SAT Prep Math Unit 6: Algebra II Methods (Grades: 9-12)

Content Area: **Mathematics**
Course(s): **SAT Prep (verbal & math) Fall, SAT Prep (verbal & math) Spring, SAT Prep (verbal & math) Summer**
Time Period: **Generic Time Period**
Length: **3 Weeks**
Status: **Published**

Unit Overview

This unit reviews some of the basic knoweldge of skills and concepts typically studied in second-year, high-level algebra courses that students need to know for the SAT.

Transfer

Students will be able to independently use their learning to increase their success in answering SAT problems directly related to higher-level algebra.

Meaning

Understandings

Students will understand that...

- There are higher-level algebraic strategies which will assist students in the solution of SAT type mathematics problems.
- They must use critical thinking skills in finding solutions to higher-level algebraically based problems.
- There are certain situation when students should and should not guess on the SAT.
- There are certain calculators that are approved for the SAT.
- There is a math reference sheet the students can use on the SAT.
- The SAT is important in achieving their career goals.

Essential Questions

Students will keep considering...

- What higher-level algebra skills do you need to know?
- How can this help me study for the SAT?

- When should I guess on the SAT?
- When should you use a calculator?
- Which strategy should I pick to answer this question?
- How can you improve your score on the SAT?
- How are the math sections of the SAT organized?

Application of Knowledge and Skill

Students will know...

- the rules for zero, negative, root, and fractional exponents.
- how to solve equations involving radicals and exponents.
- how to solve equations involving absolute value equations and inequalities.
- how to express equations as functions.
- how to determine the domain and range of a function.
- how to express graphs as functions.
- Linear functions and their graphs.
- Quadratic functions and their graphs.
- Exponential functions and their graphs.
- how to transform graphs in the coordinate plane.

Students will be skilled at...

- solving higher-level algebra problems and correctly grid the response.
- using appropriate test taking strategies.
- knowing and using strategies that are developed in the classroom or illustrated in resource materials.
- completing and scoring practice test using a Score Conversion Table.
- knowing the meaning of the symbols on the calculator keyboard
- correctly entering higher-level algebraic problems into the calculator.
- applying properties of zero, negative and fractional exponents to solve problems.
- solving problems with equations involving radicals and exponents.
- solving problems with equations involving absolute value and inequalities.
- expressing equations as functions
- determining domain and range given a function.
- graphing linear, quadratic and exponential functions.
- reflecting, and translating graphs of functions.

Academic Vocabulary

Absolute Value

Function

Domain

Range

Linear Function

Quadratic Function

Exponential Function

Parabola

Vertex

Exponential Function

Reflection

Translation

Learning Goal 6.1

Students will be able to use critical thinking skills in finding solutions to second-year, higher-level algebra problems.

Objective 6.1.1 (Level of Difficulty 2)

SWBAT: apply the laws of exponents (including zero, negative and fractional exponents) and use the laws of exponents to solve problems.

MA.N-RN.A	Extend the properties of exponents to rational exponents.
MA.N-RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
MA.N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MA.A-SSE.B.3c	Use the properties of exponents to transform expressions for exponential functions.

Objective 6.1.2 (Level of Difficulty 2)

SWBAT: manipulate, modify and solve equations and expressions involving radicals and exponents.

MA.N-RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
MA.N-RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
MA.N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MA.A-APR.D.6	Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x)$ + $r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.
MA.A-REI.A.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Objective 6.1.3 (Level of Difficulty 3)

SWBAT: solve, simplify, and manipulate absolute value equations and inequalities.

MA.A-REI	Reasoning with Equations and Inequalities
MA.A-REI.D	Represent and solve equations and inequalities graphically

Objective 6.1.4 (Level of Difficulty 4)

SWBAT: differentiate and scrutinize the solving of various functions including linear, quadratic & exponential functions using both the graphing calculator and graph paper.

MA.F-IF.A	Understand the concept of a function and use function notation
MA.F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
MA.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MA.F-IF.B	Interpret functions that arise in applications in terms of the context
MA.F-IF.C	Analyze functions using different representations

Objective 6.1.5 (Level of Difficulty 4)

SWBAT: solve problems involving the reflecting and translating function graphs.

MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology.

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.

CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Summative Assessments

- Projects
- Quizzes
- Student Portfolios
- Tests

Formative Assessments & Performance Observations

- "I have... Who has..." Review Activities
- Academic Games
- Carousel Activities
- Class Discussions
- Classwork
- Closures
- Concept Sorting Activities
- Do Nows
- Exit Tickets
- Four Corners Activities
- Graphic Organizers
- Homework
- Placemat Activities
- Question-All-Writes
- Quiz-Quiz-Trade Activities
- Round Robin
- Station Activities
- Student Interviews
- Student Response Systems
- Student Self Ratings
- Teacher Observations
- Teacher Questioning
- Think-Pair-Share Discussions
- Thumbs Up/Down
- Whip Around
- Whiteboard Use

Differentiation/Enrichment

- 504 Accomodations
- Challenge Problems
- IEP Modifications
- Learning Centers/Stations
- Leveled Practice Opportunities
- Scaffolding Questions
- Small Group Instruction
- Student Companion Website Resources
- Technology
- Use of Manipulatives (Paper strips, Exploragons, etc.)

Unit Resources

- Textbook: SAT Math Workbook, 5th Edition. (Barrons, 2012).
- Textbook: Math Workout for the SAT, 3rd Edition. (The Princeton Review, 2011).
- Textbook: SAT Subject Test: Mathematics Level 1. (Kaplan, 2012).
- Kuta Software
- www.khanacademy.org
- www.collegeboard.org
- SAT Problem of the Day App (on iphone or ipad)