To the Student:

After your registration is complete and your proctor has been approved, you may take the Credit by Examination for Algebra 1B.

WHAT TO BRING

- several sharpened No. 2 pencils
- graphic calculator

ABOUT THE EXAM

The examination for the second semester of Algebra I consists of 40 questions, of which 34 are multiple choice and the rest are short answer. All of the problems require problem-solving skills, and you must do all of your work on the exam paper. The exam is based on the Texas Essential Knowledge and Skills (TEKS) for this subject. The full list of TEKS is included in this document (it is also available online at the Texas Education Agency website, http://www.tea.state.tx.us/). The TEKS outline specific topics covered in the exam, as well as more general areas of knowledge and levels of critical thinking. Use the TEKS to focus your study in preparation for the exam.

The examination will take place under supervision, and the recommended time limit is three hours. You may not use any notes or books. A percentage score from the examination will be reported to the official at your school.

In preparation for the examination, review the TEKS for this subject. All TEKS are assessed. A list of review topics is included in this document to focus your studies. It is important to prepare adequately. Since questions are not taken from any one course, you can prepare by reviewing any of the state-adopted textbooks that are used at your school. The textbook used with our ALG 1A course is:

Bellman et al. (2008). *Prentice Hall Mathematics, Texas Algebra I.*

An Algebra I formula chart is included in this document for your study. The exam will include the formula chart as well. The practice exam will give you a model of the types of questions that will be asked on your examination. It is not a duplicate of the actual examination. It is provided to illustrate the format of the exam, not to serve as a complete review sheet.

Good luck on your examination!
Preparing for the CBE

You will find the following topics addressed in the ALG 1B CBE:

- graphing linear equations
- forms of linear equations: slope-intercept, standard form, and point-slope form
- how to use each form of linear equation to find things like the x- and y-intercepts of a line, the slope, etc.
- how to graph a line using the slope and y-intercept
- understanding how changes in the equation have certain effects on the graph of that equation
- writing equations of lines parallel or perpendicular to a given line
- using linear equations to solve word problems, including those involving changes in proportion
- understanding direct variation
- how to solve a system of equations by graphing?
- recognizing that a given system has no solution, one solution, or infinitely many solutions
- using substitution and elimination to solve a system of equations
- graphing an inequality
- finding solutions to inequalities
- understanding zero and negative exponents
- simplifying expressions with exponents
- the multiplication and division properties of exponents
- understanding the basics of exponential growth and decay
- simplifying sums
- simplifying products
- factoring polynomials
- simplifying the product using FOIL
- finding the square
- factoring expressions
- solving equations by factoring
- how to add, subtract, and multiply polynomials
• finding the greatest common factor
• how to factor by grouping
• drawing the parent function of a linear or quadratic equation
• graphing quadratic functions
• using the quadratic formula

You should review these subjects to prepare yourself for the exam.

You do not need to memorize the formulas provided on the formula chart on the next page; they will be provided for you on the final in the exact same format. Just make sure that you understand how to use them. Not all formulas will be used, so do not panic if you have finished all of the questions and you have not used every formula.
# Algebra I Formula Chart

<table>
<thead>
<tr>
<th>Formula</th>
<th>Equation/Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pythagorean Theorem</strong></td>
<td>( a^2 + b^2 = c^2 )</td>
</tr>
<tr>
<td><strong>Direct Variation</strong></td>
<td>( y = kx ), where ( x \neq 0 )</td>
</tr>
<tr>
<td><strong>Inverse Variation</strong></td>
<td>( xy = k ), where ( k \neq 0 )</td>
</tr>
<tr>
<td><strong>Distance Formula</strong></td>
<td>( d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} )</td>
</tr>
<tr>
<td><strong>Slope of a Line</strong></td>
<td>( m = \frac{y_2 - y_1}{x_2 - x_1} )</td>
</tr>
<tr>
<td><strong>Midpoint Formula</strong></td>
<td>( M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) )</td>
</tr>
<tr>
<td><strong>Quadratic Formula</strong></td>
<td>( x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} )</td>
</tr>
<tr>
<td><strong>Slope-Intercept Form of an Equation</strong></td>
<td>( y = mx + b )</td>
</tr>
<tr>
<td><strong>Point-Slope Form of an Equation</strong></td>
<td>( y - y_1 = m(x - x_1) )</td>
</tr>
<tr>
<td><strong>Standard Form of an Equation</strong></td>
<td>( Ax + By = C )</td>
</tr>
<tr>
<td><strong>Simple Interest Formula</strong></td>
<td>( I = Prt )</td>
</tr>
</tbody>
</table>
Multiple Choice. Identify the choice that best completes the statement or answers the question.

1. Which graph represents the following system of equations?

\[ y = 3x + 3 \]
\[ y = -x - 3 \]

- a. 
- b. 
- c. 
- d. 

2. Which number is NOT written in scientific notation?

- a. \(3 \times 10^{-8}\)
- b. \(6.7 \times 10^3\)
- c. \(8.7 \times 10^{-5}\)
- d. \(25.67 \times 10^{-2}\)
Find the slope of the line that passes through the pair of points.

_____ 3. (1, 7), (10, 1)

a. \( \frac{3}{2} \)

b. \( \frac{2}{3} \)

c. \( \frac{-3}{2} \)

d. \( \frac{2}{3} \)

Write the slope-intercept form of the equation for the line.

_____ 4.

\[ y = \frac{3}{2}x - 1 \]

\[ y = -\frac{3}{2}x - 1 \]

\[ y = \frac{1}{3}x + 1 \]

\[ y = \frac{1}{3}x - 1 \]
5. Use the slope and y-intercept to graph the equation.

\[ y = \frac{3}{4}x - 3 \]

a.  

b.  

c.  

d.  

Find the x- and y-intercept of the line.

6. \(2x + 3y = -18\)

a. \(x\)-intercept is 18; \(y\)-intercept is 18.

b. \(x\)-intercept is –6; \(y\)-intercept is –9.

c. \(x\)-intercept is 2; \(y\)-intercept is 3.

d. \(x\)-intercept is –9; \(y\)-intercept is –6.
7. Write \( y = \frac{2}{3}x + 7 \) in standard form using integers.

   a. \(-2x + 3y = 21\)
   b. \(3x - 2y = 21\)
   c. \(-2x - 3y = 21\)
   d. \(-2x + 3y = 7\)

Write an equation in point-slope form for the line through the given point with the given slope.

8. \((4, -6); m = \frac{3}{5}\)

   a. \(y + 6 = \frac{3}{5}x - 4\)
   b. \(y - 6 = \frac{3}{5}(x + 4)\)
   c. \(y + 6 = \frac{3}{5}(x - 4)\)
   d. \(y - 4 = \frac{3}{5}(x + 6)\)

Write an equation for the line that is parallel to the given line and that passes through the given point.

9. \(y = -5x + 3; (-6, 3)\)

   a. \(y = -5x + 27\)
   b. \(y = -5x - 27\)
   c. \(y = 5x - 9\)
   d. \(y = -5x + 9\)

continued →
Write the equation of a line that is perpendicular to the given line and that passes through the given point.

10. $4x - 12y = 2; (10, -1)$
   a. $y = 3x + 29$
   b. $y = \frac{1}{3}x + 29$
   c. $y = -3x + 29$
   d. $y = -\frac{1}{3}x + 7$

Graph each system. Tell whether the system has no solution, one solution, or infinitely many solutions.

11. $y = 5x - 4$
    $y = 5x - 5$
    a. no solutions
    b. one solution
    c. infinitely many solutions

Solve the system of equations using substitution.

12. $y = x + 6$
    $y = -2x - 3$
    a. (1, 7)
    b. (-3, 3)
    c. $\left(-6, \frac{3}{2}\right)$
    d. (4, -11)

Solve the system using elimination.

13. $6x + 3y = -12$
    $6x + 2y = -4$
    a. (10, -16)
    b. (2, -8)
    c. (-2, 8)
    d. (-10, 16)
Graph the inequality.

14. \( y < 4x - 2 \)

___

a.  

b.  

c.  

d.  

continued \( \rightarrow \)
Write the linear inequality shown in the graph.

15. [Diagram of a graph with axes labeled x and y.]

- a. $x > -3$
- b. $x \geq -3$
- c. $y > -3$
- d. $y \geq -3$

Simplify the expression.

16. $(-8.6)^0$

- a. -1
- b. 0
- c. -8.6
- d. 1

17. $7a^{-5}b^3$

- a. $7ab^{-15}$
- b. $\frac{b^3}{7a^5}$
- c. $\frac{7b^3}{a^5}$
- d. $7a^5b^{-3}$
18. \((k^2)^4\)
   a. \(k^6\)
   b. \(2k^8\)
   c. \(k^{16}\)
   d. \(k^8\)

Write the number in scientific notation.

19. 0.0805
   a. \(80.5 \times 10^{-3}\)
   b. \(8.05 \times 10\)
   c. \(0.805 \times 10^{-1}\)
   d. \(8.05 \times 10^{-2}\)

Write the number in standard notation.

20. \(9.07 \times 10^{-2}\)
   a. 0.0907
   b. 0.907
   c. 0.00907
   d. −181.4

21. Simplify the sum.
\[
(4u^3 + 4u^2 + 2) + (6u^3 - 2u + 8)
\]
   a. \(10 - 2u + 4u^2 + 10u^3\)
   b. \(-2u^3 - 2u^2 + 4u - 10\)
   c. \(-2u^3 + 4u^2 - 2u + 10\)
   d. \(10u^3 + 4u^2 - 2u + 10\)

continued →
Simplify the product.

_____22. \(3p^4(4p^4 + 7p^3 + 4p + 1)\)

a. \(12p^8 + 3p^7 + 4p^5 + p^4\)
b. \(12p^8 + 21p^7 + 12p^5 + 3p^4\)
c. \(7p^8 + 10p^7 + 7p^5 + 4p^4\)
d. \(12p^{16} + 21p^{12} + 15p^4\)

Factor the polynomial.

_____23. \(54c^3d^4 + 9c^4d^2\)

a. \(9c^3d^2(d^2 + 6c)\)
b. \(9c^3d^2(6d^2 + c)\)
c. \(9c^4d^2(d^2 + 6)\)
d. \(9c^4d^2(6d^2 + 1)\)

Simplify the product using FOIL.

_____24. \((3x - 7)(3x - 5)\)

a. \(9x^2 + 6x + 35\)
b. \(9x^2 + 36x + 35\)
c. \(9x^2 - 36x - 35\)
d. \(9x^2 - 36x + 35\)

_____25. \((4x + 3)(2x + 5)\)

a. \(8x^2 + 14x - 15\)
b. \(8x^2 - 14x - 15\)
c. \(8x^2 + 26x + 15\)
d. \(8x^2 - 26x + 15\)

continued →
Find the square.

26. \((2x - 6)^2\)
   a. \(4x^2 - 24x + 36\)
   b. \(4x^2 - 8x + 36\)
   c. \(4x^2 + 36\)
   d. \(4x^2 - 12x + 36\)

Find the product.

27. \((j + 7)(j - 7)\)
   a. \(j^2 + 14j - 49\)
   b. \(j^2 - 14j - 49\)
   c. \(j^2 + 14j - 49\)
   d. \(j^2 - 49\)

Factor the expression.

28. \(x^2 - 10xy + 24y^2\)
   a. \((x + 6y)(x + 4y)\)
   b. \((x - 2y)(x + 12y)\)
   c. \((x + 2y)(x - 12y)\)
   d. \((x - 6y)(x - 4y)\)

29. \(15x^2 - 16xy + 4y^2\)
   a. \((3x - 2y)(5x + 2y)\)
   b. \((3x - 2y)(5x - 2y)\)
   c. \((3x + 2y)(5x - 2y)\)
   d. \((3x + 2y)(5x + 2y)\)
30. \(49b^2 - 36\)
   a. \((6b + 7)(6b - 7)\)
   b. \((7b + 6)(7b + 6)\)
   c. \((7b + 6)(7b - 6)\)
   d. \((7b - 6)(7b - 6)\)

31. Graph \(f(x) = -2x^2 - 2x - 1\). Label the axis of symmetry and vertex.

   a. Axis of symmetry: \(x = -0.5\)
      Vertex: \((-0.5, 0.5)\)
   
   b. Axis of symmetry: \(x = -0.5\)
      Vertex: \((-0.5, -0.5)\)
   
   c. Axis of symmetry: \(x = -0.5\)
      Vertex: \((-0.5, 0.5)\)
   
   d. Axis of symmetry: \(x = 0.5\)
      Vertex: \((0.5, -0.5)\)
32. Solve \( x^2 + 2 = 6 \) by graphing the related function.

\[ \text{There are two solutions: 2 and } -2. \]

\[ \text{There are two solutions: 2 and } -2. \]

\[ \text{There are two solutions: } \pm \sqrt{8}. \]

\[ \text{There are no real number solutions.} \]

33. Solve the equation by factoring.

\[ 3z^2 + 3z - 6 = 0 \]

a. \( z = 1 \) or \( z = -2 \)
b. \( z = 1 \) or \( z = 2 \)
c. \( z = 3 \) or \( z = -2 \)
d. \( z = 3 \) or \( z = 2 \)
34. \( z^2 - 6z - 27 = 0 \)
   a. \( z = 3 \) or \( z = 9 \)
   b. \( z = 3 \) or \( z = -9 \)
   c. \( z = -3 \) or \( z = 9 \)
   d. \( z = -3 \) or \( z = -9 \)

**Short Answer.** Work the following problems on your own paper.

35. Factor the following trinomial.
   \[ w^{18} - 9w^9y^5 + 14y^{10} \]

36. Factor the following expression.
   \[ 198q^3r^2 - 184q^2r^2 + 18qr^2 \]

37. Make a table of values and graph the quadratic function \( y = \frac{3}{4}x^2 \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y = \frac{3}{4}x^2 )</th>
<th>( (x, y) )</th>
</tr>
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<tbody>
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</tbody>
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38. Simplify the product.
   \[ 7a^3\left(5a^6 - 2b^3\right) \]
State whether the slope is 0 or undefined.

39.

Find the slope of the line.

40.
ALG 1B Practice Final Exam Answer Keys

Multiple Choice

1. D  
2. D  
3. B  
4. A  
5. D  
6. D  
7. A  
8. C  
9. B  
10. C  
11. A  
12. B  
13. B  
14. C  
15. C  
16. D  
17. C  
18. D  
19. D  
20. A  
21. D  
22. B  
23. B  
24. D  
25. C  
26. A  
27. D  
28. D  
29. B  
30. C  
31. B  
32. C  
33. A  
34. C  

Short Answer

35. \((w^9 - 7y^5)(w^9 - 2y^5)\)

36. \(2qr^2(9q - 1)(11q - 9)\)

37.

<table>
<thead>
<tr>
<th>(x)</th>
<th>(y = \frac{3}{4}x^2)</th>
<th>((x, y))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>(0, 0)</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>(2, 3)</td>
</tr>
<tr>
<td>3</td>
<td>(\frac{3}{4})</td>
<td>(\left(3, \frac{3}{4}\right))</td>
</tr>
</tbody>
</table>
38. \(35a^9 - 14a^3b^3\)
39. 0
40. \(-\frac{1}{4}\)
§111.32. Algebra I (One Credit).

(a) Basic understandings.

(1) Foundation concepts for high school mathematics. As presented in Grades K-8, the basic understandings of number, operation, and quantitative reasoning; patterns, relationships, and algebraic thinking; geometry; measurement; and probability and statistics are essential foundations for all work in high school mathematics. Students will continue to build on this foundation as they expand their understanding through other mathematical experiences.

(2) Algebraic thinking and symbolic reasoning. Symbolic reasoning plays a critical role in algebra; symbols provide powerful ways to represent mathematical situations and to express generalizations. Students use symbols in a variety of ways to study relationships among quantities.

(3) Function concepts. A function is a fundamental mathematical concept; it expresses a special kind of relationship between two quantities. Students use functions to determine one quantity from another, to represent and model problem situations, and to analyze and interpret relationships.

(4) Relationship between equations and functions. Equations and inequalities arise as a way of asking and answering questions involving functional relationships. Students work in many situations to set up equations and inequalities and use a variety of methods to solve them.

(5) Tools for algebraic thinking. Techniques for working with functions and equations are essential in understanding underlying relationships. Students use a variety of representations (concrete, pictorial, numerical, symbolic, graphical, and verbal), tools, and technology (including, but not limited to, calculators with graphing capabilities, data collection devices, and computers) to model mathematical situations to solve meaningful problems.

(6) Underlying mathematical processes. Many processes underlie all content areas in mathematics. As they do mathematics, students continually use problem-solving, language and communication, and reasoning (justification and proof) to make connections within and outside mathematics. Students also use multiple representations, technology, applications and modeling, and numerical fluency in problem-solving contexts.

(b) Knowledge and skills.

(1) Foundations for functions. The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. The student is expected to:

(A) describe independent and dependent quantities in functional relationships;

(B) gather and record data and use data sets to determine functional relationships between quantities;

(C) describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations;

(D) represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities; and

(E) interpret and make decisions, predictions, and critical judgments from functional relationships.

(2) Foundations for functions. The student uses the properties and attributes of functions. The student is expected to:

(A) identify and sketch the general forms of linear \(y = x\) and quadratic \(y = x^2\) parent functions;

(B) identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete;

(C) interpret situations in terms of given graphs or creates situations that fit given graphs; and

(D) collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or no correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations.

(3) Foundations for functions. The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. The student is expected to:

(A) use symbols to represent unknowns and variables; and

(B) look for patterns and represent generalizations algebraically.

(4) Foundations for functions. The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations. The student is expected to:

(A) find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations;

(B) use the commutative, associative, and distributive properties to simplify algebraic expressions; and

(C) connect equation notation with function notation, such as \(y = x + 1\) and \(f(x) = x + 1\).
(5) **Linear functions.** The student understands that linear functions can be represented in different ways and translates among their various representations. The student is expected to:

(A) determine whether or not given situations can be represented by linear functions;
(B) determine the domain and range for linear functions in given situations; and
(C) use, translate, and make connections among algebraic, tabular, graphical, or verbal descriptions of linear functions.

(6) **Linear functions.** The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations. The student is expected to:

(A) develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations;
(B) interpret the meaning of slope and intercepts in situations using data, symbolic representations, or graphs;
(C) investigate, describe, and predict the effects of changes in m and b on the graph of \( y = mx + b \);
(D) graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept;
(E) determine the intercepts of the graphs of linear functions and zeros of linear functions from graphs, tables, and algebraic representations;
(F) interpret and predict the effects of changing slope and y-intercept in applied situations; and
(G) relate direct variation to linear functions and solve problems involving proportional change.

(7) **Linear functions.** The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:

(A) analyze situations involving linear functions and formulate linear equations or inequalities to solve problems;
(B) investigate methods for solving linear equations and inequalities using concrete models, graphs, and the properties of equality, select a method, and solve the equations and inequalities; and
(C) interpret and determine the reasonableness of solutions to linear equations and inequalities.

(8) **Linear functions.** The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation. The student is expected to:

(A) analyze situations and formulate systems of linear equations in two unknowns to solve problems;
(B) solve systems of linear equations using concrete models, graphs, tables, and algebraic methods; and
(C) interpret and determine the reasonableness of solutions to systems of linear equations.

(9) **Quadratic and other nonlinear functions.** The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions. The student is expected to:

(A) determine the domain and range for quadratic functions in given situations;
(B) investigate, describe, and predict the effects of changes in a on the graph of \( y = ax^2 + c \);
(C) investigate, describe, and predict the effects of changes in c on the graph of \( y = ax^2 + c \); and
(D) analyze graphs of quadratic functions and draw conclusions.

(10) **Quadratic and other nonlinear functions.** The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods. The student is expected to:

(A) solve quadratic equations using concrete models, tables, graphs, and algebraic methods; and
(B) make connections among the solutions (roots) of quadratic equations, the zeros of their related functions, and the horizontal intercepts (x-intercepts) of the graph of the function.

(11) **Quadratic and other nonlinear functions.** The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. The student is expected to:

(A) use patterns to generate the laws of exponents and apply them in problem-solving situations;
(B) analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods; and
(C) analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods.

*Source: The provisions of this §111.32 adopted to be effective September 1, 1996, 21 TexReg 7371; amended to be effective August 1, 2006, 30 TexReg 1931.*