Louisiana Guide to End-of-Course Assessment for Algebra I

This guide includes:

I. Purpose of Assessment Guide

This document is designed to assist Louisiana educators in understanding the Algebra I End-of-Course (EOC) online assessment.

II. Test Structure

The following table outlines the test structure and suggested testing times for the Algebra I EOC test.

Subtest Description	Number of Items[1]	Number of Points	Suggested Testing Times
Multiple Choice, No Calculator	25	23	60 minutes
Constructed-Response, Calculator	2	4	40 minutes
Multiple Choice, Calculator	25	23	60 minutes
Totals	**52**	**50**	**160 minutes**

[1] Forty-six multiple-choice and one constructed-response items are operational. The other five items are embedded field test items, which may be used to develop new forms.

The test is **untimed**. Although suggested testing times are provided for each session, it is very important that students be given sufficient time to complete the test. Once students have started a test session, they should proceed without interruption until they have completed the session.

III. Test Design

The Louisiana Mathematics Standards define what students should know and be able to do by the end of the Algebra I course[2]. The Algebra I course is comprised of standards from the following conceptual categories[3]: Algebra, Functions, Number and Quantity, and Statistics and Probability. Each test item is aligned to one or part of one standard.

For the EOC Algebra I assessment, test content is prioritized based on whether a standard is considered to be major, supporting, or additional content[4] for the work of Algebra I. Major content accounts for 75% of tested material, while supporting and additional content account for the remaining 25%. Supporting and additional content should be incorporated throughout instruction of the major content. Neglecting any material will leave gaps in student knowledge and cause instructional challenges in future courses. Constructed-response items may cover any content—major, supporting or additional.

- Major content (green) requires greater emphasis based on the depth of the ideas, mastery time, and/or importance to future mathematics or demands of college and career readiness.
- Supporting content (blue) supports and strengthens areas of major emphasis.
- Additional content (yellow) bridges content from one course to the next, but may not establish tight or explicit connectivity to the major work of a course.

The Algebra I EOC Test Design Table contains the following information:

- EOC subscore and conceptual category/categories
- Number of points and percent of points per conceptual category
- Major, supporting, and additional content standards assessed per conceptual category

[2] Related standards are organized into clusters; clusters are combined to form the domains; and domains are combined to form conceptual categories.
[3] For consistency in reporting, the EOC Interpretive Guide refers to these conceptual categories as domains.
[4] The *Model Content Frameworks* serves as a basis for this determination.

Some standards listed in the table are in both Algebra I and Algebra II courses. Teachers should examine which standards cross-cut between the two courses and how those standards should be applied in each course.[5]

Algebra I EOC Test Design

Subscore1

Algebra
19 of 50 points
38% of points

Major Content	
A.APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
A.CED.A.1	Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
A.CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
A.CED.A.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
A.CED.A.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.*
A.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.REI.B.4	Solve quadratic equations in one variable. a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. Click here to see a sample constructed-response item for this standard.
A.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
A.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
A.REI.D.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
A.SSE.A.1	Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.*
A.SSE.A.2	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

[5] The *Model Content Frameworks* also provides guidance on how a standard may split between the two courses and/or limitations that may differentiate how the same standard should be addressed in each course. This information can be found on the Pathway Summary Table (Table 1) on page 55 and the Assessment Limits for Standards Assessed on More Than One End-of-Course Test table (Table 2) on pages 56-59.

		Supporting and Additional Content	
		A.APR.B.3	Identify zeroes of polynomials when suitable factorizations are available, and use the zeroes to construct a rough graph of the function defined by the polynomial.
		A.REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
		A.REI.C.6	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
		A.SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeroes of the function it defines. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*
Subscore 2	Functions 18 of 50 points 36% of points	**Major Content**	
		F.IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y* = *f*(*x*).
		F.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. Click here to see a sample constructed-response item for this standard.
		F.IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*
		F.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* Click here to see a sample constructed-response item for this standard.
		F.IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
		F.IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
		Supporting and Additional Content	
		F.BF.A.1	Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
		F.BF.B.3	Identify the effect on the graph of replacing *f*(*x*) by *f*(*x*) + *k*, *k f*(*x*), *f*(*kx*), and *f*(*x* + *k*) for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*
		F.IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
		F.IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeroes, extreme values, and symmetry of the graph, and interpret these in terms of a context.
		F.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*
		F.LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
		F.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
		F.LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
		F.LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.

Subscore 3	Number and Quantity 4 of 50 points 8% of points	**Major Content**	
		None	
		Supporting and Additional Content	
		N.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
		N.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
		N.Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
		N.RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
	Statistics and Probability 9 of 50 points 18% of points	**Major Content**	
		S.ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
		S.ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
		S.ID.C.9	Distinguish between correlation and causation.
		Supporting and Additional Content	
		S.ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
		S.ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
		S.ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
		S.ID.B.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
		S.ID.B.6	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association.

IV. Testing Materials

The Algebra I Typing Help has been updated to include how to type complex roots. Teachers should incorporate the Typing Help into their assessments as often as possible to prepare students in using this tool. Students should also regularly use the EOC Tests Online Calculator if this is the calculator they will be using on the assessment. Graph paper should be made available for student use throughout the year. As in previous years, there is no reference sheet for the Algebra I EOC. The following table identifies the tools available for each session.

Tool	Provided	Session 1	Session 2	Session 3
scratch paper, graph paper, two pencils	by Test Administrator	YES	YES	YES
inch ruler, centimeter ruler, and protractor	online	YES	YES	YES
calculator	online and/or by Test Administrator	NO	YES	YES
Algebra I Typing Help	online and/or by Test Administrator	NO	YES	NO

Note: Students are **NOT** allowed to use calculators during session 1 unless students have the approved accommodation *Assistive Technology* and are allowed the use of a calculator.

V. Calculator Policy

It is recommended that a calculator be made available to each student for instructional and assessment purposes. As with all instructional materials, each individual district and school should determine which calculator best supports its mathematics curriculum and instructional program. It is recommended that grade 9 –12 students use a scientific calculator with graphing capabilities. Students are not allowed to share calculators within a test session. Calculator memories should be cleared at the end of each test session.

Calculators **not** permitted on statewide assessment:

- handheld or laptop computers
- pocket organizers
- calculators with Computer Algebra Systems (CAS) or other symbolic manipulation capabilities
- calculators with paper tape
- calculators that talk or make noise
- calculators with QWERTY (typewriter-style) keypads
- electronic writing pads or pen input devices
- cell phone calculators

VI. Resources

Assessment Resources

- Algebra I Sample Test Items 2013-2014 and Algebra I Sample Test Items 2014-2015: include sample items for all parts of the assessment, annotations explaining each item, and authentic student responses representing different score points for the constructed-response section
- Algebra I Constructed-Response Samples: includes 3 constructed-response items with scoring information
- Achievement Level Descriptors: provides descriptions of what students know and can do at each Algebra I achievement level

Instructional Resources

- 2014 Math High School Guidebook: offers comprehensive information to support teacher in creating yearly, unit, and daily instructional plans for students
- Year Plan-Mathematics Algebra I Sample: provides a suggested scope for implementation of curriculum
- Algebra I Math Remediation Guide: connects the Algebra I standards to middle school prerequisite knowledge
- Algebra I Extended Constructed Response Tasks: contains only the Algebra I ECR tasks from the 2014 Math High School Guidebook
- Algebra I Instructional Tasks: contains only the Algebra I instructional tasks from the 2014 Math High School Guidebook
- Unit Plan-Mathematics Algebra I Unit 1 Sample: provides a suggested scope for the first instructional unit in Algebra I
- EAGLE Sample Test Items: houses a bank of items that can be used for instructional or assessment purposes

General EOC Information

- EOC website: includes information on all aspects of the administration of the EOC tests, which can be accessed through the tabs at the top of the homepage (Some of the materials include announcements about current administrations, such as score report availability, registration dates, etc.; plus test coordinator and technology resources, such as the Test Administration Manual and technology guides.)
- EOC Interpretive Guide: includes an overview of the EOC tests, explanations of the processes for scoring the tests and establishing performance standards, and guidance on how to interpret the various EOC reports
- 2015-16 Louisiana Assessment Calendar: provides information on testing windows for all assessments administered in Louisiana