To the Student:

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

WHAT TO BRING

- several sharpened No. 2 pencils
- graphic calculator

ABOUT THE EXAM

The examination for the first 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 1A CBE:

- using functions; understanding domain, range, equation notation, etc.
- using linear parent functions
- distinguishing dependent and independent variables
- how to find domain and range values
- the order of operations for solving equations (you must show your work when solving equations)
- how to solve problems that involve absolute value
- how to solve and graph inequalities
- writing a linear equation from information given in a word problem
- how to graph a function
- reading graphs
- understanding the difference between continuous and discrete data
- reading scatter plots; identifying positive, negative, or no correlation
- how to take information from a word problem, organize it into a table, then make a scatter plot from the table
- drawing mapping diagrams
- writing function rules from data given in a table
- finding the constant of variation for inverse variation
- determining whether a table represents a direct or indirect variation

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.

Write an algebraic expression for the phrase.

_____ 1. –2 times the quantity \( q \) minus 3
   a. \(-2q - 3\)
   b. \(q(-2 - 3)\)
   c. \(\frac{-2}{q - 3}\)
   d. \(-2(q - 3)\)

_____ 2. The total cost to rent a row boat is $18 times the number of hours the boat is used. Write an equation to model this situation if \( c \) = total cost and \( h \) = number of hours.
   a. \(c = 18h\)
   b. \(c - 18 = h\)
   c. \(h = 18c\)
   d. \(c = \frac{h}{18}\)

_____ 3. A pair of shoes costs $52.99 and the state sales tax is 8%. Use the formula \( C = p + rp \) to find the total cost of the shoes, where \( C \) is the total cost, \( p \) is the price, and \( r \) is the sales tax rate.
   a. $95.38
   b. $60.99
   c. $57.23
   d. $78.19

Simplify the expression.

_____ 4. \(13\left[6^2 \div \left(5^2 - 4^2\right) + 9\right]\)
   a. 585
   b. 169
   c. 26
   d. 181
5. \(|-2.8|\)
   a. 2.8
   b. -2.8

6. Which of the scatter plots shows a positive correlation?

   a. 
   b. 
   c. 
   d. 

   continued →
Write a function rule for the table.

7. \[ \text{Hour Worked} \quad \text{Pay} \]

<table>
<thead>
<tr>
<th>Hour Worked</th>
<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>$15.00</td>
</tr>
<tr>
<td>4</td>
<td>$30.00</td>
</tr>
<tr>
<td>6</td>
<td>$45.00</td>
</tr>
<tr>
<td>8</td>
<td>$60.00</td>
</tr>
</tbody>
</table>

a. \( p = 7.50h \)
b. \( p = 15h \)
c. \( p = h + 15 \)
d. \( h = 7.50p \)

8. Evaluate \( |x - 2y| \) for \( x = -2 \) and \( y = 3 \).

a. 4 \( b. 8 \) \( c. -4 \) \( d. -8 \)

9. Evaluate \( x(-y + z) \) for \( x = 3, y = 3, \) and \( z = 1 \).

a. -6 \( b. 10 \) \( c. 12 \) \( d. -8 \)

10. Solve the equation.

\[ \frac{5p}{7} - 18 = -43 \]

a. -31 \( b. -\frac{85}{2} \) \( c. -50 \) \( d. -35 \)
11. \(6(4.5y - 12) = 9\)
   a. 28
   b. \(3\frac{3}{4}\)
   c. 0.6
   d. 3

12. \(5x - 5 = 3x - 9\)
   a. -2
   b. 1
   c. -1
   d. -3

13. Between what two consecutive integers is \(\sqrt{151}\)?
   a. 11 and 12
   b. 14 and 15
   c. 12 and 13
   d. 9 and 10

Which number is a solution of the inequality?

14. \(x(7 - x) > 8\)
   a. 2
   b. 8
   c. -1
   d. 0

continued →
Graph the inequality.

15. \( x \geq -3 \)
   
a. 
   
b. 
   
c. 
   
d.

Write an inequality for the graph.

16. 
   
a. \( m \leq -\frac{1}{2} \)
   
b. \( m > -\frac{1}{2} \)
   
c. \( m \geq -\frac{1}{2} \)
   
d. \( m \geq \frac{1}{2} \)

continued →
Solve the inequality. Then graph your solution.

_____17. $-2w < -18$
   a. $w > 9$
   ![Graph](image1)
   b. $w < -16$
   ![Graph](image2)
   c. $w < 9$
   ![Graph](image3)
   d. $w > -16$
   ![Graph](image4)

_____18. $|2x + 9| < 25$
   a. $-36 < x < 14$
   ![Graph](image5)
   b. $-17 < x < 8$
   ![Graph](image6)
   c. $-17 > x > 8$
   ![Graph](image7)
   d. $-8 < x < 8$
   ![Graph](image8)

Solve the inequality.

_____19. $-5x - 7 < 28$
   a. $x > -7$
   b. $x < -7$
   c. $x > \frac{21}{5}$
   d. $x < -\frac{21}{5}$
20. \(12 + 10w \geq 8(w + 12)\)
   a. \(w \geq -2\)
   b. \(w \geq 42\)
   c. \(w \geq 2\)
   d. \(w \geq 54\)

Write a compound inequality that represents each situation. Graph your solution.

21. On a road in the city of Rochester, the maximum speed is 50 miles per hour, and the minimum speed is 20 miles per hour.
   a. \(20 > x > 50\)
   b. \(20 < x < 50\)
   c. \(20 \leq x \leq 50\)
   d. \(20 \geq x \geq 50\)

Solve the compound inequality. Graph your solution.

22. \(2x - 2 < -12\) or \(2x + 3 > 7\)
   a. \(x < -5\) or \(x > 2\)
   b. \(x < -5\) or \(x > 5\)
   c. \(x < -7\) or \(x > 5\)
   d. \(x < -12\) or \(x > 2\)
Solve the equation. If there is no solution, write no solution.

23. $|x| - 7 = 6$
   a. $x = 13$
   b. $x = 13$ or $x = -13$
   c. $x = -1$
   d. no solution

24. $-2|h - 7| = -28$
   a. no solution
   b. $h = 21$
   c. $h = -7, h = 21$
   d. $h = 7, h = -21$

25. Which graph is the most appropriate to describe a quantity decreasing at a steady rate?

a. 
   ![Graph A]

b. 
   ![Graph B]

c. 
   ![Graph C]

d. 
   ![Graph D]

continued →
26. Identify the mapping diagram that represents the relation and determine whether the relation is a function.

\[ \{(-8, -6), (-5, 2), (-8, 1), (7, 3)\} \]

a. The relation is a function.

b. The relation is a function.

d. The relation is not a function.

c. The relation is not a function.

27. Evaluate \( f(x) = -2x - 5 \) for \( x = 3 \).

a. -11
b. 1
c. -6
d. 11
Write a function rule for the table.

28. 

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
</tr>
</tbody>
</table>

a. \( f(x) = x - 4 \)
b. \( f(x) = 4x \)
c. \( f(x) = x + 4 \)
d. \( f(x) = -4 - x \)

29. Write a function rule that gives the total cost \( c(p) \) of \( p \) pounds of sugar if each pound costs $0.59.

a. \( c(p) = 59p \)
b. \( c(p) = \frac{p}{0.59} \)
c. \( c(p) = p + 0.59 \)
d. \( c(p) = 0.59p \)

Find the constant of variation \( k \) for the direct variation.

30. 

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>−1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>−4</td>
</tr>
<tr>
<td>5</td>
<td>−10</td>
</tr>
</tbody>
</table>

a. \( k = -1.5 \)
b. \( k = 2 \)
c. \( k = -0.5 \)
d. \( k = -2 \)
31. Write an equation of the direct variation that includes the point (9, –12).

   a. \( y = \frac{1}{3}x \)
   
   b. \( y = \frac{1}{12}x \)
   
   c. \( y = -\frac{1}{3}x \)
   
   d. \( y = -\frac{3}{4}x \)

32. Find the constant of variation \( k \) for the inverse variation. Then write an equation for the inverse variation.

   \( y = 4.5 \) when \( x = 3 \)

   a. \( k = 13.5; 13.5y = x \)
   
   b. \( k = 1.5; y = 1.5x \)
   
   c. \( k = 1.5; y = \frac{1.5}{x} \)
   
   d. \( k = 13.5; xy = 13.5 \)

Do the data in the table represent a direct variation or an inverse variation? Write an equation to model the data in the table.

33.

<table>
<thead>
<tr>
<th>( x )</th>
<th>6</th>
<th>8</th>
<th>12</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>9</td>
<td>12</td>
<td>18</td>
<td>30</td>
</tr>
</tbody>
</table>

   a. inverse variation; \( xy = 1.5 \)
   
   b. direct variation; \( y = \frac{2}{3}x \)
   
   c. direct variation; \( y = 1.5x \)
   
   d. inverse variation; \( xy = 54 \)

continued →
Use inductive reasoning to describe the pattern. Then find the next two numbers in the pattern.

34. \(-5, -10, -20, -40, \ldots\)

a. multiply the previous term by 2; \(-80, -160\)
b. add \(-5\) to the previous term; \(-35, -30\)
c. subtract 5 from the previous term; \(-80, -160\)
d. multiply the previous term by \(-2\); 80, \(-160\)

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

35. The population of an endangered animal species has been increasing. Make a scatter plot using the data given in the table.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>230</td>
</tr>
<tr>
<td>2</td>
<td>670</td>
</tr>
<tr>
<td>3</td>
<td>620</td>
</tr>
<tr>
<td>4</td>
<td>840</td>
</tr>
<tr>
<td>5</td>
<td>1400</td>
</tr>
<tr>
<td>6</td>
<td>1580</td>
</tr>
</tbody>
</table>

36. Find the range of \(f(x) = -x + 4\) for the domain \{-3, -2, -1, 1\}.
37. Model the function rule $y = 3x + 0$ with a table of values and a graph.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

![Graph of $y = 3x + 0$]

38. Elaine is in the business of repairing home computers. She charges a base fee of $45 for each visit and $25 per hour for her labor. The total cost $c(x)$ for a home visit and $x$ hours of labor is modeled by the function rule $c(x) = 45 + 25x$. Use the function rule to make a table of values and a graph.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$c(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

![Graph of $c(x) = 45 + 25x$]

*continued →*
For the data in the table, tell whether \( y \) varies directly with \( x \). If it does, write an equation for the direct variation.

39.

\[
\begin{array}{|c|c|}
\hline
x & y \\
\hline
0 & 0 \\
1 & 4 \\
2 & 8 \\
3 & 12 \\
\hline
\end{array}
\]

Is the equation a direct variation? If it is, find the constant of variation.

40. \( x - 6y = 0 \)
ALG 1A Practice Final Exam Answer Keys

Multiple Choice


Short Answer

35. [Graph showing population change over years]
36. \{7, 6, 5, 3\}

37.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

38.

<table>
<thead>
<tr>
<th>x</th>
<th>c(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>120</td>
</tr>
</tbody>
</table>

39. yes; \( y = 4x \)

40. yes; \( \frac{1}{6} \)
§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.*