Algebra 2A 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#111.40 Refer to section (c), Knowledge and skills, 1A–8C. 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 graphing calculator. The formula sheet at the end of this study guide will be provided during the exam. You can also bring this formula sheet with you to your exam. 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 2A exam consists of 42 multiple-choice questions worth a total of 100 points. The exam covers a wide variety of topics. To help you study, we have isolated 5 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: Systems of Equations
Topic 3: Quadratic and Square Root Functions
Topic 4: Absolute Value Functions
Topic 5: Using Data

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.

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:

Examinee's Certification

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. Find the equation of a parabola with the following properties and justify your answer. The axis of symmetry is $x = 3$, the vertex is (5, 4) and the directrix is $x = 6$.

   A. There is no solution because the y-coordinate of the vertex and the focus must always be the same.
   B. There is no solution because the directrix and the axis of symmetry must be perpendicular to each other.
   C. $y = \frac{1}{16}(x - 3)^2 + 4$, because the focus formula shows that the value of a is $\frac{1}{16}$ and the vertex coordinates are substituted into the vertex form of a quadratic equation.
   D. $y = 16(x + 4)^2 + 3$, because the focus formula shows that the value of a is 16 and the vertex coordinates are substituted into the vertex form of a quadratic equation.

2. The climate of a tropical island averages a temperature of 87.8° Fahrenheit. For the past 100 years, it has never been more than 8.2° cooler or warmer than this average temperature. Which absolute value equation describes the minimum and maximum temperatures on this island for the past 100 years?

   A. $|x - 87.8| = 8.2$
   B. $|x + 87.8| = 8.2$
   C. $|x - 8.2| = 87.8$
   D. $|x + 8.2| = 87.8$

Topic 2: Systems of Equations

This topic relates to your understanding of how to generate a system of equations when given a real-world problem as well as solving systems of linear equations an inequalities by graphing, substitution, elimination, as well as Gaussian Elimination and matrices on your graphing calculator.

Study Tips for Topic 2:

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

- Create and solve a system of three equations with three variables
- Solve a system of two equations where one equation is linear and one is quadratic
- Determine the reasonableness of solutions to systems
- Formulate a system of two linear equations given a real world problem
- Determine whether or not ordered pairs are solutions to a system of two linear inequalities

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.

3. Solve the following system of equations using Gaussian Elimination, matrix technology, or substitution and/or elimination.

   $$2a + 3b + c = -2$$
   $$a - b + 2c = 9$$
   $$4a - 4b + 3c = 11$$

   A. (–1, –2, 6)
   B. (–4, 1, 3)
   C. (–2, –1, 5)
   D. (2, –3, 3)

4. For a system of equations consisting of one quadratic equation and one linear equation, which of these represents the number of possible solutions?

   A. no solutions or one solution at most
   B. no solution or two solutions at most
   C. no solution or three solutions at most
   D. no solution, two solutions, or infinitely many solutions

Topic 3: Quadratic and Square Root Functions

This topic relates to your knowledge of quadratic and square root functions. You are expected to know how to locate, define, and calculate special features of parabolas such as vertex, focus, directrix, and axis of symmetry.

Study Tips for Topic 3:

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

- Write a quadratic function when given three points that lie on the graph of that function
- Write the equation of a parabola when given attributes such as vertex, focus, directrix, axis of symmetry, and direction of opening
- Determine the effect on the graph of the square root function, and determine the resulting equation after transformations such as translations, stretches, compressions, and reflections
- Convert a quadratic equation in standard form to an equation in vertex form. Then, use the vertex form of the function to determine the special features of the parabola
- When given data, use regression to determine the best fit equation for data that fits quadratic and square root models
- Identify extraneous solutions for square root equations
- Solve quadratic inequalities and be sure to verify which intervals contain the valid solution(s)

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.

5. Write the equation of a parabola given its vertex (5, 7), and its focus (5, 9).

   A. $y = (x - 5)^2 + 7$
   B. $y = 8(x - 5)^2 + 9$
   C. $y = -(x - 5)^2 + 9$
   D. $y = \frac{1}{8}(x - 5)^2 + 7$

6. Kendra was asked to solve the square root equation below. The resulting equation after each step is also shown below. Determine whether Kendra's work is correct, or if she made an error, identify that error.

Original equation:	$\sqrt{x-2}+4=x$
Step 1:	$\sqrt{x-2}=x-4$
Step 2:	$x-2=(x-4)^2$
Step 3:	$x-2=x^2-8x+16$
Step 4:	$0=x^2-9x+18$
Step 5:	$0=(x-6)(x-3)$
Step 6:	$x = 6$ or $x = 3$

A. No error
B. $x = 3$ is extraneous
C. $x = 6$ is extraneous
D. Solutions should be $x = –6$ or $x = –3$

Topic 4: Absolute Value Functions

This topic relates to your understanding of the meaning of absolute value as well as how to use absolute value to solve real-world problems and problems involving transformations.

Study Tips for Topic 4:

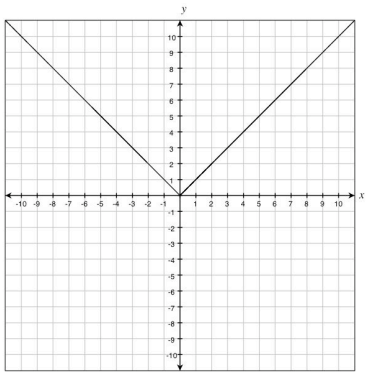
This topic relates to TEKS 6C– 6F. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Determine the function rule for transformations of absolute value functions
- Describe the effect on the graph of $y = |x|$ when it is replaced with $y = a\cdot|bx – c| + d$ for specific values of a, b, c, and d.
- Generate an absolute value equation when given a real-world context
- Solve absolute value linear equations and absolute value linear inequalities

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.

7. The graph below shows the absolute value parent function, $y = |x|$.



Which of the functions below represents the result after translating the function above to the left 3 units and reflecting it across the x-axis.

A. $y = |x| + 3$
B. $y = -|x + 3|$
C. $y = -|x - 3|$
D. $y = -|x| - 3$

8. Solve the following absolute value equation.

$$|-2x + 5| = 9$$

A. $x = 7$ only
B. $x = 2$ only
C. $x = -7$ and $x = 2$
D. $x = -2$ and $x = 7$

Topic 5: Using Data

This topic relates to your understanding of how to generate a best fit equation for a set of data. You will be asked to use these equations to make predictions, as well as to determine whether the data best fits a linear, quadratic, or exponential model.

Study Tips for Topic 5:

This topic relates to TEKS 8A– 8C. Familiarize yourself with those TEKS, and then be prepared to demonstrate knowledge of the following topics:

- Given a data set, determine whether the best fit equation should be linear, quadratic, or exponential.
- Use the regression feature on your calculator to determine the best fit equation
- Make predictions and decisions based on the best fit equation and a given data set

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.

9. Which function best fits the data given in the table below?

x	y
0	–7
2	1
4	25
6	65

A. $y = 3^x - 2$
B. $y = 4x - 7$
C. $y = 2x^2 - 7$
D. $y = |4x| - 7$

10. A car manufacturer determines that at the current price, they make $107 of profit for each car sold. A financial analyst was hired to help determine if the company should raise the price of their cars to increase profits. The analyst determined the theoretical profit the company would make based on several possible values for price increases.

x *(price increase, in $)*	*y* *(profit per car sold)*
0	107
10	157
20	167
30	137

Which function did the analyst likely use as a model, and by how much should the company raise the price in order to make the maximum profit possible?

A. $y = 1x + 127$ and about $18
B. $y = 1x + 127$ and about $18
C. $y = –0.2x^2 + 7x + 107$ and about $18
D. $y = –0.2x^2 + 7x + 107$ and about $47

Answer Key

Item Number	Correct Answer	TEKS expectation
1	B	1G, 4B
2	A	1A, 1D, 6D
3	C	3B
4	D	3A, 3D
5	A	4B
6	B	4G
7	B	6C
8	D	6E
9	C	8A, 8B
10	C	8A, 8B, 8C

Algebra 2
Formula Sheet

Factoring	
Perfect square trinomials	$a^2 - 2ab + b^2 = (a - b)^2$ $a^2 + 2ab + b^2 = (a + b)^2$
Difference of squares	$a^2 - b^2 = (a + b)(a - b)$
Sum of cubes	$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
Difference of cubes	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
Properties of Exponents	
Product of powers	$a^m a^n = a^{(m+n)}$
Quotient of powers	$\frac{a^m}{a^n} = a^{(m-n)}$
Power of a power	$(a^m)^n = a^{mn}$
Rational exponent	$a^{m/n} = \sqrt[n]{a^m}$
Negative exponent	$a^{-n} = \frac{1}{a^n}$
Quadratic Equations	
Parabola	$(x - h)^2 = 4p(y - k)$ $(y - k)^2 = 4p(x - h)$
Standard form	$f(x) = ax^2 + bx + c$
Vertex form	$f(x) = a(x - h)^2 + k$
Quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Axis of symmetry	$x = \frac{-b}{2a}$