g	Ţ	Ţ	ſ	Sample B
g	9	7	В	A əlqms2
Skill	evitoeldO	branatZ (3 bns 4 .qq)	Correct Answer	Item Number
II srdəglA				

Algebra II



Section 1

1 ABCD	11 ABCD	21 (A (B) (C) (D) (22 (F) (G) (H) (J) (23 (A (B) (C) (D) (24 (F) (G) (H) (J) (25 (A (B) (C) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D	31 A B C D
2 F G H J	12 FGHU		32 F G H J
3 ABCD	13 ABCD		33 A B C D
4 F G H J	14 FGHU		34 F G H J
5 ABCD	15 ABCD		35 A B C D
6 F G H J	16 F G H J	26 F G H J	
7 A B C D	17 A B C D	27 A B C D	
8 F G H J	18 F G H J	28 F G H J	
9 A B C D	19 A B C D	29 A B C D	
10 F G H J	20 F G H J	30 F G H J	

STOP Do not go on to Section 2 until you are instructed to do so.

Section 2

36 F G H J	46 F G H J	56 F G H J	66 F G H J
37 A B C D	47 A B C D	57 A B C D	67 A B C D
38 F G H J	48 F G H J	58 F G H J	68 F G H J
39 A B C D	49 A B C D	59 A B C D	69 A B C D
40 F G H J	50 F G H J	60 F G H J	70 F G H J
41 (A (B (C (D	51 ABCD 52 F G H J 53 ABCD 54 F G H J 55 ABCD	61 (A (B) (C) (D) (62 (F) (G) (H) (J) (63 (A) (B) (C) (D) (G) (G) (G) (G) (G) (G) (G) (G) (G) (G	71 (A (B (C) (D) (72 (F (G) H) (J) (73 (A (B (C) (D) (74 (F (G) H) (J) (75 (A (B (C) (D) (D) (D) (D) (D) (D) (D) (D) (D) (D

