Algebra 1A 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

A graphing calculator is required. Exam proctors must ensure students have access to an approved calculator. Students may bring their own calculator from home. Please refer to the UTHS Calculator Testing Policy for further information:

- https://utexas.app.box.com/v/uths-calculator

If you are taking a print exam, you must bring a #2 pencil to complete the exam. You will receive a computer-graded answer sheet when you arrive at the testing center. The proctor will provide scratch paper.

Exam Structure

You will be allowed **3 hours** to complete this exam. The Algebra 1A exam consists of 55 multiple-choice questions worth a total of 100 points. The exam covers a wide variety of topics. To help you study, we have isolated 6 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: Data Based Predictions and Calculations
Topic 5: Evaluating Linear Functions for Reasonable Results
Topic 6: Using Notation for Functions, Sequences, and Literal Equations

Formula Chart

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

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:

<div align="center">

Examinee's Certification
</div>

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 the following 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 then multiplying 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 multiplying 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 and their properties such as slope, parallel and perpendicular lines, domain, and range.

Study Tips for Topic 2:

This topic relates to TEKS 2A–2H. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Determine domain and range of linear functions when given equations and word problems
- Decide if the domain and range includes all real numbers or a certain subset of real numbers such as integers only
- Write linear equations in slope intercept, standard, and point slope forms when given a graph, a table of values or a verbal description
- Write equations and solve problems involving direct variation
- Write equations of lines that are given as parallel or as perpendicular to given lines

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 of these is the equation of a line that is parallel to $y = 5x - 4$ and goes through the point $(-3, 1)$?

   A. $y = 5x - 1$

   B. $y = \dfrac{1}{5}x - 4$

   C. $y = \dfrac{1}{5}x + \dfrac{8}{5}$

   D. $y = 5x + 16$

3. A banquet hall sets up tables and chairs for weddings and parties throughout the year. No matter what type of party, they always set up 6 chairs at each table. A function is created that determines the total number of chairs, c, needed if exactly t tables are used. Which of these could represent the range of this function?

   A. All real numbers
   B. $c > 0$
   C. $c > 6$
   D. $c \in \{6, 12, 18, 24, \dots\}$

Topic 3: Graphs and Transformations of Linear Functions

This topic relates to your understanding of graphing linear functions and how to express transformations such as reflections, stretches, and translations.

Study Tips for Topic 3:

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

- Determine the slope when you are given a table of values
- Determine the rate of change in the context of a real world problem
- Graph linear functions and identify key features such as x-intercept and y-intercept
- Graph and shade the solution set of a 2-variable linear inequality
- Describe the effects of transforming the parent function $y = x$ and write the equations as $y = a(bx - c) + d$ with specific values for a, b, c, and d

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.
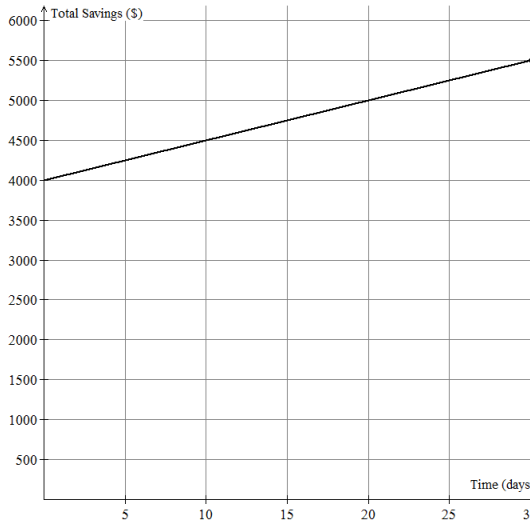
DIRECTIONS: Select the BEST responses to the following questions.

4. The solution set to which inequality is shown in the graph below?
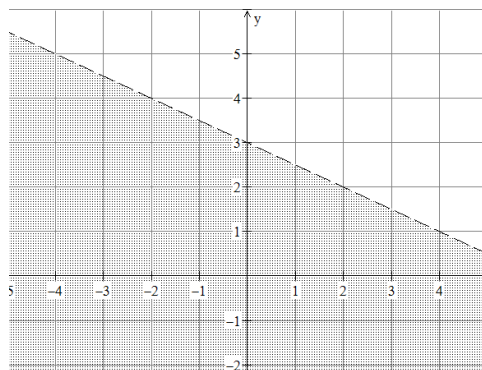
A. $x - 2y \leq 6$

B. $x + 2y < 6$

C. $y > -\dfrac{1}{2}x + 3$

D. $y \leq -\dfrac{1}{2}x + 3$

5. Which of these most accurately describes the slope of the graph below?

A. $2 per day
B. $50 per day
C. $250 per day
D. $1 per 2 days

Topic 4: Data Based Predictions and Calculations

This topic relates to your understanding of creating linear functions to best fit data given from a real world problem and using that function to make reasonable predictions.

Study Tips for Topic 4:

This topic relates to TEKS 4A–4C. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Describe whether data has a positive or negative correlation and whether that correlation is strong or weak
- Use a graphing calculator to calculate the correlation coefficient between two sets of data
- Use linear regression to find the line of best fit for data and use that equation to make accurate predictions
- Describe the difference between correlation and causation in a real world context

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.

6. The table below represents a lawyer's salary in each year after graduation. Using linear regression, calculate the correlation coefficient and predict the salary after 10 years.

x (years)	y (salary in thousands of dollars)
0	45.0
1	50.1
2	55.4
3	60.1

   A. $r \approx 0.900$; $y = \$95,660$
   B. $r \approx 0.999$; $y = \$95,660$
   C. $r \approx 0.900$; $y = \$96,510$
   D. $r \approx 0.999$; $y = \$96,510$

7. Which of the following statements illustrates correlation but not causation?

   A. Plants exposed to more sunlight grow faster.
   B. A student spends more time playing video games and less time sleeping.
   C. A soccer team's goals per game increase as their practice time increases.
   D. In a particular town traffic accidents increase as sales of umbrellas increase.

Topic 5: Evaluating Linear Functions for Reasonable Results
This topic relates to your understanding of solving linear equations and inequalities. You are expected to understand how to check a solution and explain why it is reasonable or unreasonable.

Study Tips for Topic 5:
This topic relates to TEKS 5A and 5B. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:
- Solve equations and inequalities with variables on both sides of the equation
- Solve equations and inequalities using the distributive property

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.

8. Solve the following equation.

$$-3(x + 5) - 2x = 3x + 11$$

A. $-\dfrac{1}{2}$

B. $\dfrac{1}{2}$

C. $\dfrac{13}{4}$

D. $-\dfrac{13}{4}$

Topic 6: Using Notation for Functions, Sequences, and Literal Equations

This topic relates to your understanding of solving linear equations and inequalities. You are expected to understand how to check a solution and explain why it is reasonable or unreasonable.

Study Tips for Topic 6:
This topic relates to TEKS 12A–12E. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:
*   Recognize relations shown as a table, a graph, an equation, or a mapping diagram
*   Determine whether or not a given relation meets the definition of a function
*   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 $f(n) = -3 \cdot f(n - 1)$
*   Create and use formulas for the nth term of an arithmetic or geometric sequence when given several terms
*   Solve a given formula for a specific variable, such as $F = m \cdot a$

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.

9. Given that $f(x) = \dfrac{7}{8}x - 2$, evaluate $f\left(\dfrac{8}{7}\right)$.

    A. −2
    B. −1
    C. 0
    D. 1

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	D	2E
3	D	2A
4	B	3D
5	B	3A
6	B	4A, 4C
7	D	4B
8	D	5A
9	B	12B
10	B	12C

Algebra 1
Formula Sheet

Factoring

Perfect square trinomials $\quad a^2 + 2ab + b^2 = (a + b)^2$ or $a^2 - 2ab + b^2 = (a - b)^2$

Difference of squares $\qquad\qquad\qquad\qquad a^2 - b^2 = (a + b)(a - b)$

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	$x = \dfrac{-b}{2a}$