# Algebra I Scope & Sequence - Charles A. Dana Center, March 2006

| Algebra I Topics | Time Allotted | Texas Standards[1] | | Topic Descriptions | TAKS | Dana Center Resources | | | District Resources | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Suggested time allotment for this topic | Knowledge and Skills Statements | Performance Descriptors | | Texas Assessment of Knowledge and Skills Objectives | *Algebra 1 Assessments*[2] | TEXTEAMS Institutes[3] | Agile Mind Topics | Textbook | Other |
| **Foundational topics (Approximate Time: 0-2 weeks)** | | | | | | | | | | |
| Rational numbers | 0-1 week | *8.1 (Number, operation, and quantitative reasoning. The student understands that different forms of numbers are appropriate for different situations.)*<br>*8.2 (Number, operation, and quantitative reasoning. The student selects and uses appropriate operations to solve problems and justify solutions.)* | *8.1A; 8.1B; 8.2A; 8.2B* | This topic provides a refresher on rational numbers, real numbers, and irrational numbers by presenting different types of numbers and selected operations on them in context. The topic also reviews order of operations in a contextual way. | | | | 1 | | |
| Laws of exponents | 0-1 week | *6.1 (Number, operation, and quantitative reasoning. The student represents and uses rational numbers in a variety of equivalent forms.)*<br>*7.2 (Number, operation, and quantitative reasoning. The student adds, subtracts, multiplies, or divides to solve problems and justify solutions.)*<br>*8.1*<br>A.11 (Quadratic and other nonlinear functions. The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations. | *6.1D; 7.2E; 8.1D;* A.11A | This topic is a refresher on laws of exponents. It reviews principles for multiplying and dividing exponential expressions with common bases. It also uses explorations of number patterns to develop the meanings of positive and negative exponents, as well as zero as an exponent. | 5 | | | 2 | | |

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| **Developing mathematical models (Approximate Time: 3 weeks)** | | | | | | | | | | |
| Variables and functions | 2 weeks | A.1 (Foundations for functions. The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.)<br>A.4 (Foundations for functions. The student understands the importance of the skills required to manipulate sumbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations.) | A.1A; A.1B; A.1C; A.1D; A.1E; A.4C | This topic introduces how to recognize and represent a dependency relationship between two variables, in which one depends on the other in a systematic way. This relationship is called a function. The topic begins a key theme of the course: Relationships between variables can be represented using words, tables, graphs, or symbols. | 1 | √Making Stuffed Animals | *Algebra I: 2000 and Beyond*: 1.1.1;1.1.2 | 3 | | |
| Multiple representations in the real world | 1 week | A.1<br>A.2 (Foundations for functions. The student uses the properties and attributes of functions.) | A.1A; A.1B; A.1C; A.1D; A.1E; A.2B; A.2C | This topic connects the various representations of a problem—words, concrete elements, numbers, graphs, and algebraic expressions. It also shows that the same situation can be represented by different but equivalent algebraic expressions. | 1, 2 | | | 4 | | |
| **Using patterns to identify relationships (Approximate Time: 4 weeks)** | | | | | | | | | | |
| Linear patterns | 2 weeks | A.1<br>A.3 (Foundations for functions. The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations.) | A.1A; A.1B; A.1C; A.1D; A.1E; A.3A | This topic explores the ideas that linear data show a pattern of constant addition, and, when graphed, the points lie on a line. Algebraic representations of linear data are connected to concrete, numerical, and graphical representations. Students learn to differentiate between the domain and range for a problem and those for a function rule modeling that problem. | 1, 2 | √ Mosaics | *Algebra I: 2000 and Beyond*: 1.2.1 | 5 | | |

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| Other patterns | 2 weeks | A.1<br>A.4 | A.1A; A.1B; A.1C; A.1D; A.1E; A.4B | Building on the topic that precedes it, this topic introduces other patterns that indicate nonlinear relationships between two quantities—specifically, quadratic and exponential relationships. These nonlinear patterns are represented using tables, graphs, written and verbal descriptions, and algebraic rules. | 1, 2 | √ Exploring Exponential Functions | *Algebra I: 2000 and Beyond*: 1.2.2 | 6 | | |
| **Graphs (Approximate Time: 2 weeks)** | | | | | | | | | | |
| Constructing graphs | 1 week | A.1<br>A.2 | A.1A; A.1B; A.1C; A.1D; A.1E; A.2B; A.2D | This topic introduces the principles for creating neutral, well-designed graphs. Choosing appropriate values and scales for both axes to present meaningful displays of data is highlighted. This primer also gives practical significance to the difference between the domain and range for the data and the domain and range for the rule. | 1, 2 | *Extracurricular Activities | | 7 | | |
| Analyzing graphs | 1 week | A.1<br>A.2 | A.1A; A.1B; A.1C; A.1D; A.1E; A.2C | This topic is designed to enable students to understand clearly what is happening on a graph and to develop their ability to interpret information from axis labels and axis scales and, depending on the information desired, a graph's direction or graph intersections. | 1, 2 | √Gas Tank<br>√The 600-Meter Race<br>*Swimming Pools<br>*Bathing the Dog<br>*Distance and Time | *Algebra I: 2000 and Beyond*: 1.3.1 | 8 | | |

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| **Rate of change (Approximate Time: 4 weeks)** | | | | | | | | | | |
| Exploring rate of change in motion problems | 2 weeks | A.2<br>A.3<br>A.5 (Linear functions. The student understands that linear functions can be represented in different ways and translates among their various representations.)<br>A.6 (Linear functions. The student understands the meaning of the slope and intercepts of the graphs of linear functions and zeros of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.) | A.2C; A.2D; A.3B; A.5A; A.5B; A.5C; A.6A; A.6B | Understanding the rate at which one quantity changes with respect to another is key to understanding how the two quantities are related. In this topic, students explore the concept of rate by analyzing motion over time. Students investigate the rate at which distance changes numerically and graphically. | 2, 3 | **Motion Detector Problem* | *Algebra I: 2000 and Beyond*: 2.1.3 | 9 | | |
| Exploring rate of change in other situations | 2 weeks | A.2<br>A.3<br>A.5<br>A.6 | A.2C; A.2D; A.3B; A.5A; A.5B; A.5C; A.6A; A.6B | This topic deepens student understanding of the central ideas of rate of change. Students discover that they can model data sets that have a constant rate of change with a linear function. Students also learn that not all data are linear, and thus require other models. | 2, 3 | **√Seeing the Horizon**<br>**√Constructing Houses**<br>**Speeding Cars* | *Algebra I: 2000 and Beyond*: 2.1.4 | 10 | | |
| **Linear functions (Approximate Time: 4 weeks)** | | | | | | | | | | |
| Understanding slope | 1 week | A.2<br>A.3<br>A.5<br>A.6 | A.2C; A.2D; A.3B; A.5A; A.5B; A.5C; A.6A; A.6B; A.6C; A.6D; A.6E; A.6F; A.6G | This topic relates the constant rate of change of a linear function, the slope of the line that is the linear function's graph, and the value of m in the linear function rule $y = mx + b$. Students explore this connection using tables, graphs, and function rules. | 2, 3 | **√Making Pizzas, Making Money**<br>**√Summer Money** | *Algebra I: 2000 and Beyond*: 2.1.2 | 11 | | |

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| Understanding the ***y***-intercept | 1 week | A.2<br>A.3<br>A.5<br>A.6 | A.2C; A.2D; A.3B; A.5A; A.5B; A.5C; A.6B; A.6C; A.6D; A.6E; A.6F | This topic develops students' understanding of the ***y***-intercept of the graph of a linear model and the relationship between the ***y***-intercept and the situation being modeled. It also presents ways to find the value of the ***y***-intercept directly from linear function rules expressed in slope intercept form ($y = mx + b$) or standard form ($Ax + By = C$). | 2, 3 | **Pool Problem* | *Algebra I: 2000 and Beyond*: 2.1.2 | 12 | | |
| Creating linear models for data | 2 weeks | A.2<br>A.3<br>A.5<br>A.6 | A.2A; A.2C; A.2D; A.3B; A.5A; A.5B; A.5C; A.6A; A.6B; A.6C; A.6D; A.6E; A.6F; A.6G | This topic revisits analyzing rate of change to determine whether using a linear model to represent data is appropriate. It also develops the point-slope form for the equation of a line and introduces students to the idea of transformations of functions by transforming the parent function $y = x$ to create linear models for data. | 2, 3 | **Stacking Paper Cups*<br>**Stretched Spring*<br>**T-Shirts* | *Algebra I: 2000 and Beyond*: 2.1.1; 2.2.1 | 13 | | |
| **Linear equations and inequalities (Approximate Time: 3-4 weeks)** | | | | | | | | | | |
| Solving linear equations | 1.5 weeks | A.4<br>A.5<br>A.7 (Linear functions. 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.) | A.4A; A.4B; A.5C; A.7A; A.7B; A.7C | In this topic, students learn how equations are related to functions. The topic explores how different representations of a function lead to techniques to solve linear equations, including tables, graphs, concrete models, algebraic operations, and "undoing" (reasoning backwards). | 2, 3, 4 | **Geothermal Energy*<br>**Hot-Air Balloon*<br>**Sound Travel* | *Algebra I: 2000 and Beyond*: 2.3.1 | 14 | | |
| Solving linear inequalities | 1.5 weeks | A.4<br>A.5<br>A.7 | A.4A; A.4B; A.5C; A.7A; A.7B; A.7C | This topic introduces students to solution techniques for linear inequalities. Students learn to solve with graphs, tables, and algebraic operations. | 2, 3, 4 | **CDs for the Band* | | 15 | | |

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| Absolute value equations and inequalities | 0-1 week | A.1<br>A.2<br>A.4 | A.1C; A.1D; A.2C; A.4A | In this topic students explore equations and inequalities arising from the absolute value function. They learn to solve these equations and inequalities using tables, graphs, and algebraic operations. | | | | 16 | | |
| **Systems of linear equations (Approximate Time: 5 weeks)** | | | | | | | | | | |
| Formulating and solving systems | 2.5 weeks | A.8 (Linear functions. 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. | A.8A; A.8B; A.8C | Systems of linear equations, in which two conditions apply to a situation, and thus must be modeled with two equations, are introduced in this topic. Students learn to set up a system, solve it using graphs and tables, and check the solution for reasonableness. | 4 | | | 17 | | |
| Other methods for solving systems | 2.5 weeks | A.8 | A.8A; A.8B; A.8C | Continuing with the exploration of systems of two linear equations, this topic introduces two algebraic methods for solving systems: the substitution method and the linear combination method. Students begin to see when to use each method, and how to interpret the results each method yields. | 4 | **√The Exercise Pen**<br>**Bears' Band Booster Club* | | 18 | | |
| **Quadratic functions (Approximate Time: 3 weeks)** | | | | | | | | | | |
| Graphs of quadratic functions | 1.5 weeks | A.2<br>A.9 (Quadratic and other nonlinear functions. 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. | A.2A; A.9A; A.9B; A.9C; A.9D | This topic continues the study of transformations on parent functions that began with linear functions. Students build on their previous exposure to quadratic functions as they review the features of the parent parabola, $y = x^2$, and explore how changes in the values of the constants $a$ and $c$ in $y = ax^2 + c$ affect the graph of this parent function. | 5 | **√Investigating the effect of $a$ and $c$ on the graph of $y = ax^2 + c$**<br>**Transformations of Quadratic Functions* | | 19 | | |

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| Modeling with quadratic functions | 1.5 weeks | A.9 | A.9A; A.9B; A.9C; A.9D | This topic continues the exploration of quadratic functions, focusing on how to build quadratic functions that model real-world situations. Best fit and the quadratic regression feature of graphic calculators are used to find a quadratic function rule in the form $y = ax^2 + bx + c$ to fit data. | 5 | √The Dog Run | *Algebra I: 2000 and Beyond*: 3.1.1; 3.1.2 | 20 | | |
| **Quadratic equations (Approximate Time: 4 weeks)** | | | | | | | | | | |
| Operations on polynomials | 1 week | A.4 | A.4A; A.4B | This topic explores polynomial operations through a construction scenario. Students learn how to multiply, add, and subtract polynomials using concrete models and analytic techniques. They also learn how to factor trinomials using concrete models and analytic techniques. | 2 | ***A Ring Around the Posies** | | 21 | | |
| Solving quadratic equations | 2 weeks | A.4<br>A.10 (Quadratic and other nonlinear functions. The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.) | A.4A; A.10A; A.10B | This topic focuses on solving quadratic equations that arise from quadratic functions. Students learn to solve these equations by graphing and by factoring and see how the solution methods are connected as they connect the roots of an equation, the $x$-intercepts of a graph, and the zeros of a function. | 2, 5 | √BRRR!<br>**Golfing*<br>**Home Improvements*<br>**Insects in the Water*<br>**Sky Diving* | *Algebra I: 2000 and Beyond*: 3.2.1 | 22 | | |

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| The quadratic formula | 1 week | A.4<br>A.10 | A.4A; A.10A; A.10B | This topic extends the work of the previous topic by introducing students to the quadratic formula as a method for solving quadratic equations. As using this formula sometimes requires students to simplify expressions containing square roots, the connection between the algebra and the geometry of square roots is explored. Students also learn how the value of the discriminant indicates the nature of the solutions. | 2, 5 | **How Much Paint?*<br>**Fireworks Celebration*<br>**Block That Kick* | | 23 | | |
| **Other non-linear functions (Approximate Time: 3 weeks)** | | | | | | | | | | |
| Modeling with exponential functions | 1.5 weeks | A.11 | A.11A; A.11C | This topic builds on students' knowledge of exponential functions by exploring different situations that can be modeled with exponential functions. Students use tables and graphs to contrast the repeated multiplication of exponential patterns with the repeated addition of linear patterns. | 5 | **Bright Lights*<br>**The Marvel of Medicine* | *Algebra I: 2000 and Beyond*: 3.3.1 | 24 | | |
| Modeling with inverse variation | 1.5 weeks | A.11 | A.11B | This topic builds on students' earlier introduction to inverse variation by exploring different situations that can be modeled with the function $y = k/x$. Students use tables and graphs to explore situations for which $k$ and $x$ are both positive as they deepen their understanding of inverse variation. | | **Music and Mathematics* | *Algebra II (Part 2)*: 3.1.1 | 25 | | |

[1] Standards in italics are middle school TEKS.

[2] This column includes *Assessments* that are incorporated into topics, as well as those related to topic content. Titles in bold and marked with a √ reflect assessments that are incorporated into the content of a topic. Italic titles marked with a * indicate assessments for which students will be well prepared upon completion of a topic.

[3] The referenced TEXTEAMS activities provide professional development to support teachers in the delivery of the topic content.