Algebra 1B Study Guide
Credit by Exam for Credit Recovery or Acceleration

The exam you are interested in taking is designed to test your proficiency in the relevant subject matter. You should be thoroughly familiar with the subject matter before you attempt to take the exam. This CBE CR/A Study Guide can help you prepare for the exam by giving you an idea of what you need to review. You can check your familiarity level by reviewing the Texas Essential Knowledge and Skills (TEKS) for this course. (See below.) To refine your skills, you can refer to any of the state-adopted textbooks.

Texas Essential Knowledge and Skills (TEKS)

Every question that appears on this exam is derived from the knowledge and skills statements and student expectations within the Texas-mandated standards, the Texas Essential Knowledge and Skills (TEKS). You can view the TEKS for this exam online via the following link: http://ritter.tea.state.tx.us/rules/tac/chapter111/ch111c.html#111.39 Refer to section (c), Knowledge and skills, 1A–12E. Throughout this guide, you'll see TEKS references. These refer to the numbers listed under (c) Knowledge and skills; for example, 1A or 3B.

Materials Needed

You will need to bring a #2 pencil and a graphing calculator to complete the exam. You will receive a computer-graded answer sheet, formula chart, grid paper, and scratch paper when you arrive at the testing center.

Exam Structure

You will be allowed **3 hours** to complete this exam. The Algebra 1A exam consists of 50 multiple-choice questions worth 2 points each for a total of 100 points. The exam covers a wide variety of topics. To help you study, we have isolated 10 key topics and provided study tips and sample questions for each. You can expect several multiple-choice questions on each of the following topics:

  Topic 1: Plan and Solve Real-world Problems
  Topic 2: Properties and Representations of Linear Functions
  Topic 3: Graphs and Transformations of Linear Functions
  Topic 4: Evaluating Linear Functions for Reasonable Results
  Topic 5: Graphs and Transformations of Quadratic Functions
  Topic 6: Evaluating Quadratic Functions for Reasonable Results
  Topic 7: Properties and Representations of Exponential Functions
  Topic 8: Representations of and Operations on Polynomials
  Topic 9: Manipulating Expressions with Exponents and Radicals
  Topic 10: Using Notation for Functions, Sequences, and Literal Equations

Formula Chart

You will be provided with the following formula chart. Familiarize yourself with these formulas and how to use them to solve problems based on the TEKS above.

Algebra 1
Formula Sheet

Factoring

Perfect square trinomials	$a^2 + 2ab + b^2 = (a + b)^2$ or $a^2 - 2ab + b^2 = (a - b)^2$
Difference of squares	$a^2 - b^2 = (a + b)(a - b)$

Properties of Exponents

Product of powers	$a^m a^n = a^{(m+n)}$
Quotient of powers	$\dfrac{a^m}{a^n} = a^{(m-n)}$
Power of a power	$(a^m)^n = a^{mn}$
Rational exponent	$a^{m/n} = \sqrt[n]{a^m}$
Negative exponent	$a^{-n} = \dfrac{1}{a^n}$

Linear Equations

Standard form	$Ax + By = C$
Slope-intercept form	$y = mx + b$
Point-slope form	$y - y_1 = m(x - x_1)$
Slope of a line	$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Quadratic Equations

Standard form	$f(x) = ax^2 + bx + c$
Vertex form	$f(x) = a(x - h)^2 + k$
Quadratic formula	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Axis of symmetry	$x = \dfrac{-b}{2a}$

Scholastic Honesty

When you arrive at the testing center you will be asked to carefully read the exam rules and sign a statement agreeing to take the exam in accordance with the rules. This is called the Examinee's Certification. The following is a copy of these rules:

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Examinee's Certification

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This certification must be signed *before* the exam is administered and then returned with the completed examination attached, or credit for the exam will not be given.

Scholastic dishonesty is a serious academic violation that will not be tolerated. Scholastic dishonesty encompasses, but is not limited to:

- copying from another student's work;
- using an unauthorized testing proctor or taking the exam at an unauthorized testing location;
- using materials not authorized by a testing proctor;
- possessing materials that are not authorized by a testing proctor, such as lessons, books, or notes;
- knowingly using or soliciting, in whole or Topic, the contents of an unadministered test;
- collaborating with or seeking aid from another student without authorization during the test;
- substituting for another person, or permitting another person to substitute for oneself, in taking a course test or completing any course-related assignment;
- using, buying, stealing, or transporting some or all of the contents of an unadministered test, test rubric, homework answer, or computer program.

Evidence of scholastic dishonesty will result in a grade of *F* on the examination and an *F* in the course (if applicable).

At the testing center, you will be asked to sign a statement that says
you have read the above and agree to complete the examination with scholastic honesty.

General Study Tips

The bulleted lists and sample questions in this study guide can assist you in preparing for the exam. It is a fairly complete guide for studying, but does not cover every item on the test. Ultimately, you should use the TEKS to guide your exam preparation.

Additional Study Tips

The following information provides direction for your studies. For each part, you will find study tips and sample questions to give you a general idea of the types of questions you can expect to see on the exam.

Topic 1: Plan and Solve Real-world Problems

This is a broad topic that can relate to any type of question. Students should show the ability to create a plan for problem-solving, explain their reasoning, and solve problems arising in everyday life.

Study Tips for Topic 1:

This topic relates to TEKS 1A–1G. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Solve word problems about the workplace and every day interactions in society
- Justify your solution to a problem
- Explain if a solution is or is not reasonable
- Create and use tables, graphs, number lines, Venn Diagrams and other representations to organize information

Sample Questions for Topic 1:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

1. Jose wants to make 3 dozen cupcakes for his friend's Halloween party. The recipe makes ½ dozen cupcakes and calls for ¾ cups of sugar. Jose will need to determine whether or not he has enough sugar in his pantry before he begins.
   Which of these illustrates a reasonable strategy Jose could use to estimate the amount of sugar he'll need to make 3 dozen cupcakes?

   A. He will need to make 3 times the recipe, therefore he will need less than 3 cups of sugar.
   B. He will need to make 6 times the recipe, therefore he will need more than 6 cups of sugar.
   C. He can make an over-estimate by rounding ¾ cup up to 1 cup, multiplying by 2, and lastly multiply again by 3. He will need less than 6 cups of sugar
   D. He can make an underestimate by rounding ¾ cup down to ½ cup, multiplying by 2, and lastly multiply again by 3. He will need less than 3 cups of sugar

Topic 2: Properties and Representations of Linear Functions

This topic relates to your understanding of linear equations, linear inequalities, and systems of linear equations and inequalities.

Study Tips for Topic 2:

This topic relates to TEKS 2H–2I. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Write linear equations in slope intercept, standard, and point slope forms when given a graph, a table of values or a verbal description
- Write a system of equations when given a word problem, a table, or a graph

Sample Questions for Topic 2:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

2. Which system of equations generates the data given in the table below?

x	y_1	y_2
12	51	20
14	47	23
16	43	26
18	39	29
20	35	32
22	31	35

    A. $y_1 = 75 - 4x$
       $y_2 = 2 + 3x$
    B. $y_1 = 75 - 2x$
       $y_2 = 2 + 1.5x$
    C. $y_1 = 2x + 75$
       $y_2 = 2x + 1.5$
    D. $y_1 = 75x - 4$
       $y_2 = 2x + 3$

Topic 3: Graphs and Transformations of Linear Functions

This topic relates to your understanding of graphing systems of linear equations and linear inequalities and how to represent the solutions to both types of systems when they exist.

Study Tips for Topic 3:

This topic relates to TEKS 3F–3H. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Graph linear functions given a verbal description, a data table, or key features such as intercepts and/or slope
- Graph and shade the solution set of a 2-variable linear inequality
- Determine the solution(s) of systems of equations and systems of inequalities by analyzing their graphs

Sample Questions for Topic 3:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

3. Graph the linear system and determine the solution(s) if they exist.

$$4x + y = 16$$

$$y = \frac{1}{4}x - 1$$

A. No solutions
B. (1, 0)
C. (4, 0)
D. Infinitely many solutions

Topic 4: Evaluating Linear Functions for Reasonable Results

This topic relates to your understanding of solving systems of linear equations using non-graphical approaches. You are expected to understand how to check a solution and explain why it is reasonable or unreasonable.

Study Tips for Topic 4:
This topic relates to TEKS 5C. Familiarize yourself with this TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Solve systems of two linear equations when given equations or word problems
- Solve a system of two linear equations using, substitution, elimination, or by using your graphing calculator

Sample Questions for Topic 4:
The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

4. Clark and Lois are paying off their student loans. Clark has $10,000 in student loans, and he pays back $105 every month. Lois has $7,500 in student loans, but pays back only $50 per month. Set up a system of equations that models this situation, and determine how long it will take before Clark and Lois both have the same amount of student loan debt.

    A. 12 months
    B. 46 months
    C. 62 months
    D. Lois will pay off her loan debt completely before Clark catches her.

Topic 5: Graphs and Transformations of Quadratic Functions

This topic relates to your understanding of graphing quadratic functions and describing quadratic functions in terms of transformations.

Study Tips for Topic 5:
This topic relates to TEKS 7A–7C. Familiarize yourself with these TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Graph quadratic functions on your graphing calculator
- Use the graph of a quadratic functions to identify key features such as intercepts, max/min values, vertex, and axis of symmetry
- Use the parent function $f(x) = x^2$ to describe the effects of the transformations $a \cdot f(x), f(b \cdot x), f(x - c), f(x) + d$ for any values of $a, b, c,$ or d
- Familiarize yourself with the vertex form and standard form for quadratics on the formula chart

Sample Questions for Topic 5:
The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

5. How does the graph of $y = x^2$ differ from the graph of $y = x^2 - 2$?

    A. The graph of $y = x^2 - 2$ is wider than the graph of $y = x^2$.
    B. The graph of $y = x^2 - 2$ is narrower than the graph of $y = x^2$.
    C. The graph of $y = x^2 - 2$ is shifted down from the graph of $y = x^2$.
    D. The graph of $y = x^2 - 2$ is shifted to the left of the graph of $y = x^2$.

Topic 6: Evaluating Quadratic Functions for Reasonable Results

This topic relates to your understanding of the various methods used to find solutions to quadratic equations. You are also expected to be able to use the regression feature (STAT) on your calculator to generate a quadratic function when you are given a data table.

Study Tips for Topic 6:
This topic relates to TEKS 8A and 8B. Familiarize yourself with these TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Solve quadratic equations with real solutions by graph, factoring, using square roots, completing the square, and using the quadratic formula
- Understand the benefits and limitations of each method to help you determine when to use each method
- Input data values into your calculator to generate a quadratic function that you can use to make predictions and solve real-world problems that fit quadratic models
- Familiarize yourself with the quadratic formula on the formula chart

Sample Questions for Topic 6:
The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

6. Determine the best fit equation for the data below, and use that equation to make a prediction for the savings deposit on month 20.

Month	Savings Deposit ($)
0	10.80
1	8.20
2	6.00
4	2.80
7	1.00
12	6.00

A. $y = 0.2x^2 – 2.8x + 10.8$ and approximately \$35
B. $y = 0.7x^2 – 4.9x + 11.6$ and approximately \$35
C. $y = 0.2x^2 – 2.8x + 10.8$ and approximately \$194
D. $y = 0.7x^2 – 4.9x + 11.6$ and approximately \$194

Topic 7: Properties and Representations of Exponential Functions
This topic relates to your understanding of exponential functions, their properties, transformations, as well as how to use them to solve real-world application problems.

Study Tips for Topic 7:
This topic relates to TEKS 9A–9E. Familiarize yourself with these TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Determine the domain and range of exponential functions of the form $y = a \cdot b^x$
- Use information from word problems to determine the values of a and b for exponential functions of the form $y = a \cdot b^x$
- Graph exponential functions that model growth and decay problems
- Identify the y-intercept and the asymptote(s) of an exponential function
- Use the regression feature on your graphing calculator to determine the exponential function that best fits a given data set

Sample Questions for Topic 7:
The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.
7. Cedric is working on a project in biology involving exponential decay. He knows he started with 200mg of a substance and the rate of decay is 11%. Which of the following equations appropriately models this situation?

A. $y = 11 \cdot (0.2)^x$
B. $y = 200 \cdot (0.11)^x$
C. $y = 200 \cdot (0.89)^x$
D. $y = 0.11 \cdot (200)^x$

Topic 8: Representations of and Operations on Polynomials

This topic relates to your understanding of operations with and methods of simplifying polynomial expressions.

Study Tips for Topic 8:
This topic relates to TEKS 10A–10F. Familiarize yourself with these TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Add and subtract polynomials of degree two
- Multiply polynomials of degree one and two
- Divide polynomials of degree two by polynomials of degree one or two and express the remainder as a rational expression
- Use the distributive property to rewrite polynomials of degree one or two
- Factor polynomials of degree two including perfect square trinomials, difference of two squares binomials, GCF, box method, and guess and check
- Familiarize yourself with the factoring formulas on the formula chart

Sample Questions for Topic 8:
The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

8. Divide: $\dfrac{2x^2 + 4x + 2}{(x+1)^2}$

   A. $\dfrac{2}{x+1}$
   B. 2
   C. $x + 1$
   D. $2x + 2$

Topic 9: Manipulating Expressions with Exponents and Radicals

This topic relates to your understanding of the rules used for simplifying expressions with exponents and expressions with square roots.

Study Tips for Topic 9:
This topic relates to TEKS 11A and 11B. Familiarize yourself with these TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Add, subtract, multiply, divide, and simplify expressions with square roots
- Reduce a single radical to simplest terms
- Simplify numeric and algebraic expressions using the laws of exponents

Sample Questions for Topic 9:
The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

9. Simplify the expression below.
   $4^3 - (3x^2)^3 + (x^2)^3$

   A. $64 - 26x^6$
   B. $12 - 26x^6$
   C. $64 - 8x^6$
   D. $12 - 8x^5$

Topic 10: Using Notation for Functions, Sequences, and Literal Equations

This topic relates to your understanding of using notation for functions and sequences.

Study Tips for Topic 10:

This topic relates to TEKS 12B to 12C. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Define and distinguish between an arithmetic and a geometric series
- Evaluate a function using function notation such as "$f(x)$" when given a domain value
- Identify terms of arithmetic and geometric sequences given in recursive function notation such as $f(n) = -3 \cdot f(n-1)$
- Familiarize yourself with how to identify any term of a sequence relative to the previous term in that sequence

Sample Questions for Topic 10:

The following are sample questions. You can find the correct answers listed after the questions, but try answering the questions without looking at the answers first to check your comprehension.

DIRECTIONS: Select the BEST responses to the following questions.

10. A sequence can be written as a function such that each term is defined in relation to the term before it. For example, $f(n) = f(n-1) \cdot \dfrac{2}{5}$. If the first term is defined as $f(1) = 25$, find the 5th term of the sequence.

A. 10

B. $\dfrac{16}{25}$

C. $\dfrac{32}{3125}$

D. $\dfrac{32}{125}$

Answer Key

Item Number	Correct Answer	TEKS expectation
1	C	1A, 1B, 1D
2	B	2I
3	C	3F
4	B	5C
5	C	7C
6	A	8B
7	C	9B, 9C
8	B	10C
9	A	11B
10	B	12C