Algebra I
Curriculum Framework

Mapping High School Algebra I to:

Mathematics Cognitive Demands
Texas State Standards: Texas Essential Knowledge and Skills, TEKS
Underlying Processes in TEKS assessed in
Texas Assessment of Knowledge and Skills, TAKS
National Council of Teachers of Mathematics, NCTM,
Principles and Standards 2000

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The El Paso Collaborative for Academic Excellence

A Curriculum Framework for High School Algebra I

A group of K-16 classroom teachers and faculty, curriculum specialists, and department chairs met and developed a curriculum framework for high school Algebra I, an important step in developing explicit and comprehensive goals for teachers of Algebra I in the El Paso area. This framework represents the collective work of classroom teachers from K-12 schools and faculty from El Paso Community College and the University of Texas at El Paso. It is meant to assist mathematics teachers in ensuring that the current high school Algebra I course is aligned with the high school Algebra II course which is aligned with the first year college mathematics course that entering college freshman will take. The expectation is that by using the framework, the number of students having to enroll in remedial mathematics courses will be reduced. Students will benefit because of the collective effort of teachers who will embrace the next stage in this process: implementation with the goal of providing practical revision. With participation from every high school mathematics teacher, the curriculum frameworks will become the standard in mathematics coursework for every student in El Paso.

Background

In 1998, the El Paso Collaborative board identified as its top priorities: 1) continuing to focus on mathematics, and 2) aligning mathematics curriculum, K-16. A review of local data on mathematics achievement showed a larger number of students enrolled in and completing college preparatory mathematics courses in high school. It also revealed a continuous increase in student achievement on TAAS. This higher student achievement, however, did not reflect student readiness for college mathematics courses. Further review of the data revealed that large numbers of high school students were placing and enrolling in remedial courses at El Paso Community College and the University of Texas at El Paso. While many factors contribute to the placing of large numbers of students in remedial courses, one known factor is that there was little alignment between what high school teachers expect students to know and be able to do and the expectations of college and university faculty.

To deal with some of these issues, the El Paso Collaborative for Academic Excellence proposed and was funded, by the National Science Foundation and the Pew Charitable Trusts, to support a K-16 Mathematics Alignment Initiative to align mathematics curriculum, instruction, and assessment. A beginning goal of the Initiative was to determine what students need to know and be able to do in a high school mathematics course that would prepare them to enroll in and successfully complete a college level mathematics course. Algebra II was identified as the pivotal course that could provide high school students with preparation for entering and successfully completing a college freshman pre-calculus course without first needing remediation.

Working Group

The Initiative convened a working group of classroom teachers and faculty to write a framework for Algebra II that teachers could utilize as a curriculum guide, no matter what instructional materials they were using for the course. (This work was continued with the development of curriculum frameworks for K-8 Mathematics, Algebra I, Geometry, and Precalculus.) The working group included: K-12 classroom teachers from both urban and rural independent school districts; mathematics and science staff developers, mentors with specialization in mathematics from the three major school districts; mathematics instructors from El Paso Community College; and professors representing the Colleges of Education (mathematics), Science (mathematics), and Engineering (computer science) from the University of Texas at El Paso. A complete list of participants in the K-16 Mathematics Working Group is attached.

To prepare for writing the curriculum frameworks for Algebra I and II, the group engaged in dialogue and discussion focused on mathematics teaching and learning. Using formatted discussions, the group:

- analyzed and discussed student performance in mathematics using data collected from state-mandated assessments, and college placement tests;
- examined textbooks, course requirements, outline format, and state and national placement tools used to assess student knowledge of mathematics;
- reviewed the Texas Essential Knowledge and Skills (TEKS) and the National Council of Teachers in Mathematics (NCTM) Principles and Standards 2000;
- discussed how concepts were connected and developed at different grade levels and how they led to concepts in higher mathematics;
- discussed international education systems, mathematics teaching and learning, and other issues related to mathematics education in other countries, such as Germany, Japan, Mexico, and Russia;
- identified alternate ways of assessing student learning that provide for standards-based assessment;
- discussed models of teaching mathematics; and,
- reviewed and discussed literature on mathematics education.

After these initial meetings, the group met bimonthly during academic years and for several days in the summer, to write curriculum frameworks for Algebra II, and continued with K-8 Mathematics, Algebra I, Geometry, and Precalculus. Content for the high school course was placed in text outline form as well as matrix form to map content topics to cognitive demands. Course content was also mapped to textbooks and materials being used in the three major independent school districts, as well as to state (TEKS) and national (NCTM) mathematics standards. A table on standards-based assessment was attached to the matrix as a guide for assessing student learning and understanding of mathematics content. Also included are suggestions on how to determine a student's grade for the course and a timeline for covering the course.

K-16 Leaders Group

A leaders group that included district leaders and central office people from the three major independent school districts, the provost of the University, science and education deans, and mathematics department chairs from both the University and Community College, as well as lead principals and teachers from the districts, was also convened to dialogue and discuss issues in mathematics education. This group provided guidance and feedback and contributed revisions to the curriculum frameworks throughout their development.

Needs

What we need now is assistance from high school principals and teachers who will help review, revise, and make practical use of the framework during the current academic year. Ideally, we want the framework reviewed by every high school mathematics teacher, especially by every high school teacher of Algebra I and Algebra II. In order to continue our work in aligning the mathematics curriculum, K-16, we need active participation from every mathematics department in every school in both rural and urban independent school districts.

Call 747-5778 for more information on how you can be involved in reviewing and revising the framework for high school Algebra I.

Lucy Hernandez Michal
Director, K-16 Mathematics Alignment Initiative
MSP Director of Mathematics and Science
lmichal@utep.edu

K-16 MATHEMATICS ALIGNMENT WORKING GROUP

Jessie Aguilar	EPCC	Mathematics	Feb. 2000 – Oct. 2000
Liza Aguirre	CLISD	Horizon High School	Oct. 2004 - present
Nancy Arroyo	YISD	Riverside High School	Oct. 2003 - present
Alicia Beltran	SISD	Sanchez Middle School	Oct. 2001 – present
Patricia Benitez	EPISD	Magoffin Middle School	Oct. 2004 - present
Naomi Berglund	EPISD	Mesita Elementary School	Feb. 2000 - April. 2001
Vicky Brown	SISD	Helen Ball Elementary School	Feb. 8 - July 2000
Lupe Bujanda	EPISD	Bowie HS, MSP Staff Dev	Feb. 2000 - present
Lien Diaz	EPISD	Mentor MS, MSP Staff Dev	Oct. 2001 - present
Art Duval, Ph.D.	UTEP	Mathematics	Feb. 2000 - present
Pat Estrada	YISD	Mentor – MS	Feb. 2000 – June 2004
Maritza Fernandez	YISD	Hacienda Heights Elem. School	Oct. 2002 – June 2004
Carol Gardner	EPISD	USP Mentor - Elementary School	Feb. 2000 – June 2003
Ann Gates, Ph.D.	UTEP	Engr. - Computer Science	Feb. 2000 – June 2002
Sandra K. Garza	SISD	Mentor ES**,** SISD Elem Math	Feb. 2000 – present
Joanne Gillis	EPISD	Franklin High School	Feb. 2000 – June 2003
Terrie Giron	YISD	Mentor HS, MSP Staff Dev	Feb. 2000 – present
Martha Gonzales	EPISD	Vilas Elementary School	Oct. 2004 - present
Margie Gutierrez	SISD	Mentor MS	Feb. 2000 – June 2003
Carol Hardee	SISD	Mentor MS	Oct. 2002 - present
Greg Hatch	SISD	MSP Staff Developer	Oct. 2003 - present
Veronica Hernandez	EPISD	Mentor HS, MSP Staff Dev	Feb. 2000 – June 2002
Helmut Knaust, Ph.D.	UTEP	Mathematics	Oct. 2004 - present
Martha Kaudaissy	SISD	Campestre Elementary	Oct. 2001 – present
Blanca Lopez-Martinez	YISD	Mentor ES	Feb. 2000 – June 2003
Tony Murillo	SISD	Socorro Middle School	Oct. 2002 - present
Becky Ontiveros	EPISD	Mentor MS	Feb. 2000 - Aug. 2001
Jaime Ortiz	YISD	Parkland High School	Feb. 2000 - June 2000
Debra Paulson	EPISD	Hornedo MS, EPISD MS Math	Feb. 2000 – present
Joanne Peeples, Ph.D.	EPCC	Mathematics	Oct. 2002 – present
Estella Quinones, Ph.D.	UTEP	Metallurgical & Materials	Oct. 2002 - present
Martin Rede	SISD	Mentor HS, MSP Staff Dev	Feb. 2000 – present
Diane Reed	YISD	J. M. Hanks High School	Feb. 2000 - present
Ullrich Reichenbach	SISD	Montwood High School	Feb. 2001 – Dec. 2002
Fred Rojas	SISD	Americas High School	Oct. 2002 – June 2004
Edna Salas	SISD	Hilley Elementary School	Oct. 2002 - present
James Salazar	YISD	Bel Air HS, MSP Staff Dev	June 2001 – present
Gabriela Schwab	EPCC	Mathematics	Oct. 2002 - present
Marsha Self	EPCC	Mathematics	Feb. 2000 – June 2003
Gus Serrano	YISD	Ranchland Hills Middle School	Feb. 2000 – April 2003
Diane Seufert	EPISD	Carlos Rivera Elementary	April 2001 – present
Mariano Silva	EPISD	Mentor MS	June 2003
Sue Spotts	EPISD	Wiggs Middle School	Oct. 2000 - present
Mourat Tchoshanov, Ph.D., UTEP		Mathematics	Feb. 2000 - present
Rita Tellez	EPISD	Bowie HS, EPISD HS Math	Oct. 2002 – Oct. 2004
Tom Ukstad	SISD	Americas High School	Feb. 2000 - present
Jaime Vasquez	SISD	Hueco Elementary School	Feb. 2000 - May 2000
Donnett Vollmer	EPISD	Magoffin Middle School	Feb. 2000 - May 2000
Xiaomin Wang, Ph.D.	EPCC	Mathematics	Oct. 2004 – April 2005
Matthew Winsor, Ph.D.	UTEP	Mathematics	Oct. 2004 – present
Stella Woo	EPISD	Silva Magnet High School	Oct. 2004 – present
Lucy Hernandez. Michal	Director, K-16 Mathematics Alignment Initiative MSP Director of Mathematics and Science		Jan. 2000 - present

ALGEBRA I COURSE OUTLINE

I. COURSE DESCRIPTION

Algebra I is a course of study of foundations for functions, linear functions, and, quadratic and other non-linear functions. Students will build on the basic foundations learned in K-8 mathematics. Building on their algebraic thinking and symbolic reasoning, students will study functions, one of the most fundamental of mathematical concepts and use this to determine, represent, and analyze linear relationships as functions. Students will examine the properties and attributes of functions and in particular those of linear functions. Their study of linear functions will include using multiple representations: numerical form, tabular form, graphical form, and algebraic form. A student will understand how knowing algebra empowers them to use symbols to represent, formulate, and solve equations and inequalities based on linear functions to solve situations occurring in life.

II. PREREQUISITE KNOWLEDGE

A student entering Algebra I should have successfully completed K-8 mathematics and should have an eighth grade level of understanding and be able to use:

A. Addition, subtraction, multiplication, and division of numbers and quantitative reasoning
B. Patterns, relationships, and algebraic thinking
C. Geometry and spatial reasoning
D. Measurement
E. Probability and statistics

III. CONTENT

A. Upon successful completion of Algebra I, the student will know, understand, and be able to use:
   1. Functions
   2. Properties and attributes of functions including general form of linear functions and quadratic functions, domain, range, x- and y-intercepts
   3. Collect, organize, and model given data
   4. Model, predict, and solve problems involving linear relationships
   5. Operations on algebraic symbols to solve equations and inequalities
   6. Linear functions and their graphs
   7. Slope and intercepts of linear functions
   8. Analyze, interpret, and solve given situations to systems of linear equations in two unknowns
   9. Quadratic equations, quadratic functions and their graphs
   10. Examples of non-linear functions other than quadratic functions

IV. ASSESSMENT

A. It is suggested that a variety of methods be used to assess student learning. This includes assessments that show student work as well as student explanations of their work. These assessments might include both traditional and alternative methods such as:
   1. Performance based tasks

2. Open book (including homework)
3. Technology-based presentations
4. Interviews
5. Observations
6. Portfolios
7. Projects with rubrics (individual and group)
8. Warm-up quizzes
9. Multiple choice
10. Open response
11. Comprehensive, multi-step problems
12. Final Exam – The final exam should be a comprehensive exam standardized by campus with future plans to standardize by district, city, and/or state. Having all students taking a final exam prepares students for college final exams. The final exam should count approximately 25% of the grade.

B. Recommended Course Grade – Each district has guidelines for course grades and, whenever possible, it is suggested that final course grades for students be guided by the following:

1. Formative assessments 25% (daily tools: warm-ups, quizzes, teacher observations and interviews, group work)
2. Closed book assessments 25% (Open response, multiple choice, quantitative comparisons, SAT, multi-step problems)
3. Open book assessments 25% (homework, projects, presentations, portfolios)
4. Final Comprehensive Exam 25%

V. TIMELINE

A brief overview of basic topics may be given at the beginning of the semester (no more than 1 week). It is recommended that any further review given be embedded within the units as needed.

VI. INFORMATION/RESOURCES

A. FOR STUDENTS

1. Course description
2. Teacher information (conference period, office hours)
3. Work, projects, homework, exams, etc., to be produced by the students including grading policy for each
4. Rubrics for projects/presentations/portfolios
5. Resources – tutoring, lab, Internet web sites specific to the course, computer programs, teacher conference period, other outside support available
6. Weekly calendar
7. Materials needed for the course: It is recommended that a textbook/calculator package be issued to each student for the course

B. FOR TEACHERS

1. Labs – Math, science, and computer
2. Materials needed: textbooks, calculators with view screens, charts, transparencies, etc.
3. Computer: hardware, software, and multi-media resources
4. Professional Networks: provisions for teacher teaming during conference time, professional

development/credits or endorsements to increase salaries, peer coaching

5. References – instructor manuals, journals, Educational Resource Information Clearinghouse, Internet websites
6. CBL- Computer Based Lab and CBR – Computer Based Range
7. Vertical alignment information on K-16 alignment initiatives
8. Suggested course calendar

VII. MATRIX MAPPING TOPICS TO COGNITIVE DEMANDS

A. Attached is a matrix that matches cognitive demands to knowledge and skills in Algebra I. The work on cognitive demands has been guided by the work of Andrew Porter, Norman Webb, and John Smithson. The cognitive demands identified by Porter, Webb, and Smithson were used as models and modified by the working group to fit the work in Algebra I. These identify thinking levels that incorporate five (5) levels of cognitive demands. They are listed in order on the matrix from higher order to lower order as you read from left to right. The matrix also maps the textbook and materials being used in each of the major independent school districts, and the state and national mathematics standards.

B. Cognitive Demands for Mathematics

Cognitive demands assist teachers in distinguishing what a student is expected to know and be able to do with mathematics content and what level of thinking student must be engaged in while learning content. This mapping of topics of cognitive demands describes content knowledge that will not merely be stored, but also understood, represented, organized, connected, and structured in ways that facilitate retrieval and application of knowledge. With knowledge and skills mapped to cognitive demands, teachers know how to get students to use, represent, and connect pieces of content knowledge in coherent ways that will determine whether students understand knowledge deeply and can use it to solve new problems. The cognitive demands are not linear, nor are they sequential. In many instances they overlap and are not clearly separated. They are to:

1. **Generalize** – make and prove conjectures, prove statements generate questions
2. **Make Connections** – transfer knowledge, connect two or more concepts to solve non-routine problems
3. **Understand Concepts** – communicate "big ideas", justify and explain solutions to problems, use multiple representations to model mathematical ideas, select the most appropriate representation for given situations
4. **Perform Procedures** – do computations, make observations, measure and compare, solve routine problems
5. **Memorize** – recall facts, definitions, formulas, properties, rules

C. Format and Further Information on Matrix Structure

1. All TEKS are included in the framework
2. Items in the matrix appearing in regular fonts are TEKS and are placed within the appropriate cognitive demand column.
3. Italicized items are used:
    a. to support the teaching and learning of a topic; these do not reference a TEKS;
    b. to paraphrase a TEKS to address the different levels of cognitive demands; these will have a referenced TEKS and are placed under multiple cognitive demands 4.

Strands/topics in matrices overlap and may be integrated.

5. Cognitive demands overlap and are not linear.
6. The framework is not intended to be sequential.
7. Other topics supporting the study of algebra may be included in the matrix.

Algebra I Course Framework Matrix Mapping Cognitive Demands to Knowledge and Skills

Knowledge and Skills	Cognitive Demands				
	Generalize	**Make Connections**	**Understand Concepts**	**Perform Procedures**	**Memorize**
Foundations for Functions (a) The student uses the basic understandings from K-8 as a basic foundation for functions	*Understand combining like terms and how it is related to the distributive property*	*Use the Distributive Property to multiply binomials* *Model properties geometrically* a2 Students use symbols in a variety of ways to study relationships among quantities	a3 Students use functions to determine one quantity from another, to represent and model problem situations and to analyze and interpret relationships a4 Students set up equations and inequalities and use a variety of methods to solve them a5 Students use a variety of representations(concrete, pictorial, numerical, symbolic, graphical, and verbal) tools and technology (*graphing calculators, data collection devices, and computers*) to model mathematical situations to solve meaningful problems	*Identify a function from a given mapping or from a set of ordered pairs* *Evaluate a function at a given value* *Evaluate linear and quadratic expressions for given values* *Solve literal equations and formulas for a specified variable*	Notation y = x y = mx + b ax + by = c f(x) = mx + b Distributive property Identity Property Equality Property Commutative Property Associative Properties Use: Symbols to represent unknowns and variables Graphing calculator

Textbook and Materials	NCTM Standards
Glencoe: 1.1, 1.3, 1.6 - 1.9; Connected Math: Moving Straight Ahead, Say it With Symbols, Thinking with Mathematical Models	Understand functions, Represent and analyze mathematical situations and structures using algebraic symbols, Use mathematical models to represent and understand quantitative relationships, Analyze change in various concepts

Algebra I Course Framework Matrix Mapping Cognitive Demands to Knowledge and Skills

Knowledge and Skills	Cognitive Demands				
	Generalize	**Make Connections**	**Understand Concepts**	**Perform Procedures**	**Memorize**
Foundations for functions (b) A.1 The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways. A.2 The student uses the properties and attributes of functions A.3 The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations. A.4 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.	bA.1E interpret and make decisions, predictions, and critical judgments from rational relationships bA.2C Interpret situations in terms of given graphs or creates situations that fit given graphs bA.3B Look for patterns and represent generalizations algebraically	bA.1C Describe functional relationships for given problem situations and write equations or inequalities to answer questions arising from the situations bA.2D Collect and organize data, make and interpret scatterplots (including recognizing positive, negative, or not correlation for data approximating linear situations), and model, predict, and make decisions and critical judgments in problem situations bA.4C Connect equation notation with function, such as $y = x + 1$ and $f(x) = x + 1$	bA.1A Describe independent and dependent quantities in functional relationships bA.1B *Determine functional relationships between quantities from gathering and recording data or using given data sets* bA.1 Represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities bA.2B Identify mathematical domains and ranges and determine reasonable domain and range values for given situations, both continuous and discrete bA.3A Use symbols to represent unknowns and variables	bA.1B Identify and determine domain, range, independent and dependent variables bA.2A Identify and sketch the general forms of linear ($y = x$) and quadratic form ($y = x^2$) parent functions bA.4A Find specific function values, simplify polynomial expressions, transform and solve equations, and factor as necessary in problem situations bA.4B Use the commutative, associative, and distributive properties to simplify algebraic expressions cA.2E cA.2F Identify x and y intercepts in all representations	Vocabulary: Domain Range Scatterplot Reasonable domain
Textbook and Materials			**NCTM Standards**		
Glencoe: 3.2-3.3; 3.5, 3.6, 5.1, 5.2, 5.4-5.5; 6.5A-6.5; Connected Math: Moving Straight Ahead, Say it With Symbols, Thinking with Mathematical Models			Understand functions Represent and analyze mathematical situations and structures using algebraic symbols Use mathematical models to represent and understand quantitative relationships Analyze change in various concepts		

Algebra I Course Framework Matrix Mapping Cognitive Demands to Knowledge and Skills

Knowledge and Skills	Cognitive Demands				
	Generalize	**Make Connections**	**Understand Concepts**	**Perform Procedures**	**Memorize**
Linear Functions bA.5 The student understands that linear functions can be represented in different ways and translates among various representations. bA.6 The student understands the meaning of the sloe and intercepts of the graphs of linear functios and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations bA.7 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. bA.8 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	Generalize effect of changes of slope (m) and y-intercept (b) given changes in graphs, tables, equations and situations, $y = mx + b$, using technology bA.6C Investigate, describe, and predict the effects of changes in M and b on the graph of $y = mx + b$ bA.6F Interpret and predict the effects of changing slope and y-intercept in applied situations bA.7A Analyze situations involving linear functions and formulate linear equations or inequalities to solve problems bA.8A Analyze situations and formulate systems of linear equations to solve problems	*bA.2C* Interpret situations in terms of given graphs or create situations that fit given graphs bA.5A Determine whether or not given situations can be represented by linear functions bA.6G Relate direct variation to linear functions and solve problems involving proportional change bA.5C Use, translate, and make connections among algebraic, tabular, graphical or verbal descriptions of linear functions bA.6B Interpret the meaning of slope and intercepts in situations using data, symbolic representations or graphs *Solve systems of linear inequalities (feasible regions, bounded , unbounded) by graphing*	bA.1D Represent relationships among quantities using concrete models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities bA.5A *Determine if given graphs or tables can be represented by linear functions* bA.5B Determine the domain and range for linear functions in given situations bA.6A Develop the concept of slope as rate of change and determine slopes from graphs, tables, and algebraic representations bA.7A Analyze situations involving linear functions and formulate linear equations or inequalities to solve problems. bA.7B Investigate methods for solving linear equations and equalities using concrete models, graphs, and properties of equality, select a method, and solve equations and inequalities bA.7C Interpret and determine reasonableness of solutions to linear equations and inequalities bA.8C Interpret and determine the reasonableness of solutions to systems of linear equations	bA.2A *Identify and sketch general forms of $y = x$* bA.5D Graph and write equations of lines given at least two characteristics of lines (points, point and slope, slope and y-intercept) bA.6E, Determine intercepts and zeros of linear functions from graphs, tables and algebraic representations bA.5G *Solve problems using proportional reasoning and proportional change* bA.6D Graph and write equations of lines given characteristics such as two points, a point and a slope, or a slope and y-intercept bA.8B Solve systems of linear equations using concrete models, graphs, tables, and algebraic methods	Notation $y = x$ $y = mx + b$ $ax + by = c$ $f(x) = ax + b$ function linear function slope y-intercept standard form slope-intercept form rate of change exponent base roots, zeroes independent variable dependent variable

Textbook and Materials	NCTM Standards
Glencoe: 3.1-3.3, 3.5-3.6; 4.1-4.5; 5.1-5.5; 6.1A, 6.1-6.2; 7.1-7.2, 7.7B, 7.8; 11.4-11.5 CMP: Moving Straignt Ahead, Thinking with Mathematical Models	Understand functions, Represent and analyze mathematical situations and structures using algebraic symbols, Use mathematical models to represent and understand quantitative relationships, Analyze change in various concepts

Algebra I Course Framework Matrix Mapping Cognitive Demands to Knowledge and Skills

Knowledge and Skills	Cognitive Demands				
	Generalize	**Make Connections**	**Understand Concepts**	**Perform Procedures**	**Memorize**
Quadratic and other Non-linear Functions bA.9 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 bA.10 The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods bA.11 The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.	bA.9B Investigate, describe and predict the effects of changes in **a** on the graph of $y = \mathbf{a}x^2 + c$ (a< 0, a >0) using technology bA.9C Predict the effects of changes in c on the graph of $y = x^2 + c$ bA.11B Analyze data and represent situations involving inverse variation using concrete models, tables, graphs, or algebraic methods bA.11C Analyze data and represent situations involving exponential growth and decay using concrete models, tables, graphs, or algebraic methods. *Make and test conjectures of various represented models of what constitutes a quadratic function* *Justify steps in solutions to linear equations and inequalities*	bA.2C *Interpret situations from graphs and create situations that fit given graphs* bA.9D *Analyze graphs of quadratic functions and draw conclusions from given graphs, tables and geometric models* bA.10B Make connections among solutions (roots) of a quadratic equations, zeros of their related functions, and horizontal intercepts (x-intercepts) of the graph of the function. *Use geometric models to represent factored and expanded form of a quadratic expression*	bA.2B *Identify domain and range and also determine reasonable domain and range for given situations* bA.11B Justify the solutions of quadratic equations as the roots of their function *Explain the property of zero products*	*bA.1A Identify and sketch* $Y = x^2$ *and other quadratic functions* bA.9A Determine domain and range values for which quadratic functions make sense bA.9C Investigate and describe the effects of changes in c on the graph of $y = x^2 + c$ bA.10A Solve quadratic equations using concrete models, tables and graphs *bA.10B Compare the solutions of quadratic equations to the roots of their function* bA.11A Use patterns to generate the laws of exponents and apply them in problem-solving situations *Evaluate a quadratic function for a given value of x*	Quadratic expression Quadratic equation Quadratic function $Y = x^2$ $Y = ax^2 + bx + c$ Exponential function Inverse variation Quadratic formula Zeroes Maximum Minimum Parameter Irrational Numbers Zero Product Property
Textbook and Materials			**NCTM Standards**		
Glencoe: 7.8; 8.1-8.5; 11.1-11.5 **CMP**: Frogs and Fleas, Thinking with Mathematical Models			Understand functions, Represent and analyze mathematical situations and structures using algebraic symbols, Use mathematical models to represent and understand quantitative relationships		

Algebra I Course Framework Matrix Mapping Cognitive Demands to Knowledge and Skills

Cognitive Demands					
Knowledge and Skills	**Generalize**	**Make Connections**	**Understand Concepts**	**Perform Procedures**	**Memorize**
Suggested Review before starting Algebra I	Justify each step of a solution using the real number properties	Explain each step of a solution	Use properties of real numbers to combine like terms Use inverse properties to isolate variables in an equation Formulate equations and expressions from problem situations	Use order of operations Evaluate algebraic expressions Use properties of real numbers to solve equations and perform computations to solve equations with variables on either side of an equation such as: ax = b ax + b = c a + bx = c a = bx + c	Vocabulary Natural numbers Whole numbers Integers Rational #s Irrational #s Real numbers Properties of real numbers Equation Evaluate Like terms Justify Solution Variable

Algebra I Course Framework Matrix Mapping Cognitive Demands to Knowledge and Skills

Type of Assessment	*Purpose of Assessment*	*How often?*	*Materials Needed*	*Descriptors for Acceptable Level of Performance*
FORMATIVE ASSESSMENTS 25%				
Student/Teacher Interviews	*To examine the thinking process of students*	*Weekly*	*Paper/recorder*	*Vocabulary, participation*
Observations Discussions	*To measure if a student is able to communicate understanding of a concept*	*As often as possible*	*Checklist*	*Participation*
Warm-up	*Daily review reinforcement*	*Daily*	*Overhead, paper/pencil, calculators*	*Working problem 70% or better*
CLOSED BOOK ASSESSMENTS 25%				
Multiple Choice Exams	*Evaluate skills* Preparation for mandated tests	*Twice a week*	*Scanners* Multiple tests	*80% correct*
Open Response Exams	*Test individual student understanding*	*3 - 4 per grading period*	*Rubrics* Test	*80% correct*
OPEN BOOK ASSESSMENTS 25%				
Performance Based Task	*To measure how close student are in mastering TEKS standards* To measure how well the student transfers and integrates knowledge Measure understanding of concepts	*Every 6 – 12 weeks*	*Tools on a student generated list* Calculator, computer, chart paper, poster board, transparencies, presentation tools, manipulatives, video equipment, multi-media	*Rubric (descriptor) based on TEKS or standard* Include: Content criteria, Process criteria Presentation criteria
Presentation in groups of two, three, or four	*Summative*	*1 per grading period*	*Research material* Access to media center Consumable material	*Knowledge of content* Vocabulary Oral communication
Homework and "Open book" exams	*Student finds and uses information in resources to:* ▪ Solve problems and explain solutions ▪ Explain mathematic concepts ▪ Prepare for "closed book" exam	*Midway thru and at the end of a "Big Idea"*	*Textbooks, notes, library, computer resources, calculator, manipulatives*	*Demonstrate knowledge and understanding of the big idea at the "Mastery Level"*
Technology-based presentation	*Extend understanding of concepts*	*2 per semester*	*Computer software, calculators*	*Student/teacher created rubric*
Journaling	*Thinking process, communication*	*Weekly*	*Notebook paper, index cards 5x7*	*Clear writing about topic, turning it in*
Projects	*Extension of concepts* Tests different styles of understanding	*Every 6 weeks*	*Varies with written rubric describing project*	*Rubric Requirements*
FINAL COMPREHENSIVE EXAM 25%				
Comprehensive	*To measure what student knows and is able to do with the knowledge acquired from the entire course*	*1 at the end of the entire course*	*Test*	*80% correct*