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This guide is provided to help you use Discovering Algebra in the way that will best support your California students. Here is a brief description of the components of this guide and how you might use them.

- **Correlation of Discovering Algebra, California Edition, to the Algebra I California Content Standards**: Detailed description of how each standard is developed throughout the book, with references to key lessons, investigations, examples, and exercises.

- **Pacing Guide**: A suggested timeline that will enable you to cover the required topics prior to the California Standards Test. More detailed pacing guides for a variety of formats, including a standard course, an enriched course, and a block schedule, are also available in the Discovering Algebra Teacher’s Edition. To challenge your advanced students, you might assign the additional Projects and Take Another Look exercises recommended for the enriched course format, as well as the optional lesson involving matrices.

- **Differentiating Instruction**: Discussion of ways to provide universal access to all students, including advanced, strategic, and ELL students. For strategic students enrolled in an additional math or academic support class, consider providing the supporting teachers Condensed Lessons: A Guide for Parents and Tutors to inform them of the curriculum, and More Practice Your Skills for California Standards to use with their students.

- **Preparation for Algebra Pretest and Exercise Sets**: Tools for assessing and reviewing the prerequisite skills that your incoming students need to move into algebra, including solutions.

- **Additional Practice Problems for California Content Standards**: Eight exercise sets to practice and review for the California Standards Test, including solutions. You can use these periodically throughout the year, or intensively during the week or two just prior to the testing.

- **California Standards Multiple Choice Assessments**: Five quizzes and a test that contain problems similar in format to those your students will find on the Algebra I California Standards Test, including solutions. These practice assessments are built into the detailed pacing guides provided in the Discovering Algebra Teacher’s Edition so that you can spiral preparation for a multiple-choice format without calculators throughout the year.
Correlation of *Discovering Algebra* to California Algebra I Standards

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<th>California Algebra I Standard</th>
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<tr>
<td>1.0 Students identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable.</td>
<td>Students are introduced to various properties of numbers in several different lessons. Rational and irrational numbers are introduced in Lesson 2.1: Proportions, as students study proportions, and real numbers are introduced in Lesson 9.1: Solving Quadratic Equations, as students analyze solutions to quadratic equations. The distributive property is covered in Lesson 2.7: Evaluating Expressions, and the commutative properties of addition and multiplication in Lesson 4.4: Equivalent Algebraic Equations. In particular, see Investigation 4.4: Equivalent Equations. Students continue to use number properties throughout Chapter 3: Linear Equations; Chapter 4: Fitting a Line to Data; and Chapter 5: Systems of Equations and Inequalities, as they learn to evaluate algebraic expressions and solve linear equations. They continue to use these properties throughout the rest of the text as they solve quadratic and exponential equations. Students also use numeric and algebraic properties to rewrite linear equations given in point-slope form in slope-intercept form (see Example 4.4B) and to write quadratic equations in different forms (see Example 9.3B and Example 9.4A).</td>
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<td>1.1 Students use properties of numbers to demonstrate whether assertions are true or false.</td>
<td>Lesson 2.7 Exercise 2 asks students to apply number properties to determine which of two statements is correct. Similar exercises occur in other lessons: See Lesson 2.2 Exercise 11, Lesson 4.4 Exercises 1 and 9, Chapter 6 Review Exercise 9, Lesson 8.6 Exercise 6, Lesson 9.6 Exercise 7, and Lesson 9.4 Exercise 6. Additionally, students are often asked to solve an equation, then substitute the solution into the original equation and evaluate to verify: See Lesson 4.4 Exercise 16.</td>
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<td>2.0 Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents.</td>
<td>Students are introduced to solving equations through an undoing approach in Lesson 2.8: Undoing Operations, in which students understand “opposite” operations—that subtraction undoes addition, division undoes multiplication, and so on. They practice with opposites in Lesson 3.6: Solving Equations Using the Balancing Method and Lesson 7.4: Function Notation. Students learn about reciprocals as a way of solving proportions in Investigation 2.1: Multiply and Conquer. Reciprocals are further addressed in Lesson 10.1: Parallel and Perpendicular. Students first encounter square roots in Lesson 7.6: Squares, Squaring, and Parabolas. They explore roots further in Lesson 9.1: Solving Quadratic Equations; Lesson 9.6: Completing the Square; Lesson 9.7: The Quadratic Formula; Lesson 10.5: Operations with Roots; and Lesson 10.6: A Distance Formula. They encounter cube roots in Lesson 9.8: Cubic Functions. Students review exponent rules in Chapter 0: Fractions and Fractals, particularly in Lesson 0.2: More and More and Lesson 0.3: Shorter yet Longer. Exponent rules are formally developed in Chapter 6: Exponents and Exponential Models. Students explore the multiplication and power rules of exponents in Lesson 6.3: Multiplication and Exponents, and the division rule of exponents.</td>
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<td>3.0  Students solve equations and inequalities involving absolute values.</td>
<td>Students define the absolute-value function in Lesson 7.5: Defining the Absolute-Value Function. They solve absolute-value equations in a variety of ways in Example 7.5B and exercises such as Lesson 7.5 Exercises 2, 7, 8, and 14 and Lesson 7.6 Exercises 2, 3, and 4. Students encounter absolute-value inequalities in Lesson 7.5 Exercise 12 and Lesson 7.6 Exercise 5.</td>
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<td>4.0  Students simplify expressions before solving linear equations and inequalities in one variable, such as (3(2x - 5) + 4(x - 2) = 12).</td>
<td>Students begin learning how to rewrite expressions in equivalent forms using the distributive property in Lesson 2.7 Evaluating Expressions. Throughout Chapter 3: Linear Equations, students learn methods of solving equations. In Lesson 4.4: Equivalent Algebraic Expressions, they learn properties of equality that can be applied when simplifying or solving equations. Students practice simplifying while solving equations in Lesson 4.4 Exercise 12c–d, Lesson 4.7 Exercise 2, Chapter 4 Review Exercise 6, and Lesson 7.3 Exercise 15. Solving equations is practiced repeatedly in Chapter 5: Systems of Equations and Inequalities. See Lesson 5.1 Exercise 13, Lesson 5.2 Exercise 12b, Lesson 6.3 Example B, and Chapter 7 Review Exercises 14 and 17. Additionally, solving equations is continually practiced in many application exercises throughout the book. Students learn how to solve inequalities in Lesson 5.5: Inequalities in One Variable, see Example B and Exercises 6, 7, and 11. They practice solving inequalities in Lesson 8.6: Introduction to Rational Functions Exercise 14.</td>
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<td>5.0  Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.</td>
<td>Students begin writing linear expressions in Lessons 2.8–3.2 and write linear equations to represent problems scenarios, including word problems, in Lessons 3.4 and 3.5. They begin solving equations using an undoing method in Lessons 2.8–3.5, then learn a balancing method of solving equations in Lesson 3.6: Solving Equations Using the Balancing Method. For examples of solving multi-step exercises in Chapter 3, see Lesson 3.4 Exercises 4, 8, 9, and 10 and Lesson 3.6 Exercises 3 and 9. Lesson 3.6 Exercise 3 also includes justifications for each step. Properties of equality are introduced in Lesson 4.4: Equivalent Algebraic Equations. These properties are then used as justifications in solving problems. See Lesson 4.1 Exercise 16, Lesson 4.4 Examples B and C and Exercise 3, and Chapter 4 Review Exercise 6. Justifications are further reinforced in Lesson 5.2: Solving Systems of Equations Using Substitution (see Example A and Exercise 1), Lesson 5.3: Solving Systems of Equations Using Elimination, and Chapter 5 Review Exercise 4. Solving application and word problems is emphasized throughout the text. Students solve multi-step inequality word problems in one variable in Lesson 5.5: Inequalities in One Variable, and justify their steps. See Example B and Exercises 2, 5, 6, 7, 8, and 11.</td>
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<td>6.0 Students graph a linear equation and compute the $x$- and $y$-intercepts (e.g., graph $2x + 6y = 4$). They are also able to sketch the region defined by linear inequality (e.g., they sketch the region defined by $2x + 6y &lt; 4$).</td>
<td>Graphing linear equations is developed incrementally beginning in Chapter 1: Data Exploration when students graph the line $y = x$. In Lesson 2.4: Direct Variation, they graph direct variation graphs. In Chapter 3: Linear Equations, students continue writing and graphing linear equations as they generate a recursively defined sequence. The concept of $y$-intercept is introduced informally as the starting value of a sequence, and students discover that this point lies on the $y$-axis (see Lesson 3.2: Linear Plots). In Lesson 3.4: Linear Equations and the Intercept Form, students are formally introduced to the term $y$-intercept. They write equations in slope-intercept form and have to find the $y$-intercept to do so (see Examples A and B and Exercise 6). Students also find $x$-intercepts, in context (see Lesson 3.4 Example B, part e; Lesson 3.7 Activity, Steps 9 and 12; and Lesson 4.5 Exercise 4d). In Lesson 3.5: Linear Equations and Rate of Change, Lesson 3.7: Modeling Data, Chapter 3 Review, throughout Chapter 4: Fitting a Line to Data, and in Chapter 5 Review, students continue to write and graph equations in slope-intercept form, find $x$- and $y$-intercepts, and often apply these concepts to real-world situations. See Lesson 3.5 Investigation, Lesson 3.7 Activity, and Chapter 3 Review Exercises 2, 8c, and 8d. In Lesson 4.4 Exercise 10, students find the $x$- and $y$-intercepts for an equation written in standard form and use these values to graph the equation. Students sketch regions defined by linear inequalities in Lesson 5.6: Graphing Inequalities in Two Variables. See the Lesson 5.6 Investigation, Examples A and B, and Exercises 4–6, and Lesson 5.7 Exercises 7, 8, and 11.</td>
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<td>7.0 Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula.</td>
<td>In the Lesson 4.1: A Formula for Slope Example, students find the slope of a line given two points and then use the slope to find other points on the line. This concept is expanded in Lesson 4.3: Point-Slope Form of a Linear Equation when they write the equation of a line using two points. Practice is provided in Exercises in Lesson 4.4: Equivalent Algebraic Equations, Lesson 4.5: Writing Point-Slope Equations to Fit Data, Lesson 4.7: Applications of Modeling, and Chapter 4 Review. Often students write two equations using different points and verify that the two equations are equivalent. This process allows them to see that all of the points lie on the same line. See the Lesson 4.3 Investigation, Steps 2–5. Students derive equations in point-slope form in the Lesson 4.3 Exercises (see Exercise 2) and use the point-slope form to write equations that fit data (see Lesson 4.3 Exercises 4, 8, 9, and 10). Students apply their experience in Chapter 5: Systems of Equations and Inequalities. See Lesson 5.1 Exercise 1, Lesson 5.2 Exercises 2 and 6, and Lesson 5.3 Exercise 2. They review these ideas often. See Lesson 6.1 Exercises 13 and 14 and Lesson 7.5 Exercise 11.</td>
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<td>8.0 Students understand the concepts of parallel lines and perpendicular lines and how those slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point.</td>
<td>Students are introduced to slopes of parallel lines in Lesson 4.3 Exercise 7, Lesson 10.1: Parallel and Perpendicular formalizes relationships among slopes of parallel and perpendicular lines. See Lesson 10.1 Investigation, Examples A and B, and Exercises 2, 3, 4, 5, and 7–14. These concepts are further practiced in Lesson 10.2 Exercises 6 and 7 and Chapter 10 Review Exercise 6.</td>
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<td>9.0  Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.</td>
<td>Students find the equation of a line perpendicular to a given line that passes through a given point in Lesson 10.1 Exercise 5 and Lesson 10.2 Exercise 7b. In Chapter 5: Systems of Equations and Inequalities, students solve systems of equations algebraically and by looking at tables and graphs. They look at graphical solutions in Lesson 5.1: Solving Systems of Equations. They solve systems of equations algebraically using substitution in Lesson 5.2: Solving Systems of Equations Using Substitution, using elimination in Lesson 5.3: Solving Systems Using Elimination, and using matrices in Lesson 5.4: Solving Systems of Equations Using Matrices. They practice the skill in Chapter 5 Review Exercises 2, 3, 4, and 10, Lessons 7.2 Exercise 17, Lesson 7.5 Exercise 15, Chapter 7 Review Exercises 14 and 16, Lesson 8.2 Exercise 15, and Chapter 9 Review Exercise 15. The graphical interpretation of a solution to a system of equations is introduced in the Lesson 5.1 Example and reinforced throughout the chapter. See Lesson 5.1 Exercises 3 and 6, Lesson 5.2 Exercise 12, and Lesson 5.3 Exercises 6, 8, and 9. In Lesson 5.7: Systems of Inequalities, students solve systems of inequalities in two variables and sketch the solution sets.</td>
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<td>10.0 Students add, subtract, multiply, and divide monomials and polynomials. Students solve multi-step problems, including word problems, by using these techniques.</td>
<td>Students multiply a monomial by a monomial and a polynomial by a monomial in Lesson 6.3: Multiplication and Exponents. See Lesson 6.3 Exercises 1, 8, 13, and 14, Lesson 6.4 Exercises 3 and 4, Lesson 6.6 Exercise 6, Lesson 6.7 Exercise 4, Chapter 6 Review Exercise 9, and Lesson 7.1 Exercise 17. They divide monomials in Lesson 6.5: Looking Back with Exponents Example A and Exercises 2 and 5 and Lesson 7.6 Exercise 14. They divide polynomials in Lesson 9.4: Factored Form Exercise 14. Students multiply binomials in Lesson 9.3: From Vertex to General Form Example B and Exercises 2, 4, and 10, and Lesson 9.4 Exercise 15 and multiply trinomials in Exercise 12. They add and subtract polynomials while simplifying expressions in various word problems throughout the book. This skill is practiced directly in Lesson 9.6 Exercise 12 and Lesson 9.8 Exercise 12. Students divide polynomials in Lesson 9.7 Exercise 12 and Lesson 9.8 Exercise 3 (when factoring). Multiplying, adding, and subtracting polynomials is practiced extensively in multi-step problems and word problems in Chapter 9: Quadratic Models, particularly when converting from one form of a quadratic equation to another. For example, see Lesson 9.3 Exercise 9.</td>
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<td>11.0 Students apply basic factoring techniques to second- and simple third-degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, and recognizing perfect squares of binomials.</td>
<td>Students are introduced to factoring in Lesson 4.4: Equivalent Algebraic Expressions; see Exercise 7. They learn how to factor second-degree polynomials in Lesson 9.3: From Vertex to General Form. They learn to identify perfect squares of binomials in the Lesson 9.3 Investigation, Steps 4, 5, and 7. They continue working with factoring in Lesson 9.4: Factored Form and Lesson 9.6: Completing the Square. In Lesson 9.4 Exercise 12, students are introduced to polynomials that are a difference of two squares. Students practice factoring in Lesson 9.7 Exercise 12 and Chapter 9 Review Exercise 14. In Lesson 9.8: Cubic Functions, students factor third-degree polynomials. They identify common monomial factors in Exercise 3.</td>
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<td>12.0 Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.</td>
<td>Students are first introduced to factoring and simplifying rational expressions in Lesson 8.6 Example B. They then factor polynomials extensively in Chapter 9: Quadratic Models. Factoring to reduce rational expressions is introduced in Lesson 9.4 Exercise 13 and practiced in Lesson 9.4 Exercise 14, and Lesson 9.7 Exercise 12.</td>
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<td>13.0 Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.</td>
<td>Students encounter rational functions and learn to add, subtract, multiply, and divide them in Lesson 8.6: Introduction to Rational Functions. They solve problems, including word problems, involving rational functions in Example A and Exercises 9 and 10. Adding, subtracting, multiplying, and dividing rational expressions is covered in Example B and practiced in Exercises 12 and 13. These skills are practiced with more complicated expressions in Chapter 8 Review Exercise 11, Lesson 9.8 Exercise 13, Chapter 9 Review Exercise 16, and Chapter 10 Review Exercise 12.</td>
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<td>14.0 Students solve a quadratic equation by factoring or completing the square.</td>
<td>In Lesson 9.4: Factored Form, students solve quadratic equations by factoring. In Lesson 9.6: Completing the Square, students learn to solve a quadratic equation given in polynomial form by completing the square.</td>
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<td>15.0 Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.</td>
<td>Students explore rate-time-distance and other rate relationships throughout Discovering Algebra. In Lesson 2.3: Proportions and Measurement Systems, Lesson 2.4: Direct Variation, and Lesson 2.5: Inverse Variation, students begin to develop their understanding of rates to analyze relationships and write equations (see Lesson 2.4 Exercise 10, Lesson 2.5 Exercise 5, and Chapter 2 Review Exercise 9). Rate-time-distance and other rate relationships are further developed in Chapter 3: Linear Equations. See the Lesson 3.2 Investigation, Lesson 3.3: Time-Distance Relationships, and Lesson 3.4 Exercises 2, 3, and 14. Rate problems are introduced in Lesson 4.7 Exercise 6 and practiced in Chapter 7 Review Exercise 11. Work problems are introduced in Lesson 4.5 Exercise 11 and practiced in Chapter 5 Review Exercise 9. Percent mixture problems are introduced in Lesson 5.2 Example B and practiced in Lesson 5.2 Exercises 13 and 14, Lesson 5.4 Exercise 10, and Lesson 5.7 Exercise 16.</td>
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<td>16.0 Students understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and functions.</td>
<td>Discovering Algebra is a functional approach to algebra. In the first half of the book, students work informally with relations and functions. In Lesson 7.1: Secret Codes and Lesson 7.2: Functions and Graphs, students formally define functions and learn several methods of identifying whether a relation is a function. See Lesson 7.1 Exercises 4, 5, and 11, and Lesson 7.2 Investigation and Exercises 4–14. In Lesson 8.6: Introduction to Rational Functions, students learn about features of rational functions, including asymptotes. Students learn to describe the domain and range of a relation or function, and through their extensive work with linear, quadratic, exponential, rational, and quadratic functions throughout Discovering Algebra, they become adept at identifying many features of these functions and their graphs.</td>
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<td>17.0 Students determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression.</td>
<td>Domain and range are defined in Lesson 7.1: Secret Codes, and independent and dependent variables are defined in Lesson 7.3: Graphs of Real-World Situations. Students identify the domain and range of relationships represented by graphs, ordered pairs, and symbolic expressions throughout Lesson 7.1 (see Example and</td>
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<td>18.0 Students determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion.</td>
<td>Students determine whether relations represented by graphs, ordered pairs, and symbolic expressions are functions throughout Chapter 7: Functions and are often asked to explain or justify their conclusions. For examples, see Lesson 7.1 Exercises 4, 5, and 11 and Lesson 7.2 Exercises 4–14.</td>
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<td>19.0 Students know the quadratic formula and are familiar with its proof by completing the square.</td>
<td>Students learn and use the quadratic formula in Lesson 9.7: The Quadratic Formula. They derive the quadratic formula by completing the square in the Lesson 9.7 Investigation.</td>
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<td>20.0 Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.</td>
<td>In Lesson 9.7: The Quadratic Formula, students use the quadratic formula to solve quadratic equations and find roots. See the Example and Exercises 3, 5, and 9. They practice and master the technique in Chapter 9 Review Exercises 8 and 12.</td>
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<td>21.0 Students graph quadratic functions and know that their roots are the x-intercepts.</td>
<td>Students begin graphing quadratic functions in Lesson 7.6: Squares, Squaring, and Parabolas, and continue exploring parabola graphs in Chapter 8: Transformations. Then, in Chapter 9: Quadratic Models, students graph quadratic functions extensively. In Lesson 9.2: Finding the Roots and the Vertex, students identify x-intercepts and learn the connection between roots and x-intercepts (see Example A and Exercises 7 and 8). In Lesson 9.4: Factored Form, students use their understanding of x-intercepts and roots to write equations in factored form given a graph, and identify x-intercepts, roots, or zeros given an equation (see Investigation, Example A, and Exercises 3, 4, 5, 9, 10, and 12).</td>
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<td>22.0 Students use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points.</td>
<td>Students first explore parabolas that have zero, one, or two intersection points with the x-axis in Lesson 9.1 Exercise 4. In Lesson 9.2: Finding the Roots and Vertex, students explore quadratic functions whose graphs intersect the x-axis twice. In Lessons 9.3: From Vertex to General Form and 9.4: Factored Form, students learn to factor, and in Lesson 9.4, they identify x-intercepts using the factored form of a quadratic equation (see Exercise 3). In Lesson 9.4 Exercise 12f–g and Lesson 9.6 Exercise 7c, students investigate quadratic equations that have no intersections with the x-axis. In Lesson 9.7: The Quadratic Formula, students use the quadratic formula to determine the number of x-intercepts of the graph of a quadratic equation. See Exercises 4 and 7. Students practice determining solutions in Chapter 9 Review (see Exercises 3, 7, 8, and 11).</td>
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<td>23.0 Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.</td>
<td>Chapter 9: Quadratic Models contains many opportunities for students to explore the application of quadratic equations to motion problems. See Lesson 9.1 Example A, Investigation, and Exercises 5, 6, 7, and 9; Lesson 9.2 Investigation and Exercises 7–10; Lesson 9.3 Exercises 8, 9, and 11; Lesson 9.4 Exercise 11; Lesson 9.5 Activity; Lesson 9.6 Exercises 8 and 10; Lesson 9.7 Exercise 5; and Chapter 9 Review Exercise 10.</td>
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<td>24.0 Students use and know simple aspects of a logical argument.</td>
<td>In Discovering Algebra, logical arguments are often presented in narrative text and Examples to demonstrate the step-by-step sequence of thinking required to solve problems. See, for example, Lesson 4.4 Example B, in which an argument is presented and (continued)</td>
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<td>24.1 Students explain the difference between inductive and deductive reasoning and identify and provide examples of each.</td>
<td>Students use inductive and deductive reasoning and make conclusions based on observed patterns and follow logical arguments throughout the book. In the Lesson 6.1 Investigation, they observe a pattern in ratios and write an equation based on this pattern. In the Lesson 6.3 Investigation, they determine the power property of exponents based on observations. They follow a deductive argument in the derivation of the quadratic formula in the Lesson 9.7 Investigation. In Lesson 10.1, inductive and deductive reasoning are formally introduced and defined. See the lesson text and Exercises 7–14 and 16. Students apply their understanding in Lesson 10.2 Exercise 9, Lesson 10.4 text, Lesson 10.5 Project, and Chapter 10 Review Exercise 13.</td>
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<td>24.2 Students identify the hypothesis and conclusion in logical deduction.</td>
<td>Students formally identify the hypotheses and conclusion in logical deduction in Lesson 10.1. See the lesson text and Exercise 16. They review it in Chapter 10 Review Exercise 3.</td>
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<td>24.3 Students use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion.</td>
<td>In Lesson 7.2: Functions and Graphs, students find examples and counterexamples to clarify what is and is not a function. Chapter 9 Review Exercises 17 and 20, and Lesson 10.1 Exercise 15 provides additional practice with counterexamples.</td>
</tr>
<tr>
<td>25.0 Students use properties of the number system to judge the validity of results, to justify each step of a procedure, and to prove or disprove statements.</td>
<td>Field properties are introduced in Lesson 4.4: Equivalent Algebraic Equations. They are used to justify the step-by-step transformation of one expression into another. Field properties are used elsewhere to justify certain difficult procedures. For example, in Lesson 9.7: The Quadratic Formula, they are used to justify the steps in the development of the quadratic formula. Chapter 9 Review Exercise 1 and Chapter 10 Review Exercise 8 require students to justify conclusions.</td>
</tr>
<tr>
<td>25.1 Students use properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counterexamples to, claimed assertions.</td>
<td>In Lesson 4.4: Equivalent Algebraic Equations, students use properties of numbers to verify whether algebraic equations are equivalent. See Investigation Step 6, Example B, and Exercises 1, 9, and 11e. In Lesson 9.3 Example B and Chapter 9 Review Exercise 20, students present arguments to justify the transformation of an equation from one form to another.</td>
</tr>
<tr>
<td>25.2 Students judge the validity of an argument according to whether the properties of the real number system and the order of operations have been applied correctly at each step.</td>
<td>In Lessons 0.1 and 2.7, students learn the order of operations. In Lesson 0.4 Exercise 6 and Lesson 2.7 Exercise 2, they determine which of two arguments is correct and identify the mistake in the incorrect one. In Lesson 2.8: Undoing Operations, students learn to write expressions to represent number tricks. When doing this, they must correctly apply the order of operations and properties of real numbers (see Investigation and Example A). Students evaluate expressions for equivalence in Lesson 4.4 Exercise 1.</td>
</tr>
</tbody>
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(continued)
<table>
<thead>
<tr>
<th>California Algebra I Standard</th>
<th>Discovering Algebra Chapter, Lesson, and Exercise Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.3 Given a specific algebraic statement involving linear, quadratic, or absolute value expressions or equations or inequalities, students determine whether the statement is true sometimes, always, or never.</td>
<td>In Lesson 6.3: Multiplication and Exponents, students again determine which of two arguments is correct. See Example A and Exercises 5 and 9. Students are asked to determine whether a given algebraic statement is true in a variety of contexts in Discovering Algebra. In many of these problems, students are asked to rewrite the right side of the equation to make the statement true. See Lesson 5.2 Exercise 2 (linear); Lesson 5.5 Exercise 1 (inequalities); Chapter 6 Review Exercise 9 (exponential equations); Lesson 7.5 Exercise 3 (absolute-value equations); and Lesson 9.3 Exercise 10 and Lesson 9.4 Exercise 6 (quadratic equations). See Lesson 7.6 Exercise 5 for an instance in which students are asked to find what values make a statement true. See Lesson 7.6 Exercise 12 for an instance in which students justify why a quadratic equation has no solutions. See Lesson 9.7 Exercise 3 for an instance in which students identify which quadratic equations have solutions and which do not. Students evaluate statements as sometimes, always, or never true in Chapter 3 Review Exercise 17 and Chapter 10 Review Exercise 9.</td>
</tr>
</tbody>
</table>
This chart shows a suggested Pacing Guide that will enable you to cover all topics required for the Algebra I California Mathematics Standard Test, which is held annually in April.

A semester is typically 90 days. We’ve scheduled less than that number to account for days lost to staff development days, finals, minimum days, assemblies, and other interruptions. You may wish to add technology projects or other enrichment and reinforcement activities, or additional review days.

The bracketed lessons are optional; they are designed to reinforce key Grade Seven California Mathematics Content Standards. Chapter 0 reviews operations on rational numbers, while the first half of Chapter 1 reviews statistics and data analysis. Examine the lessons and use those that will help your students transition into algebra. The Preparation for Algebra Pretest provided later in this guide can help you assess the skill level of your incoming students.

<table>
<thead>
<tr>
<th>Lesson Number</th>
<th>Lesson Title</th>
<th>Number of Days</th>
<th>California Algebra I Content Standards Addressed</th>
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<tbody>
<tr>
<td>[0.1]</td>
<td>The Same yet Smaller</td>
<td>2</td>
<td>Reinforcement of Grade 7 Standards</td>
</tr>
<tr>
<td>[0.2]</td>
<td>More and More</td>
<td>1</td>
<td>Reinforcement of Grade 7 Standards</td>
</tr>
<tr>
<td>[0.3]</td>
<td>Shorter yet Longer</td>
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<td>Reinforcement of Grade 7 Standards</td>
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<tr>
<td>[0.4]</td>
<td>Going Somewhere?</td>
<td>1</td>
<td>1.1, 25.2</td>
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<tr>
<td>[1.1]</td>
<td>Bar Graphs and Dot Plots</td>
<td>1</td>
<td>Reinforcement of Grade 7 Standards</td>
</tr>
<tr>
<td>[1.2]</td>
<td>Summarizing Data with Measures of Center</td>
<td>1</td>
<td>Reinforcement of Grade 7 Standards</td>
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<tr>
<td>[1.3]</td>
<td>Five-Number Summaries and Box Plots</td>
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<tr>
<td>[1.4]</td>
<td>Histograms and Stem-and-Leaf Plots</td>
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<td>[1.5]</td>
<td>Exploring a Conjecture</td>
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<td>1.6</td>
<td>Two-Variable Data</td>
<td>2</td>
<td>Preparation for 6.0 and 16.0</td>
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<tr>
<td>1.7</td>
<td>Estimating</td>
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<td>Preparation for 6.0 and 16.0</td>
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<tr>
<td>2.1</td>
<td>Proportions</td>
<td>1</td>
<td>1.0, 2.0</td>
</tr>
<tr>
<td>2.2</td>
<td>Capture-Recapture</td>
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<td>1.1, 25.2, Preparation for 15.0</td>
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<td>Proportions and Measurement Systems</td>
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<tr>
<td>2.4</td>
<td>Direct Variation</td>
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<tr>
<td>2.5</td>
<td>Inverse Variation</td>
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<td>2.7</td>
<td>Evaluating Expressions</td>
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<td>2.8</td>
<td>Undoing Operations</td>
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<td>Recursive Sequences</td>
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<td>3.2</td>
<td>Linear Plots</td>
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<td>6.0, 15.0</td>
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<td>3.3</td>
<td>Time-Distance Relationships</td>
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<tr>
<td>3.4</td>
<td>Linear Equations and the Intercept Form</td>
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<td>Linear Equations and Rate of Change</td>
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<td>Solving Equations Using the Balancing Method</td>
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<td>3 Review</td>
<td>Review and Mixed Review</td>
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<td>4.0, 5.0, 25.0, 25.3</td>
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<td>A Formula for Slope</td>
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<td>Writing a Linear Equation to Fit Data</td>
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<td>Point-Slope Form of a Linear Equation</td>
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<td>Writing Point-Slope Equations to Fit Data</td>
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<td>More on Modeling</td>
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<td>Applications of Modeling</td>
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<td>Solving Systems of Equations</td>
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<td>5.2</td>
<td>Solving Systems of Equations Using Substitution</td>
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<td>4.0, 5.0, 7.0, 9.0, 15.0</td>
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<tr>
<td>5.3</td>
<td>Solving Systems of Equations Using Elimination</td>
<td>2</td>
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<td>MPYS 5.2b</td>
<td>Mixture, Rate, and Work Problems</td>
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<td>Inequalities in One Variable</td>
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<td>5.6</td>
<td>Graphing Inequalities in Two Variables</td>
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<td>5.7</td>
<td>Systems of Inequalities</td>
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<td>6.0, 9.0, 15.0</td>
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<td>Recursive Routines</td>
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<td>7.0, Preparation for 16.0 and 17.0</td>
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<td>Exponential Equations</td>
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<td>Multiplication and Exponents</td>
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<td>6.5</td>
<td>Looking Back with Exponents</td>
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<td>Zero and Negative Exponents</td>
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<td>Fitting Exponential Models to Data</td>
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<td>6.9</td>
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<td><strong>First-Semester Total Days</strong></td>
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<td>72 including optional lessons</td>
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<td>7.1</td>
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<td>7.2</td>
<td>Functions and Graphs</td>
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<td>Review and Mixed Review</td>
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<td>9.2</td>
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<td>From Vertex to General Form</td>
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<th>Lesson Title</th>
<th>Number of Days</th>
<th>California Algebra I Content Standards Addressed</th>
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<tr>
<td>9.5</td>
<td>Projectile Motion</td>
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<td>23.0</td>
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<td>MPYS 9.4b</td>
<td>Rational Expressions</td>
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<td>Completing the Square</td>
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<td>9.7</td>
<td>The Quadratic Formula</td>
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<td>2.0, 10.0, 12.0, 19.0, 20.0, 22.0, 23.0, 25.1</td>
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<td><strong>Review and Mixed Review</strong></td>
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<td>Finding the Midpoint</td>
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<td>Operations with Roots</td>
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<td>Translating Points</td>
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<td>4.0, 5.0</td>
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<td>Reflecting Points and Graphs</td>
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<td>8.4</td>
<td>Stretching and Shrinking Graphs</td>
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<td>Using Transformations to Model Data</td>
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<td>13.0, Foundation for Algebra II</td>
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<td><strong>Review</strong></td>
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<td><strong>Review and Mixed Review</strong></td>
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<tr>
<td><strong>Second-Semester Total Days</strong></td>
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Differentiating Instruction Using Discovering Algebra

The diverse classroom is a given in California; students of all backgrounds and abilities attend most schools. Providing universal access to the same academic standards-based curriculum can be challenging to teachers. The cooperative investigations in Discovering Algebra provide an opportunity for students to benefit from the diversity in your classroom. Seeing different approaches can lead to deeper mathematics understanding and to skills that will extend beyond the classroom to the workplace.

Managing a diverse classroom is not easy. Balancing the variety of needs as well as retaining a cohesive classroom community is one of the greatest challenges you face as an educator. A curriculum that engages students in hands-on learning can help you effectively meet that challenge. Discovering Algebra investigations provide the opportunities for students to work cooperatively on problems using physical models—talking and writing, making conjectures and explaining the reasoning behind them, sharing ideas and seeing different approaches. The Discovering Algebra Teacher’s Edition will help you be aware of opportunities to highlight different approaches and will alert you to students’ difficulties along the way. Advanced students will have the opportunity to take the investigations further, while students who might struggle with mathematics may find that the hands-on investigations give them a chance to connect the mathematics to something they can experience and understand. Monitor proficient students to ensure they don’t monopolize the conversation.

Some students may learn more effectively when they are able to process information in a modality they understand, so offer opportunities to create posters or show learning in other ways. (You might give students extra points for classroom posters; ask them to make a rough draft first and let them know that they will not get full credit until their poster is correct.) Discussions are helpful for English Language Learners (ELL) or other students whose understanding of English is weak. Your goal is to show you respect ideas and good thinking as much as, or more than, right answers alone. Making mistakes is OK; everyone learns from mistakes.

Students benefit from explaining their work, but they may not like to do it. Students may feel they shouldn’t have to explain because, in previous classes, they saw that as the teacher’s job. Reviewing is also important. Some students may balk at keeping track of important formulas and examples—it requires effort. The ability to reflect on one’s own learning is extremely valuable. If you can push explanation and reflection consistently, your students will benefit.

This section of the California Implementation Guide gives you suggestions on how to differentiate assignments and experiences as you help students master key California Algebra I Content Standards. As examples, specific ideas are given for standards 5, 6, 7, and 9 in Chapters 3, 4, and 5. You don’t have to follow all these suggestions, but keep them in mind as options so that you can be ready with extra activities for various needs, and assign them when it seems appropriate. You can also use suggestions similar to these as opportunities for students to earn extra points. The suggestions are written for three groups of students who need more than the standard lesson plans.
• Advanced students either have a current understanding of the topic or are able to grasp its fundamentals very quickly. They need more depth in problems, more challenging work, and extensions. They should spend time working with teammates, explaining their thinking, and writing about the mathematics. Many of these advanced students have “unconscious competence.” Their learning will be deeper as they exchange ideas and reflect on what they discover from an investigation. Enrichment activities, Take Another Look, and Assessing What You Have Learned should be required.

• Benchmark students are making good progress toward achieving the standards by moving at the pace of the book. The regular schedule of investigations and building understanding through homework are generally sufficient for this group.

• Strategic students lack skills or background knowledge, or have difficulty understanding the topic at the usual pace. They will benefit from the connections the investigations will help them make. They can be supported by reduced homework, particularly, fewer Reason and Apply problems. Instead, assign More Practice Your Skills worksheets (also available at www.keymath.com).

• ELL students need hands-on experiences and extra help with the mathematics vocabulary. They benefit significantly from group interactions. Their skills may be low, middle, or high after verbal comprehension is achieved. Making explanatory posters allows them to use and define new vocabulary.

Here are examples of instructions for enhancing learning for the three groups that are not necessarily moving at the pace of the book.

Chapter 3

Standard 6.0 Students graph a linear equation, compute $x$- and $y$-intercepts, and sketch the regions defined by a linear inequality.

3.1 Recursive Sequences

Advanced: Ask these students to add series of numbers based on the sequences in the book, then look for formulas to solve problems from the exercises.

Strategic/ELL: Allow plenty of time for the toothpick investigation and discussion of the results. These students should use manipulatives until they are comfortable moving away from them. Provide a table for students to enter their results. Assign the More Practice Your Skills worksheet, Recursive Sequences.

ELL: Take time to make sure all students understand the vocabulary: recursive, sequence, linear, and term.

3.2 Linear Plots

Advanced: Ask students to investigate graphs of the relationship between the side length, perimeter, and area of similar shapes. They could define situations that would give each kind of graph.

Strategic/ELL: Ask students to act out the scenario of the Investigation On the Road Again. Mark and label the vehicles’ progress every hour.

ELL: Ask students to create a list of linear situations. Make sure they understand the term linear relationship. They might create a poster explaining the definition and giving examples.
3.3 Time-Distance Relationships

**Advanced:** Ask students to explore the graphs for objects that are accelerating or decelerating. What happens to an object that is thrown up in the air?

**Strategic/ELL:** Spend extra time discussing the investigation from Lesson 3.2, especially Steps 6–11, relating the \( y \)-intercepts to starting points, the slope of the line to the speed, and the intersection to the point the cars meet.

**Strategic:** During class discussion, talk about why the direction on the graph does not represent the direction the object is actually traveling.

3.4 Linear Equations and the Intercept Form

**Advanced:** Ask students for a carefully written explanation of the investigation, including the relationships between situation, table, graph, and equation.

**Strategic/ELL:** These students might not understand abstraction of formulas at this point. Make sure they have attainable goals, whether this means fewer problems or simpler ones.

**ELL:** Take time to make sure all students understand the vocabulary: intercept form, \( y \)-intercept, and coefficient.

3.5 Linear Equations and Rate of Change

**Advanced:** Have students complete the Project Legal Limits. Have students come up with real-life examples that would yield discrete and continuous graphs, and write about the differences.

**Strategic/ELL:** Ask students to make posters using a problem to show the links between situation, table, graph, and equation.

**ELL:** Take time to make sure all students understand the vocabulary: discrete and continuous.

3.7 Activity Day: Modeling Data

**Advanced:** Assign the Improving Your Reasoning Skills problem.

**Strategic:** Rather than doing this optional activity, low-achieving students can catch up and consolidate their learning by creating a poster or doing additional More Practice Your Skills worksheets.

Chapter 4

**Standard 7.0** Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula.

**Standard 5.0** Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable, and provide justification for each step.

4.3 Point-Slope Form of a Linear Equation

**Advanced:** Give students practice switching between equations in point-slope form and equations in slope-intercept form. Ask them to explain the benefits and problems with each of those two forms and to describe their relationship variable by variable.

**Strategic/ELL:** Help students link \( y \), \( y_1 \), \( b \), \( x \), and \( x_1 \) to the corresponding aspects of a line; ask them to explain or draw what each variable represents and how to
identify them in the equation of a line. Ask them to explain or draw the slope formula.

**ELL:** Ask students to explain why this form is called *point-slope*. Take time to make sure all students understand the vocabulary: *quadrilateral*.

### 4.4 Equivalent Algebraic Equations

**Advanced:** Have students switch between the general equations of all three forms algebraically (using equations with variables only). Ask them to justify their steps using properties from the book.

**Strategic:** Have students start with equivalent equations with one variable, then solve, and justify steps. Ask them to do the same with two variables. Have students use the More Practice Your Skills worksheet.

**ELL:** Take time to make sure all students understand the vocabulary: *standard form*.

### 4.5 Writing Point-Slope Equations to Fit Data

**Advanced:** Focus on Exercise 8 (Mini-Investigation). Ask students to test lines of fit using extreme input values and talk about what happens with outliers.

**Strategic:** Start students off working with just two points, as in Exercise 1. Give them practice drawing lines of fit; discuss which lines fit better and why.

## Chapter 5

**Standard 9.0** Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically; inequalities too.

Matrices are not part of the California Algebra I Content Standards, but advanced students can work through matrices in addition to work done with the rest of the class. They can start by going through Lesson 1.8 during Lessons 5.1 to 5.3, then doing Lesson 5.4 while other students spend a day either consolidating their knowledge of Lessons 5.1 to 5.3 or reviewing the basics of inequalities.

### 5.1 Solving Systems of Equations

**Advanced:** Emphasize careful writing and explanations for the investigation.

**Strategic:** Stop the investigation for these students at Step 8. Provide more practice in finding a variety of solutions to a linear equation in $ax + by = c$ form or use the appropriate worksheet.

**ELL:** Take time to make sure all students understand the vocabulary: *systems of equations*.

### 5.2 Solving Systems of Equations Using Substitution

**Advanced:** Ask students to write out the answers to Exercise 11, including the explanations.

**Strategic:** Provide students with substitution and evaluation practice.

### 5.3 Solving Systems of Equations Using Elimination

**Advanced:** Have students give examples of, and explain, inconsistent and redundant systems.

**Strategic:** Focus on problems such as \[
\begin{align*}
2x + 3y &= 8 \\
3x - 3y &= -3
\end{align*}
\] where no row reduction is required.
ELL: Take time to make sure all students understand the vocabulary: inconsistent and redundant.

5.4 Solving Systems of Equations Using Matrices
Advanced: Students can complete this optional lesson.

Benchmark/Strategic: Make posters explaining elimination and substitution. Focus on problems such as \( \begin{cases} 2x + 3y = 3 \\ 3x - 4y = 13 \end{cases} \), where row reduction is required.

5.5 Inequalities in One Variable
Advanced: As students work with compound inequalities, require that they articulate the conditions under which the operation sign switches directions and why.

Strategic: Emphasize the investigation and work with negatives (such as \(-6 < -2\)). Spend time talking about the sign switch. Ask students to make a poster summarizing the information.

ELL: Take time to make sure all students understand the vocabulary: greater than, less than, and inequality. Give students practice reading the mathematical sentences from the book aloud. For example, \(5 + 2a > 21\): “Five plus 2a is greater than 21.” Focus on Exercises 4 and 9.

5.6 Graphing Inequalities in Two Variables
Advanced: Require students to explain the solution to the Investigation Graphing Inequalities. Challenge them to graph nonlinear inequalities or extrapolate this to three-dimensional situations.

Strategic: Ask students to explain how the grid of circles for the investigation is like two-dimensional inequalities and what the solution set means. Ask them to make a poster defining open and closed circles for dividing points and dashed versus solid lines for dividing lines.

ELL: Take time to make sure all students understand the vocabulary: plane, half-plane, and solution set.

5.7 Systems of Inequalities
Advanced: Have students do the Take Another Look activity on page 330, or have students plot conic sections (for example, \(x^2 + y^2 < 4\) or \(\frac{x^2}{4} - \frac{y^2}{9} \geq 1\)) and explain the relationship between the solutions, equations, and graphs.

Strategic: Students might spend an extra day summarizing their learning on inequalities.
You might start your year with a review of the basic concepts and skills required to move forward into algebra. The section includes an algebra pretest to assess how much knowledge each student already possesses and what areas may need review, as well as two exercise sets that focus on number sense and pre-algebra. In addition to these exercise sets, you may choose to use the optional lessons in Chapters 1 and 2 to help your students transition into algebra.
Pretest

1 Which shows 0.0361 written in scientific notation?
   A $3.61 \times 10^2$
   B $361 \times 10^{-4}$
   C $3.61 \times 10^{-2}$
   D $3.61^{-2}$

2 $\left(\frac{4}{7} + \frac{3}{7}\right) \div \frac{1}{2} =$
   A $\frac{1}{4}$
   B $\frac{1}{2}$
   C $1$
   D $2$

3 $\left(\frac{5}{6} - \frac{1}{2}\right) - \left(\frac{3}{4} - \frac{2}{3}\right) =$
   A $\frac{1}{4}$
   B $\frac{13}{12}$
   C $\frac{5}{12}$
   D $\frac{1}{12}$

4 1.2 is between which pair of numbers?
   A $\frac{9}{10}$ and $\frac{21}{20}$
   B $\frac{11}{10}$ and $\frac{7}{6}$
   C $\frac{11}{9}$ and $\frac{4}{3}$
   D $\frac{5}{3}$ and $\frac{13}{12}$

5 Which number is closest to 6.5?
   A 6.4          B 6.49
   C 6.53         D 6.5101

6 Which sequence is arranged in ascending (increasing) order?
   A $-4.1, -\frac{21}{5}, \sqrt{15}, 4.009, 4.1$
   B $-\frac{21}{5}, -4.1, \sqrt{15}, 4.1, 4.009$
   C $-\frac{21}{5}, -4.1, \sqrt{15}, 4.009, 4.1$
   D $-\frac{21}{5}, -4.1, 4.009, 4.1, \sqrt{15}$

7 Which percent is equivalent to $\frac{5}{4}$?
   A 25%
   B 80%
   C 120%
   D 125%

8 Francis bought a sweater on sale for 35% off. The original price was $36.00. How much did Francis pay?
   A $12.60
   B $23.40
   C $24.60
   D $48.60

9 Which of the following is true?
   P: $|6| > 0$    Q: $|3| \leq |-3|$
   R: $|-4| = |4|$    S: $|x - y| = |y - x|$
   A All are true.
   B Only P is true.
   C Only Q and S are true.
   D P, Q, and S are true.

10 $\sqrt{50}$ is closest to which whole number?
   A 7          B 8
   C 49         D 2500
Pretest (continued)

Name ____________________________ Period _____ Date ____________

11. \(6^{-2} = \)
   A. \(-12\)
   B. \(-36\)
   C. \(-\frac{1}{12}\)
   D. \(-\frac{1}{36}\)

12. \(\frac{2^4 \cdot 3^2 \cdot 9^3}{2^3 \cdot 3^2} = \)
   A. \(\frac{1}{6}\)
   B. \(\frac{1}{3}\)
   C. 3
   D. 6

13. 173 centimeters is equivalent to how many meters?
   A. 17,300 meters
   B. 17.3 meters
   C. 1.73 meters
   D. 0.173 meter

14. Which expression gives the area of the shaded triangle?
   ![Diagram of a triangle with sides labeled a, b, and 3]
   A. \(\frac{b(a + 3)}{2}\)
   B. \(\frac{3ab}{2}\)
   C. \(\frac{1}{2}ab + 3b\)
   D. \(\frac{ba + 3}{2}\)

15. The length, \(l\), of a rectangle is three times its width, \(w\). Which expression represents the perimeter of the rectangle?
   A. \(2(2w + 3)\)
   B. \(3w^2\)
   C. \(4w\)
   D. \(8w\)

16. Which equation represents the relationship: Three less than the product of a number and six is \(-24\)?
   A. \(6(y - 3) = -24\)
   B. \(\frac{y}{6} - 3 = -24\)
   C. \(6y - 3 = -24\)
   D. \(6y - 24 = -3\)

17. Jason went to the county carnival. The admission cost $2.50 and each ride cost $1.75. Which equation can Jason use to calculate his total cost, \(C\), if he takes \(n\) rides?
   A. \(C = 2.5n + 1.75\)
   B. \(C = 2.50 + n + 1.75\)
   C. \(C = 1.75n + 2.5\)
   D. \(C = (2.50 + 1.75)n\)

18. If \(x = -3\), \(y = 2\), and \(z = 4\), which expression has the greatest value?
   A. \(xyz\)
   B. \(-z(x + y)\)
   C. \(x + y + z\)
   D. \(z + y - x\)

19. Point \(P\) is marked on the number line. Which point is represented by \(-2P - 7\)?
   ![Number line with points A through D]
   A. \(A\)
   B. \(B\)
   C. \(C\)
   D. \(D\)

(continued)
20 If \( p = \frac{2}{3} \), which expression has the greatest value?
   A \( 2p \)          B \( p + 1 \)
   C \( p^2 \)          D \( p^3 \)

21 If \( x = -3 \), what is the value of \( 2x^2 - (6 + x)^2 \)?
   A -27          B 27
   C -9          D 9

22 Which expression is equivalent to \( 2x - (3 + 4x) \)?
   A \(-3 - 2x\)        B \(-3 + 2x\)
   C \(-3 + 6x\)        D \(3 + 6x\)

23 Which equation is the equation of the graphed line?

   A \( y = -\frac{2}{3}x + 4 \)
   B \( y = -\frac{3}{2}x + 4 \)
   C \( y = \frac{2}{3}x + 4 \)
   D \( y = \frac{3}{2}x + 4 \)

24 Which point is on the graph of \( y = 2x - 5 \)?
   A \((1, -3)\)        B \((1, 3)\)
   C \((-1, -3)\)       D \((-3, 1)\)

25 Which best represents the graph of \( y = -\frac{1}{2}x + 4 \)?
   A
   B
   C
   D

(continued)
26 A 3-inch-long coiled spring stretches an additional 0.5 inch with each 1-ounce weight attached to its end. Which graph best shows the relationship between the number of ounces hung on the end of the spring and the length of the spring?

A  

B  

C  

D  

27 If $6 - 3x = 24$, what is the value of $x$?
A $x = 6$
B $x = -6$
C $x = 10$
D $x = -10$

28 Solve the equation $P = 2l + 2w$ for $l$.
A $l = \frac{P + 2w}{2}$
B $l = \frac{P}{2} - 2w$
C $x = \frac{-3}{2}$
D $l = \frac{2P - w}{2}$

29 The formula $C = \frac{5}{9}(F - 32)$ is used to convert Fahrenheit degrees ($^\circ$F) to Celsius degrees ($^\circ$C). Which statement is NOT correct?
A $50^\circ$F = $10^\circ$C
B $96^\circ$F = $30^\circ$C
C $32^\circ$F = $0^\circ$C
D $212^\circ$F = $100^\circ$C

30 Sara and Juan each leave San Río at the same time and drive in opposite directions. Sara averages 50 mi/h and Juan averages 42 mi/h. After $k$ hours, how far apart are they?
A $\frac{50}{k} + \frac{42}{k}$
B $\frac{k}{50} + \frac{k}{42}$
C $\frac{92}{k}$
D $92k$
Exercise Set A (Number Sense)

Name ___________________________  Period ____________  Date ________________

1. Evaluate each expression.
   a. \(3^3 = \)  
   b. \((2^3)(3^2) = \)  
   c. \(\frac{1}{2}^3 = \)  
   d. \((-4)^2 = \)  
   e. \(4^{-2} = \)  
   f. \((5^3)(5^{-3}) = \)  
   g. \((2^{-2})(12) = \)  
   h. \((3^{-2})(3^{-3}) = \)
   i. \(\frac{4^3}{4^2} = \)  
   j. \(\frac{32}{33} = \)  
   k. \(\frac{5^3}{5^{-2}} = \)  
   l. \(\frac{2^3 \cdot 3^4}{2 \cdot 3^2} = \)

2. Calculate the total.
   a. \(\frac{1}{3} + \frac{3}{4} = \)  
   b. \(\frac{5}{3} \cdot \frac{4}{5} \cdot \frac{9}{8} = \)  
   c. \(\frac{1}{2} - \frac{2}{3} = \)  
   d. \(\frac{5}{6} \div \frac{2}{3} = \)  
   e. \(3 - \left(\frac{3}{2}\right)^2 = \)  
   f. \(\frac{2}{3} \left(\frac{3}{4} - \frac{5}{12}\right) = \)  
   g. \(13.4 + 2.71 = \)  
   h. \(7 - 2.37 = \)  
   i. \(-2.54 - 1.48 = \)  
   j. \(0.23(7.8 + 2.2) = \)  
   k. \(0.3^2 = \)  
   l. \(-2.4 \div 0.6 = \)

3. Which point on the number line best represents each number?

   a. 16  
   b. \(\sqrt{7^4}\)  
   c. \((-9)^2\)
   d. \(\sqrt{960}\)  
   e. \(\left(\frac{1}{2}\right)^{-2}\)  
   f. \(\frac{1}{3^{-3}}\)

4. a. Write each number in scientific notation.
   i. 325  
   ii. 45,012  
   iii. 0.23  
   iv. 0.00891  
   v. 6.3 million  
   vi. thirteen hundred

   b. Write each number in standard decimal notation.
   i. \(6.01 \times 10^4\)  
   ii. \(7.761 \times 10^{-4}\)  
   iii. \(4.3 \times 10^{-4}\)
   iv. \(\frac{3}{8}\)  
   v. \(6 - \frac{3}{5}\)  
   vi. \(3\frac{1}{2} - \frac{5}{8}\)

5. Express each number as a decimal number rounded to the nearest tenth.
   a. 62.355  
   b. 91.98  
   c. 0.061  
   d. 35.422  
   e. \(5.0824 \times 10^2\)  
   f. \(2.64 \times 10^{-1}\)  
   g. \(\frac{4}{3}\)  
   h. \(\left(\frac{3}{2}\right)^3\)

(continued)
Exercise Set A (continued)

Name ___________________________ Period ________ Date _____________

6. Find the perimeter, \( P \), and the area, \( A \), of each figure.

\[
\begin{align*}
\text{a. } & P = \frac{2\frac{1}{2}}{1.25} \quad \text{b. } P = \frac{2\frac{1}{2}}{8'} \\
& A = \frac{1.75}{1} \quad \quad \quad & A = \frac{1.75}{1} \\
\text{c. } & P = \frac{1.5}{1.5'} \\
& A = \frac{1}{1} \\
\text{d. } & P = \frac{2'}{2'} \\
& A = \frac{2'}{2'}
\end{align*}
\]

7. \[ \begin{align*}
\text{a. } | -3 | + | 5 | = \quad & \text{b. } | -3 + 5 | = \\
\text{c. } | 12 - 5 | - | 5 - 12 | = \quad & \text{d. } | -4 - 4 | =
\end{align*} \]

8. Use <, >, or = to make each statement true.

\[ \begin{align*}
\text{a. } (8 - 9) \quad & \quad | 8 - 9 | \\
\text{b. } \frac{2}{3} \quad & \quad \left( \frac{2}{3} \right)^2 \\
\text{c. } \sqrt{119} \quad & \quad 11 \\
\text{d. } (-6.1)^2 \quad & \quad 6.1^2 \\
\text{e. } \sqrt{4^2} \quad & \quad 4 \\
\text{f. } -9 + 13 \quad & \quad 13 - 9 \\
\text{g. } 6^2 + 4^2 \quad & \quad (6 + 4)^2 \\
\text{h. } 1^8 \quad & \quad 1^3
\end{align*} \]


\[ \begin{align*}
\text{a. } & \text{Gina walks 2.5 miles in 50 minutes. At that rate, how far can Gina walk in 2 hours? How long would it take her to walk 1 mile?} \\
\text{b. } & \text{Oranges cost$5 for 3 pounds. How much does 7.5 pounds cost? How many pounds of oranges can you buy for$2.50?} \\
\text{c. } & \text{Discount Sports is offering 20% off all ski wear. What is the sale price of a jacket that regularly costs$78?} \\
\text{d. } & \text{Rip Hardware marks up its merchandise 45% above the wholesale cost. If they pay $16.40 for a hammer, for what price would they sell it?}
\end{align*} \]

10. Brad went shopping for oranges at three fruit markets.

At Market A, oranges cost $3.99 per dozen. Brad bought a dozen.

At Market B, oranges were 15 for$5.55. Brad bought 5.

At Market C, 6 oranges sold for $1.83. Brad bought 10.

\[ \begin{align*}
\text{a. } & \text{What is the price per orange at each market?} \\
\text{b. } & \text{What is the average cost of an orange? Give answer to the nearest tenth of a cent.} \\
\text{c. } & \text{How much did Brad spend at each market?} \\
\text{d. } & \text{What is the average cost that Brad paid for the oranges he bought? Give answer to the nearest tenth of a cent.}
\end{align*} \]
Exercise Set B (Pre-Algebra)

1. Evaluate each expression for \(x = 4, y = -3,\) and \(z = 2.\)
   a. \(3xz - (x + y)\)          b. \(2x^2 + (2y)^2 - z^3\)          c. \((x - 3y)(4 - z^2)\)
   d. \(-xyz\)          e. \(-\frac{xy}{6}\)          f. \((x - y)xz\)

2. Evaluate each expression for the given value of the variable.
   a. If \(p = -2, p^2 - 3p + 1 = \) b. If \(q = \frac{1}{2}, 2(4q - 1)^2 =\)
   c. If \(r = 1.4, 6 - (10 + 5r) = \) d. If \(s = 2, 2s^{-1} =\)
   e. If \(x = -1, (x - 1)(1 - 3x) = \) f. If \(y = 4, 3y =\)

In Exercises 3–5, simplify each expression.

3. a. \(3 + 2(x + 1)\)          b. \(3 + 2(x - 1)\)          c. \(3 - 2(x + 1)\)
   d. \(3 - 2(x - 1)\)          e. \(3x - 2(x + 1)\)          f. \(-3x - 2(x - 1)\)

4. a. \(3a - 11 + 2a - 4\)          b. \(5b + 3 - 7 - 2b - 3b\)
   c. \(3(2c - 1) + 2(c + 4)\)          d. \(4d - (3 - d) + 2(3d - 1)\)

5. a. \((x)(x)(x)(x)\)          b. \(\frac{x^5}{x^2}\)          c. \((-3a^2)(4a)\)
   d. \(\frac{(8)^6}{(2)^2}\)          e. \(\frac{(20x^6)}{(-4x^3)}\)          f. \(3x^2(2x - 1)\)
   g. \(\frac{(2x^2z^2)(3x^4z^3)}{(-8x^4)}\)

6. For each equation, find the value of \(x.\)
   a. \(3x - 7 = 5\)          b. \(12 + 5x = 7\)
   c. \(3x + 2(x - 3) = 9\)          d. \(2(2 - x) - (x + 4) = 3\)
   e. \(4x + 6 = 18\)          f. \(4 - 2x = x + 7\)

7. Complete each table of values.
   a. \(y = 2x - 3\)          b. \(y = 3x + 1\)          c. \(y = -x + 4\)          d. \(y = 5 - 2x\)

   \[
   \begin{array}{c|c|c|c|c|c|c|c}
   x & y & x & y & x & y & x & y \\
   4 & 5 & -6 & & & & & \\
   3 & 1 & 4 & 2 & & & & \\
   2 & 0 & 3 & 7 & & & & \\
   1 & -2 & 4 & 0 & & & & \\
   0 & -5 & 0.5 & 1.25 & & & & \\
   -1 & -10 & 3.9 & -1.25 & & & & \\
   \end{array}
   \]
Exercise Set B (continued)

8. Plot the graph of each equation.
   a. \( y = x + 2 \)  
   b. \( y = 2x - 4 \)  
   c. \( y = -2x + 3 \)  
   d. \( y = \frac{1}{2}x + 1 \)

9. Consider the graph at right.
   a. Give the coordinates of points \( A \) and \( B \).
       Find the slope of line \( k \).
   b. Give the coordinates of points \( C \) and \( D \).
       Find the slope of line \( l \).
   c. Give the coordinates of points \( E \) and \( F \).
       Find the slope of line \( m \).
   d. Give the coordinates of points \( G \) and \( H \).
       Find the slope of line \( n \).

10. While on a vacation, Bill rents a mountain bike. The cost is a one-time charge of $24 for insurance and servicing plus $15 a day.
   a. Write an equation that shows the relationship between the cost, \( C \), and the number of days, \( d \), of the rental.
   b. If Bill rents the bike for one week, how much will he pay?
   c. If Bill has budgeted $100 for bike expenses, for how many days can he rent?
Exercise Set A (Number Sense)

1. a. 27 b. 72 c. 1\(^{-1}\)
d. 16 e. \(\frac{1}{16}\) f. 1

2. a. 3 b. 2 c. \(-\frac{5}{6}\)
d. \(\frac{5}{4}\) e. \(\frac{3}{4}\) f. \(\frac{10}{9}\)

3. a. \(B\) b. \(E\) c. \(G\)
d. \(D\) e. \(A\) f. \(C\)

4. a. i. \(3.25 \times 10^2\) ii. \(4.5012 \times 10^4\)
   iii. \(2.3 \times 10^{-1}\) iv. \(8.91 \times 10^{-3}\)
   v. \(6.3 \times 10^6\) vi. \(1.3 \times 10^3\)
b. i. 6010 ii. 0.0007761
   iii. 2.325 iv. 5.4
   v. 5.4 vi. 1.875

5. a. 62.4 b. 92.0 c. 0.1
d. 1254.6 e. 508.2 f. 0.3
g. 4.7 h. 3.4

6. a. \(P = 10\text{ in.}\) b. \(P = 18.5\text{ ft}\)
   \(A = 6.25\text{ in.}^2\) \(A = 10\text{ ft}^2\)
c. \(P = 10.5\text{ cm}\) d. \(P = 6\text{ ft}\)
   
6. a. \(P = 10\text{ in.}\) b. \(P = 18.5\text{ ft}\)
   \(A = 6.25\text{ in.}^2\) \(A = 10\text{ ft}^2\)
c. \(P = 10.5\text{ cm}\) d. \(P = 6\text{ ft}\)
   
7. a. 8 b. 2 c. 0 d. 8
8. a. < b. > c. < d. =
   e. = f. = g. < h. =

Exercise Set B (Pre-Algebra)

1. a. 23 b. 60 c. 0
d. 24 e. 2 f. 56

2. a. 11 b. 2 c. \(-11\)
d. 1 e. \(-8\) f. 81

3. a. \(2x + 5\) b. \(2x + 1\)
c. \(-2x + 1\) d. \(-2x + 4\)
e. \(x - 2\) f. \(-5x + 2\)

4. a. \(5a - 15\) b. \(-4\)
c. \(8c + 5\) d. \(11d - 5\)

5. a. \(x^4\) b. \(x^3\) c. \(-12a^3\)
d. \(4y^4\) e. \(-5x^3\) f. \(6x^3 - 3x^3\)
g. \(6x^2y^2\) h. \(-\frac{1}{2}x\)

6. a. \(x = 4\) b. \(x = -1\) c. \(x = 3\)
d. \(x = -1\) e. \(x = 3\) f. \(x = -1\)

7. a. \(y = 2x - 3\) b. \(y = 3x + 1\)
c. \(y = -x + 4\) d. \(y = 5 - 2x\)

\[
\begin{array}{cccccccc}
x & y & x & y & x & y & x & y \\
4 & 5 & 5 & 16 & -6 & -2 & 0 & 5 \\
3 & 3 & 1 & 4 & 4 & 0 & 2 & 1 \\
2 & 1 & 0 & 1 & 1 & 3 & -1 & 7 \\
1 & -1 & -2 & -5 & 0 & 4 & 2.5 & 0 \\
0 & -3 & -5 & -14 & 0.5 & 3.5 & 1.25 & 2.5 \\
-1 & -5 & -10 & -29 & 0.1 & 3.9 & -1.25 & 7.5 \\
\end{array}
\]
8. a.

\[ y = x + 2 \]

b.

\[ y = 2x - 4 \]

c.

\[ y = -2x + 5 \]

d.

\[ y = \frac{1}{2}x + 1 \]

9. a. \( A(0, 5), B(-5, 0);\) slope = 1
   b. \( C(2, 0), D(4, 4);\) slope = 2
   c. \( E(0, 8), F(8, 4);\) slope = \(-\frac{1}{2}\)
   d. \( G(-5, -3), H(4, -3);\) slope = 0

10. a. \( C = 15d + 24 \)
   b. \$129
   c. 5 days
These problems review the content of each chapter with an aim toward specifically addressing California Content Standards. Because the Algebra I California Standards Test does not allow the use of a calculator, these problems are also written such that a calculator should not be used. You can use these periodically throughout the year, or intensively during the week or two just prior to California Standards Testing.
Exercise Set 1 (for use after Chapter 2)

1. Find the value of the unknown number in each proportion.
   a. \( \frac{14}{42} = \frac{a}{60} \)
   b. \( \frac{82}{30} = \frac{41}{b} \)
   c. \( \frac{25.4}{c} = \frac{2.54}{0.32} \)
   d. \( \frac{d}{150} = \frac{49}{175} \)

2. Ben wants to estimate the number of plastic tokens in his collection without dumping them all out of their box and counting them. He randomly picks out 100 tokens, marks them, and then puts them back into the box and thoroughly mixes all the tokens. He then picks out another 46 tokens and finds that 8 of them are marked.
   a. Write a proportion that Ben can use to estimate the number, \( n \), of tokens in his collection.
   b. What is Ben’s estimate of the number of tokens?

3. 10 yards is approximately 9 meters, and 1 kilogram is approximately 2.2 pounds. Use these conversion factors to answer the following questions.
   a. Write a proportion that can be used to answer each question. Do not find the answer.
      i. 62 meters is equal to how many yards?
      ii. 5.5 kilograms is equal to how many pounds?
      iii. 35 yards is equal to how many meters?
      iv. 13.5 pounds is equal to how many kilograms?
   b. Find a sequence of steps, using the conversion information above, that you can use to convert 60 inches to centimeters. Do not give the answer.

4. Find each price.
   a. A pair of jeans originally priced at $42 discounted 20%.
   b. The price of a $50 barrel of oil after a price increase of 12%.
   c. The regular price of a dozen oranges on sale at 25% off for $3.
   d. The full price of a used car when a 30% discount saves you $1,260.

5. Use the conversion factor 1 inch = 2.54 centimeters to answer a–d.
   a. Write an equation for converting centimeters, \( c \), to inches, \( i \).
   b. Write an equation for converting inches, \( i \), to centimeters, \( c \).
   c. 12 inches equals how many centimeters to the nearest tenth?
   d. 254 centimeters equals how many inches to the nearest tenth?

(continued)
Exercise Set 1 (continued)

Name ___________________________ Period ___________ Date ________________

6. Answer each question. Show your work. (Note that there are 5280 feet in 1 mile and 3 feet in 1 yard.)
   a. A car drives 30 miles in 45 minutes. What is its average speed in feet per second?
   b. A person “power walks” 22 yards in 10 seconds. What is her speed in miles per hour?

7. A plane flies 2640 miles from A to B into a headwind in 6 hours.
   a. What is its average rate of speed to the nearest mile per hour?
      On its return flight the plane takes one hour less time.
   b. What is its average speed on the return trip?
   c. What is the plane’s average speed to the nearest mile per hour for all of the time the plane was in the air?
   d. Is your answer to 7c the average of your answers to 7a and b? Why or why not?

8. y is directly proportional to x.
   a. Complete the following table:
      \[
      \begin{array}{|c|c|c|c|}
      \hline
      x & -3 & 4 & -1.5 & 0 & \hline
      y & -8 & -12.5 & 22 & \hline
      \end{array}
      \]
   b. Write an equation that represents the relationship between x and y.

9. The force exerted by a piston is inversely proportional to the volume of the trapped air within the piston. In a given piston, 10 cm³ of trapped air exerts 800 newtons of force.
   a. If \( v \) is the volume of trapped air in cm³ and \( n \) is the force exerted in newtons, write an equation that models this situation.
   b. What is the force when the piston compresses the air to 8 cm³? To 5 cm³?
   c. What happens to the volume of air when the force exerted is halved, to 400 newtons?

10. Solve each equation. Show and justify each step.
    a. \( 4a = 1.24 \)
    b. \( \frac{b}{6} = 13 \)
    c. \( \frac{32}{10} = \frac{c}{15} \)
    d. \( 144 = \frac{12}{d} \)
Exercise Set 2 (for use after Chapter 3)

Name ___________________________ Period _____________ Date ________________

1. Solve each equation. Check your answer by substituting back into the original equation.
   a. \(6 + 8x = -26\)
   b. \(14x - 11 = 38\)
   c. \(0.75x - 9 = -15\)

2. Remove parentheses and simplify each expression. Give a reason for each step.
   a. \(3(2x - 1)\)
   b. \(6(2 - x) - 3(4 - 3x)\)
   c. \(\frac{-1}{2}(4x + 3) + \frac{3}{2}(2x - 1)\)

3. Consider the expression \(\frac{2(x + 3.5)}{0.5} - 4.5 + 2.5\).
   a. List, in order, the operations you use to find the value of the expression if \(x = 3\). Find the value.
   b. Set the expression equal to \(-14.5\). Solve for \(x\) by undoing the sequence of operations you listed in 3a. Show and explain your steps. Check your solution.

4. Undo the order of operations to solve for \(x\). Then verify that your solution is correct by substituting your solution into the original equation.
   a. \(3(x + 5) - 8 = 13\)
   b. \(\frac{2}{3}(x - 9) + 3 = 1\)

5. Insert one set of parentheses in each statement to make it true.
   a. \(3 \cdot 2 + 4 - 9 \div 3 = -3\)
   b. \(4 + 3 \cdot 5 - 8 + 11 = 0\)
   c. \(-10 + \frac{1}{2} + 2 - \frac{1}{2} \cdot 12 = -10\)

6. Solve for \(x\). Show and explain each step. Check your answer.
   \(2(x - 2) + 4(2x + 1) = -5\)

7. Does each table show a linear relationship? If not, explain why not.
   a. \(\begin{array}{c|c}
   x & y \\
   \hline
   0 & -3 \\
   1 & -1 \\
   2 & 0 \\
   3 & 2 \\
   \end{array}\)
   b. \(\begin{array}{c|c}
   x & y \\
   \hline
   -2 & 5 \\
   0 & 4 \\
   3 & 2.5 \\
   7 & 0.5 \\
   \end{array}\)
   c. \(\begin{array}{c|c}
   x & y \\
   \hline
   2.5 & 0 \\
   0 & -5 \\
   3 & 1 \\
   -3 & -9 \\
   \end{array}\)

(continued)
Exercise Set 2 (continued)

Name ___________________________________________  Period ________  Date ______________

8. Each table represents a linear relationship. For each relationship, find
   i. the rate of change
   ii. the \(y\)-intercept
   iii. the equation

   a. \( \begin{array}{cc} x & y \\ 0 & 5 \\ 1 & 2 \\ 2 & -1 \end{array} \)

   b. \( \begin{array}{cc} x & y \\ 3 & 4 \\ 4 & 5.5 \\ 5 & 7 \end{array} \)

   c. \( \begin{array}{cc} x & y \\ -2 & -15 \\ 1 & -3 \\ 3 & 5 \end{array} \)

9. The table shows the speed of a car as it begins to brake.

   \[
   \begin{array}{cc}
   \text{Time (s)} & \text{Speed (ft/s)} \\
   0 & 72 \\
   0.5 & 66 \\
   1.0 & 60 \\
   1.5 & 54 \\
   \end{array}
   \]

   a. Define variables and write an equation to represent the speed of the car.
   b. If the car continues to slow down at the same rate, what will the speed of the car be after 4 seconds?
   c. Graph your equation.
   d. Use your graph to find how long it takes the car to stop. What point gives you this information?
   e. Use your equation to check that your answer to 9d is correct.

10. The temperature in °F, \(T\), of a pot of water heating on a stove for \(m\) minutes is given by the equation \(T = 58 + 11m\).

   a. What is the temperature of the water when the stove is first turned on?
   b. What is the temperature of the water after 4 minutes?
   c. How long will it take for the water to boil (212°F)?
Exercise Set 3 (for use after Chapter 4)

1. Consider the equation $5x - 2y = 15$.
   a. Graph the equation.
   b. Find the slope and $y$-intercept.
   c. Does the point $(40, 92)$ lie on the graph? Explain your answer.

2. Write the equation of a line that is parallel to $y = 3x + 2$ and passes through the point $(-3, 2)$.

3. A line passes through the points $(-10, 9)$ and $(-1, -3)$.
   a. Write the equation of the line in slope-intercept form, $y = mx + b$.
   b. Write the equation of the line in point-slope form, $y = y_1 + b(x - x_1)$.
   c. Write the equation of the line in general form, $ax + by + c = 0$.

4. The Tune-In Music Company offers online music for your listening pleasure. The company charges $5.95 per month, for which a subscriber gets 40 hours of music. A charge of $0.25 is added for each additional hour beyond 40.
   a. Write an equation that represents the cost in dollars, $C$, of Tune-In's music service if a person uses it for $h$ hours each month, where $h$ is between 10 and 40 hours.
   b. Write an equation that represents the cost of the service for a subscriber who uses it for more than 40 hours per month.

5. Treasure hunter Pirate Dan has found a secret message with directions that he thinks will lead him to a cache of gold coins. The directions tell him to start from a boulder on the top of Danger Hill and walk three chains east and three chains south to an oak tree. He is then to walk along a line that runs “twice as far north as it does east.” The clues then become less clear, but Dan decides to put together what he knows. He wants to make a graph map of the clues he has. He marks north pointing toward the top of his graph paper. Help him with his task.
   a. Sketch and label a graph showing all of the clues Dan knows.
   b. Write the equation of the “walking line” in point-slope form.

6. Identify each statement as always true, sometimes true, or never true. If it is always true, prove it. If it is sometimes true, give one true and one false case. If it is never true, explain why.
   a. $-4(x + 1) + 5 = -4x + 9$
   b. $-2 - 3(x + 2) = -2x - 8$
   c. $6 + 2(x - 1) = 2(x + 5) - 6$
Exercise Set 3 (continued)

Name _____________________________  Period _________ Date ________________

7. A pot of water is heated on a stove. The temperature of the water increases at a constant rate. After \(5\frac{1}{2}\) minutes the temperature of the water is 55°F. After 8 minutes the temperature is 65°F. What was the temperature of the water when it was first put on the stove?

8. A line has the equation \(y = 3 - 2(x - 4)\).
   
   a. Use the equation to find where the line crosses the \(y\)-axis.
   
   b. Use the equation to find where the line crosses the \(x\)-axis.
   
   c. Use the equation to graph the line.
   
   d. Use the graph to check your answers to 8a and b.

9. Solve for \(x\).
   
   a. \(-4 + 3(x + 7) = 5x - 9\)
   
   b. \(4\left(\frac{1}{2}x + 3\right) - \frac{1}{2}(x - 2) = 0\)

10. A line with slope 2 passes through the point (2, 11).
    
    a. Write the equation of the line in \(y = mx + b\) form.
    
    b. Write the equation of the line parallel to the line in 10a that passes through the origin.
    
    c. Write the equation of the line that is always midway between the two lines in 10a and b.
Exercise Set 4 (for use after Chapter 5)

1. Jen likes to mix her own healthy “nutty” hiking snack. She starts with Good Energy Trail Mix, which has 5% peanuts, and adds her own “mixed nuts,” which are 30% peanuts. She likes her snack to have 10% peanuts. For the weekend she needs 400 mL of her snack.
   a. Define the variables.
   b. Write a system of equations to model this situation.
   c. Solve the system of equations and find how much trail mix and mixed nuts Jen should combine.

2. The San Pan Community Pool has two pumps that it uses to fill its swimming pool. One pump can fill the pool in 24 hours. The other can fill it in 12 hours. How long would it take to fill the pool if both pumps were used?

3. Phil is a competitor in the two-day California Long-Distance River Rowing Competition. On the first day, Phil rows 8 miles down the Snake River in 3 hours. The next day he rows back up the river in 4 hours. Let $r$ be the speed of the river current in miles per hour, and let $p$ be Phil’s rowing speed with no current.
   a. Write a system of equations to model this situation.
   b. Solve the system.
   c. What is the speed of the river current?

4. Sketch a graph of the solution set of this system of inequalities.
   \[
   \begin{align*}
   5x + 2y & \leq 10 \\
   -2x + y & \geq 4
   \end{align*}
   \]

5. Write the system of equations or inequalities that describes each point or region.

   a. Point A
   b. Region 1
   c. Region 2
   d. Region 3
   e. Region 4

(continued)
6. Simplify and solve each inequality. Justify each step. Then show your solution on a number line.
   a. \(4(2x + 5) - 3(x - 2) > 2(x + 4)\)
   b. \(\frac{3(3 - 2x)}{5} \geq \frac{2x + 5}{2}\)

7. Ben earns $6 per hour working at a greenhouse each Saturday. He had $28 in his bank account when he started his job, and he has deposited every cent he has earned. Ben now has more than $370 in his account.
   a. Write an inequality to model this situation.
   b. What conclusion can you draw about the number of hours Ben has worked?

8. A triangle has vertices \((0, 6)\), \((5, 0)\), and \((-5, 1)\). Write a system of inequalities that describes the triangle and its interior.

9. The Central Mountain High School drama club took in $736 at its annual festival. Adult tickets cost $8 and student tickets cost $5. A total of 116 tickets were sold. How many adult tickets were sold? How many student tickets?
   a. Define the variables.
   b. Write a system of equations to model this situation.
   c. Solve the system of equations and state your solution.

10. As part of their math assignment, Francis and Juan exchanged papers and corrected each other's work. Francis gave Juan the following two problems. Identify and correct any errors.
   a. Solve for \(x\): \(2(x - 1) - (x - 4) < 6\)
      Answer: \(2x - 1 - x - 4 < 6\)
      \(x - 5 < 6\)
      \(x < 11\)
   b. Solve the system: \(y = 4x + 1\) and \(2x + 3y = -25\)
      Answer: \(2x + 3(4x + 1) = -25\)
      \(2x + 12x + 3 = -25\)
      \(14x + 3 = -25\)
      \(14x = -22\)
      \(x = -\frac{22}{14} = -\frac{11}{7}\)
      \(y = 4\left(-\frac{11}{7}\right) + 1 = \frac{-44}{7} + \frac{7}{7} = -\frac{37}{7}\)
Exercise Set 5 (for use after Chapter 6)

Name ___________________________ Period _____________ Date ______________

1. Write an equivalent expression in simplest form.
   a. $3x^2 \cdot 5x \cdot 2x^3$
   b. $3x^2y^3 \cdot (2xy)^2 \cdot -2xy^2$
   c. $3x^2(2x + 1) - 4x(x^2 + 3x - 1)$
   d. $-xy^2(3x + 4y^{-1}) + xy(3xy + 4)$

2. The exponent rules you’ve learned apply not only to integer exponents but also to fractional exponents. Note that fractional exponents correspond to roots: $x^{1/2} = \sqrt{x}$, $x^{1/3} = \sqrt[3]{x}$, and so on. Write an equivalent expression in simplest form.
   a. $(a^{1/3})^3 + (a^{1/2})^2$
   b. $(2b^{1/4} \cdot b^{1/2})^4$
   c. $(4^{1/2} \cdot 8^{1/3})^{-1}$

3. Arrange the following expressions in ascending order (least to greatest).
   
   $\frac{1}{3}, -1.5, \left(-\frac{1}{2}\right)^2, -2^2, \left(-1 + \frac{1}{3}\right), (-4)^0, (3.25 \cdot 10^{-1}), \left(\frac{1}{3}\right)^{-1}$

4. The amount that is owed on a credit card account gets larger each month that the balance is not paid. Interest charges are calculated and added to the balance each month. The Buy More Credit Card Company charges 2% interest per month on unpaid balances.
   a. Write an equation to calculate the balance amount, $A$, after $t$ months on a Buy More Credit Card if the account’s initial balance is $1,000.
   b. What is the amount owed after 2 months if no other purchases are made?

5. Use the properties of exponents to rewrite each expression without parentheses and without negative exponents.
   a. $2\left(2x^2y^{-2}z^{-1}\right)^{-2}$
   b. $4x^0(2xy^{-1} - x^{-1}y) - 3y^{-1}(2x - 3x^{-1}y^2)$
   c. $5x^{-2}yz^3$  
   d. $-x(x^{-1} - (x^2 + x^{-1}(x - x^3)))$

6. Evaluate each expression.
   a. $\left(\frac{2}{3}\right)^{-2}$
   b. $\left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)^0 + \left(\frac{1}{2}\right)^{-1}$
   c. $-x^4$, when $x = -\frac{1}{3}$
   d. $\frac{2^5 - 3^{-3}}{2^3 - 3^{-4}}$

(continued)
Exercise Set 5 (continued)

7. For each table, find the value of the constants $a$ and $b$ such that $y = ab^x$. Then use your equation to find the missing values.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$x$</td>
<td>$y$</td>
</tr>
<tr>
<td>-2</td>
<td>?</td>
</tr>
<tr>
<td>-1</td>
<td>64</td>
</tr>
<tr>
<td>0</td>
<td>?</td>
</tr>
<tr>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>$x$</td>
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</tr>
<tr>
<td>-2</td>
<td>?</td>
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<td>108</td>
</tr>
<tr>
<td>0</td>
<td>144</td>
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<tr>
<td>1</td>
<td>192</td>
</tr>
<tr>
<td>2</td>
<td>?</td>
</tr>
</tbody>
</table>

8. Is each statement true or false? If it is false, find a counterexample that proves it is false.

a. Raising a number to the negative two power makes it smaller.

b. $-x^3 = (-x)^3$

c. $3^x + 3^x = 3^{x+1}$

9. Philip has noticed that the number of weeds in his small flower garden increases every day. Instead of pulling them out, he has decided to study and count them. He counted the weeds every day for a week.

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of weeds</td>
<td>14</td>
<td>21</td>
<td>32</td>
<td>47</td>
<td>71</td>
<td>106</td>
<td>160</td>
</tr>
</tbody>
</table>

a. Define variables and write an equation that models the number of weeds in Philip’s garden each day.

b. According to the model, about how many weeds were in the garden the day before he started to count? Explain.

10. Write a function that models each situation.

a. The number of ants, $A$, after $w$ weeks if the colony starts with 750 ants and the population doubles every week.

b. The amount, $P$, in dollars in a savings account after $t$ months if you start with $250, do not make another deposit, and 1% interest is added every month.
Exercise Set 6 (for use after Chapter 7)

Name ___________________________   Period _________   Date _______________

1. Sketch a graph of a relation between $x$ and $y$ that has all of the characteristics listed in i–iii. Explain how your sketch fits each characteristic. Then state the range of your relation.
   i. It is not a function.
   ii. Its domain is the integers $-5$ to $5$, inclusive.
   iii. It contains the points $(-3, 1)$ and $(3, 1)$.

2. If $f(x) = 2|x - 3| - 4$, find
   a. $f(3)$
   b. $f(-5)$
   c. $f(4.5)$
   d. $x$, when $f(x) = 2$
   e. $x$, when $f(x) = -6$

3. State whether each relation is a function. If it is not a function, explain why not.
   a. $(2, 1)$
   b. $(4, 2)$
   c. $y = |x + 4| - 1$
   d. $y^2 = 3x - 2$
   e. $|y + 2| = x - 5$

   (3, 1)   (5, 3)
   (6, 1)   (6, 4)
   $(-2, 2)$   $(5, 5)$
   $(-3, 3)$   $(0, -1)$

4. Consider this graph of $f(x)$.

(continued)
Exercise Set 6 (continued)

Name ___________________________ Period _______ Date ______________

5. For each relationship:
   i. Sketch a reasonable graph. Scale and label the axes.
   ii. State the independent variable and domain of your graph.
   iii. State the dependent variable and range of your graph.
   a. The distance traveled in miles as you drive a car on a highway.
   b. The temperature of water as it is heated on a stove.
   c. The weight of a box as you add books one at a time.

6. The graph below shows the temperature in San Bennet during one 24-hour
period, starting at midnight.

![Graph showing temperature over 24 hours.]

   a. Is the relation a function? If not, explain why not.
   b. At what time does the maximum temperature occur?
   c. During what times is the temperature rising?
   d. When is the temperature 65°F?
   e. What is the range of the relation?

7. The graph of a relation between \( x \) and \( y \) includes the points \((3, 0),\) \((-2, 3), (3, -2), (2, 4), (-1, -1), \) and \((4, 5)\).

   a. Can \( y \) be a function of \( x \)? Explain.
   b. Can \( x \) be a function of \( y \)? Explain.

8. Consider the functions \( f(x) = -3x + 4, g(x) = x^2 - x + 1, \) and \( h(x) = \sqrt{2x + 1} \). Find each function value in a–l.

   a. \( f(0) \)  
   b. \( f(4) \)  
   c. \( f(-0.5) \)  
   d. \( f(-3) \)
   e. \( g(0) \)  
   f. \( g(4) \)  
   g. \( g(-0.5) \)  
   h. \( g(-3) \)
   i. \( h(0) \)  
   j. \( h(4) \)  
   k. \( h(-0.5) \)  
   l. \( h(-3) \)

   m. What is the domain of each function?

(continued)
Exercise Set 6 (continued)

9. Describe each function as linear or nonlinear, and give the x-values for which each function is increasing, decreasing, positive, and negative.
   a. \(y = \frac{1}{2}x - 6\)
   b. \(y = |x| + 2\)
   c. \(y = x^2 - 4\)
   d. \(y = -3\)

10. Determine a function that satisfies each description.
   a. Sketch a function that increases only on the interval \(-3 < x < 3\) and is positive only on the interval \(x < 5\).
   b. Give the equation of a function that increases and is positive on the interval \(x > 0\) and never decreases and is never negative.
   c. Sketch and give the equation of a function that is linear, always decreases, and is positive on the interval \(x < -2\).
Exercise Set 7 (for use after Chapter 9)

Name ____________________________ Period __________ Date ______________

1. Solve each equation using the method indicated. Show your steps.
   a. Use factoring to solve \( x^2 - 4x = 12 \).
   b. Use completing the square to solve \( 2x^2 + 6x - 3 = x^2 - 2x - 2 \).
   c. Use the quadratic formula to solve \( \frac{2x^2 + x - 1}{1 - x} = 2 \), where \( x \leq 1 \).

2. Find the equation of each parabola graphed below. Give the equations in general form, \( y = ax^2 + bx + c \).

3. The parabola \( y = x^2 + 6x + 5 \) and the line \( y = 2x + b \) intersect in exactly one point.
   a. Find the value of \( b \).
   b. Find the point of intersection.

4. Find the equation of the parabola with \( x \)-intercepts \(-2 \) and \(8 \) and \( y \)-intercept \(16 \).

5. The height in feet of a ball \( t \) seconds after it is kicked off of a high platform is given by the equation \( h = -16t^2 + 16t + 32 \).
   a. What is the height of the platform?
   b. How high is the ball 1 second after being kicked?
   c. At what time does the ball reach maximum height?
   d. What is the maximum height of the ball?
   e. At what time does the ball hit the ground?

   a. \( \frac{x}{x + 2} - \frac{1}{x} \)
   b. \( \frac{x + 1}{x^2 - 4} + \frac{2}{x + 2} \)
   c. \( \frac{x^2 + x \cdot 6}{x^2 + 6x + 9} \cdot \frac{x^2 + 3x \cdot 4}{x^2 + 2x \cdot 8} \)
   d. \( \frac{4x + 4}{x - 3} \div \frac{2x^2 + 12x + 10}{x^2 + 2x - 15} \)

(continued)
Exercise Set 7 (continued)

Name ___________________________    Period _________    Date ______________

7. Find the intersection(s) of the parabola \( y = x^2 - 3x - 10 \) and the line \
\( y = x + 2 \).

8. The quadratic formula can be derived by completing the square to solve 
the quadratic equation \( y = ax^2 + bx + c \). Fill in each missing step or
justification.

1. \( ax^2 + bx = -c \)  
2. \( x^2 + \frac{b}{a}x = -\frac{c}{a} \)  
3. _________________  
4. _________________ 
5. _________________  
6. _________________  
7. _________________ 

9. A ball thrown or hit into the air follows a parabolic path. Joan, a great
volleyball player, managed to dive and bump the ball just before it hit the
floor 7 feet from the net. The ball just cleared the net, which is 7 feet
high, on its way down and hit the floor 1 foot from the net on the
opponent’s side.

a. Find an equation that could be used to model the path of the
volleyball.

b. What was the maximum height of the ball?

10. If \( f(x) = 2x^2 + bx + 2 \), what are the conditions on \( b \) in order to make
each of the following true?

a. \( f(x) \) has two distinct real roots.

b. \( f(x) \) has no real roots.

c. \( f(x) \) has exactly one root.
1. Juanita made the conjecture that squaring a number makes it larger. She tested her conjecture by squaring 3, 5, and −4. Because $3^2 > 3$, $5^2 > 5$, and $(−4)^2 > −4$, she felt confident that her conjecture is true.
   a. What kind of reasoning did Juanita use to make her conjecture?
   b. Does 1 support Juanita’s conjecture? What is this type of example called?
   c. Is Juanita’s new conjecture correct? If not, prove that it is not true.

2. Find the equation of the line through the point (−6, 1) that is perpendicular to the line with equation $3x − 4y − 2 = 0$. Express the equation in standard form.

3. Is quadrilateral $ABCD$ a parallelogram? Explain your reasoning.

4. Jan adds the two odd numbers 5 and 9 and gets 14. He adds two different odd numbers, 13 and 7, and gets 20. He repeats this five more times. He concludes that whenever two odd numbers are added the answer is even.
   a. Is Jan’s reasoning inductive or deductive? Explain.
   b. Do you agree with Jan’s conclusion?
   c. Has Jan proved his conclusion? If not, provide a proof. (Hint: An odd number can be defined as a number in the form $2p + 1$, where $p$ is any integer, and an even number can be defined as a number in the form $2q$, where $q$ is any integer.)
   d. What kind of reasoning is your proof?
Exercise Set 8 (continued)

Name ___________________________  Period _________  Date _____________

5. Consider the equation \( \frac{x^2 + 4x - 5}{x - 1} = 6 \).
   a. Solve the equation and justify each step. If you get a solution, go on to 5b.
   b. Check your answer by substituting it back into the equation.
   c. Explain what happens and why.

6. Identify the hypothesis and the conclusion in each of the following statements. Rewrite each statement as an equivalent statement in the form “If . . . (hypothesis), then . . . (conclusion).”
   a. Integers are rational numbers.
   b. \( x = 3 \) is the solution to the equation \( 14 - 4x = 2 \).
   c. The order in which \( p \) and \( q \) are added does not affect the answer.

7. Find the equation of the perpendicular bisector of segment \( PQ \), where \( P \) is \((-2, 3)\) and \( Q \) is \((4, 5)\).

8. Recall that fractional exponents correspond to roots, so \( x^{1/2} = \sqrt{x}, x^{1/3} = \sqrt[3]{x} \), and so on. Evaluate each expression.
   a. \( \sqrt{9} + \sqrt[4]{16} \)
   b. \( \sqrt{50} + \sqrt{18} \)
   c. \( 12^{1/2} + 1^{1/3} + 0^{1/4} + 3^{1/2} \)

9. Line \( a \) passes through the points \((0, 7)\) and \((9, 10)\). Line \( b \) passes through the points \((18, 3.5)\) and \((12, 1.5)\). Are the lines parallel, perpendicular, or neither? Justify your answer. Where do the graphs intersect?

10. Rewrite the equation \( y = x^2 - 6x + 4 \) in vertex form. Justify each step using properties of numbers and properties of equality.
Exercise Set 1

1. a. $a = 20$
   b. $b = 15$
   c. $c = 3.2$
   d. $d = 42$
2. a. \( \frac{8}{46} = \frac{100}{n} \)
   b. $n = 575$. There are about 575 tokens in the collection.
3. Sample answers:
   a. i. \( \frac{10 \text{ yd}}{9 \text{ m}} = \frac{x \text{ yd}}{62 \text{ m}} \)
   ii. \( \frac{1 \text{ kg}}{2.2 \text{ lb}} = \frac{5.5 \text{ kg}}{x \text{ lb}} \)
   iii. \( \frac{10 \text{ yd}}{9 \text{ m}} = \frac{35 \text{ yd}}{x \text{ m}} \)
   iv. \( \frac{1 \text{ kg}}{x \text{ kg}} = \frac{1 \text{ kg}}{2.2 \text{ lb}} = \frac{13.5 \text{ lb}}{2.2 \text{ lb}} \)
   b. 60 in. \( \cdot \frac{1 \text{ ft}}{12 \text{ in.}} \cdot \frac{1 \text{ yd}}{3 \text{ ft}} \cdot \frac{9 \text{ m}}{10 \text{ yd}} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \)
4. a. $33.60$
   b. $56.00$
   c. $4.00$
   d. $4,200.00$
5. a. $c = 2.54$  b. \( \frac{c}{2.54} \)
   c. $30.5$ cm
   d. 100 in.
6. a. \( \frac{30 \text{ mi}}{45 \text{ min}} = \frac{5280 \text{ ft}}{1 \text{ min}} = \frac{1 \text{ min}}{60 \text{ s}} = \frac{2 \text{ ft}}{3 \text{ s}} \)
   b. \( \frac{22 \text{ yd}}{10 \text{ s}} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{1 \text{ mi}}{5280 \text{ ft}} \cdot \frac{1 \text{ min}}{60 \text{ s}} \cdot \frac{1 \text{ h}}{60 \text{ min}} = \frac{4.5 \text{ mi}}{h} \)
7. a. 440 mi/h
   b. 528 mi/h
   c. 480 mi/h
   d. No. The first trip took longer, so the two trips should not be weighted equally. Therefore, you can’t just average them.
8. a. | $x$ | $y$
    |---|---|
    | $-3$ | 6 |
    | 4 | -8 |
    | -1.5 | 3 |
    | 6.25 | -12.5 |
    | 0 | 0 |
    | -11 | 22 |
   b. $y = -2x$
9. a. $n \cdot v = 8000$
   b. $n = 1000$ newtons; $n = 1600$ newtons
   c. The volume doubles to 20 cm$^3$.
10. a. $4a = 1.24$
   
   \[
   \frac{4a}{4} = \frac{1.24}{4}
   \]
   
   $a = 0.31$
   
   Divide both sides by 4.
   
   b. \( \frac{b}{6} = 13 \)
   
   \[
   6 \cdot \frac{b}{6} = 6 \cdot 13
   \]
   
   $b = 78$
   
   Divide and multiply.
   
   c. \( \frac{32}{10} = \frac{c}{15} \)
   
   \[
   15 \cdot \frac{32}{10} = 15 \cdot \frac{c}{15}
   \]
   
   $48 = c$
   
   Multiply both sides by 15.
   
   d. \( \frac{144}{12} = d \)
   
   \[
   \frac{1}{144} = \frac{d}{12}
   \]
   
   Invert both sides.
   
   \[
   12 \cdot \frac{1}{144} = 12 \cdot \frac{d}{12}
   \]
   
   $\frac{1}{12} = d$
   
   Multiply both sides by 12.
   
   Exercise Set 2

1. a. $x = -4$
   b. $x = 3.5$
   c. $x = -8$
2. a. $3(2x - 1)$
   
   \[
   6x - 3
   \]
   
   Distributive property.
   
   b. $(2 - x) - 3(4 - 3x)$
   
   \[
   12 - 6x - 12 + 9x
   \]
   
   Distributive property.
   
   c. $3x$
   
   Combine like terms.
   
   c. \( -\frac{1}{2}(4x + 3) + \frac{3}{2}(2x - 1) \)
   
   \[
   -2x - \frac{3}{2} + 3x - \frac{3}{2}
   \]
   
   Distributive property.
   
   \[
   x - 3
   \]
   
   Combine like terms.
3. a. Start with $x = 3$.
   
   Add 3.5.
   
   Multiply by 2.
   
   Subtract 4.5.
   
   Divide by 0.5.
   
   Add 2.5.
   
   The value of the expression is 19.5.
b.  \( \frac{2(x + 3.5) - 4.5}{0.5} + 2.5 = -14.5 \)  
   Original equation.  
   \[ \frac{2(x + 3.5) - 4.5}{0.5} = -17 \]  
   Subtract 2.5 to undo the addition.  
   \[ 2(x + 3.5) - 4.5 = -8.5 \]  
   Multiply by 0.5 to undo the division.  
   \[ 2(x + 3.5) = -4 \]  
   Add 4.5 to undo the subtraction.  
   \[ x + 3.5 = -2 \]  
   Divide both sides by 2.  
   \[ x = -5.5 \]  
   Subtract -3.5 from both sides.  
   Check:  
   \[ \frac{2(-5.5 + 3.5) - 4.5}{0.5} + 2.5 \stackrel{?}{=} -14.5 \]  
   \[ -14.5 = -14.5 \]  
   4. a. 3(x + 5) - 8 = 13  
   Original equation.  
   \[ 3(x + 5) = 21 \]  
   Add 8 to undo the subtraction.  
   \[ x + 5 = 7 \]  
   Divide by 3 to undo the multiplication.  
   \[ x = 2 \]  
   Subtract 5 to undo the addition.  
   Check:  
   \[ 3(2 + 5) - 8 = 13 \]  
   \[ 13 = 13 \]  
   b.  \( \frac{2}{3}(x - 9) + 3 = 1 \)  
   Original equation.  
   \[ \frac{2}{3}(x - 9) = -2 \]  
   Subtract 3 to undo the addition.  
   \[ x - 9 = -3 \]  
   Divide by \( \frac{2}{3} \) (or multiply by \( \frac{3}{2} \)) to undo the multiplication.  
   \[ x = 6 \]  
   Add 9 to undo the subtraction.  
   Check:  
   \[ \frac{2}{3}(6 - 9) + 3 \stackrel{?}{=} 1 \]  
   \[ 1 = 1 \]  
   5. a. 3 \cdot (2 + 4 - 9) + 3 = -3  
   b. 4 + 3 \cdot 5 - (8 + 11) = 0  
   c. -10 + \( \frac{1}{2} + 2 - \frac{1}{2} \cdot 12 = -10 \)  
   6. 2(x - 2) + 4(2x + 1) = -5  
   Original equation.  
   \[ 2x - 4 + 8x + 4 = -5 \]  
   Distributive property.  
   \[ 10x = -5 \]  
   Combine like terms.  
   \[ x = -\frac{5}{10} \]  
   Divide both sides by 10.  
   \[ x = -\frac{1}{2} \]  
   Reduce.  
   Check:  
   \[ 2\left(-\frac{1}{2} - 2\right) + 4\left(-\frac{1}{2} + 1\right) \stackrel{?}{=} -5 \]  
   \[ -5 = -5 \]  
   7. a. No. The rate of change of \( y \) as \( x \) changes from 0 to 1 is 2, whereas the rate of change of \( y \) as \( x \) changes from 1 to 2 is 1.  
   b. Yes  
   c. No. The rate of change of \( y \) as \( x \) changes from 0 to 3 is 2, whereas the rate of change of \( y \) as \( x \) changes from \(-3 \) to \( 3 \) is \( \frac{5}{3} \).  
   8. a. i. \(-3 \)  
   ii. \( \frac{1}{2} \)  
   iii. \( y = -3x + 5 \)  
   b. i. \( \frac{3}{2} \)  
   ii. \( -\frac{1}{2} \)  
   iii. \( y = \frac{3}{2}x - \frac{1}{2} \)  
   c. i. \( 4 \)  
   ii. \( -7 \)  
   iii. \( y = 4x - 7 \)  
   9. a. Let \( t \) represent time in seconds, and let \( s \) represent speed in feet per second; \( s = -12t + 72 \).  
   b. \( s = 24 \text{ ft/s} \)  
   c.  
   
   ![Graph](image_url)  
   d. 6 s. The \( x \)-intercept, (6, 0), shows this information.  
   e. \( s = -12(6) + 72 = 0 \). The speed of the car is 0 ft/s after 6 s.  
   10. a. 58°F  
   b. 102°F  
   c. 14 minutes  
   
   Exercise Set 3  
   1. a.  
   ![Graph](image_url)
b. slope: 2.5; \( y \)-intercept: \(-7.5\)

c. No; \(5(40) - 2(92) \leq 15\).

2. \( y = 3x + 11 \)

3. a. \( y = -\frac{4}{3}x - \frac{13}{3} \)
   
b. \( y = 9 - \frac{4}{3}(x + 10) \) or \( y = -3 - \frac{4}{3}(x + 1) \)

   c. \(4x + 3y + 13 = 0\)

4. a. \( C = 5.95 \)
   
b. \( C = 5.95 + 0.25h\)

5. a. \( y = \frac{4}{3}x + \frac{13}{3} \)

   b. \( y = -3 + 2(x - 3) \)

6. a. Never true; \(-4(x + 1) + 5 = -4x + 9\) simplifies to \(1 = 9\), and \(1 = 9\) is never true.
   
b. Sometimes true. If \(x = 1\), the equation simplifies to \(-11 = 10\), which is not true. If \(x = 0\), the equation simplifies to \(-8 = -8\), which is true.
   
c. Always true; \(6 + 2(x - 1) = 2(x + 5) - 6\) simplifies to \(2x + 4 = 2x + 4\), which is always true.

7. 33°F

8. a. \((0, 11)\)
   
b. \((5.5, 0)\)

   c. \( y = 3 - 2(x - 4) \)

9. a. \( x = 13 \)
   
b. \( x = -\frac{26}{3} \)

10. a. \( y = 2x + 7 \)
    
b. \( y = 2x \)
    
c. \( y = 2x + 3.5 \)

Exercise Set 4

1. a. Let \( t = \) mL of trail mix needed. Let \( n = \) mL of mixed nuts needed.
   
b. \( t + n = 400 \)
   
   \( 0.05t + 0.3n = 0.1(400) \)
   
c. \( t = 320, n = 80;\) Jen needs to combine 320 mL of trail mix and 80 mL of mixed nuts.

2. 8 h

3. a. \( \frac{3(p + r)}{4} = 8 \)
   
b. \( p = \frac{7}{3}, r = \frac{1}{3} \)
   
c. \( \frac{1}{3} \) mi/h

4. 

5. Forms may vary.
   
a. \( y = 2x - 3\) and \( y = \frac{1}{4}x + 1 \)
   
b. \( y < 2x - 3\) and \( y \geq \frac{1}{4}x + 1 \)
   
c. \( y > 2x - 3\) and \( y \geq \frac{1}{4}x + 1 \)
   
d. \( y > 2x - 3\) and \( y \leq \frac{1}{4}x + 1 \)
   
e. \( y < 2x - 3\) and \( y \leq \frac{1}{4}x + 1 \)
6. Steps may vary.

\[
4(2x + 5) - 3(x - 2) > 2(x + 4) \quad \text{Original inequality.}
\]

\[
8x + 20 - 3x + 6 > 2x + 8
\]

Distributive property.

\[
5x + 26 > 2x + 8
\]

Combine like terms.

\[
3x + 26 > 8
\]

Subtract 2x from both sides.

\[
x > -18
\]

Subtract 26 from both sides.

\[
x > -6
\]

Divide both sides by 3.

\[
\frac{3(3 - 2x)}{5} \geq \frac{2x + 5}{2} \quad \text{Original inequality.}
\]

Multiply both sides by the common denominator, 10.

\[
2(3(3 - 2x)) \geq 5(2x + 5)
\]

Reduce both sides.

\[
18 - 12x \geq 10x + 25
\]

Distributive property.

\[
18 - 22x \geq 25
\]

Subtract 10x from both sides.

\[
-22x \geq 7
\]

Subtract 18 from both sides.

\[
x \leq -\frac{7}{22}
\]

Divide both sides by -22 (and reverse the inequality).

7. a. 6h + 28 > 370

b. Ben has worked more than 57 hours.

8. Forms may vary.

\[
\begin{align*}
y & \leq 6 - \frac{6}{5}x \\
y & \leq 6 + x \\
y & \geq -\frac{1}{10} (x - 5)
\end{align*}
\]

9. a. Let \(a\) represent the number of adult tickets sold, and let \(s\) represent the number of student tickets sold.

b. \(a + s = 116\)

\(8a + 5s = 736\)

c. \(a = 52, s = 64\); 52 adult tickets were sold and 64 student tickets were sold.

d. \(x\) represents the number of adult tickets sold, and \(y\) represents the number of student tickets sold.

10. a. In the first line of the answer, the \(-1\) in front of the second set of parentheses is not distributed to the second term of the binomial within the parentheses. The correct solution is

\[
2(x - 1) - (x - 4) < 6
\]

\[
x - 2 - x + 4 < 6
\]

\[
x + 2 < 6
\]

\[
x < 4
\]

b. In the fourth line of the answer, \(3\) should be subtracted from both sides of the equation. But on the right side, \(3\) is added to \(-25\). The correct solution is

\[
y = 4x + 1 \quad \text{and} \quad 2x + 3y = -25
\]

\[
x = -2
\]

\[
y = 4(-2) + 1 = -7
\]

**Exercise Set 5**

1. a. \(30x^6\)

b. \(-24x^5y^3\)

c. \(2x^3 - 9x^2 + 4x\)

d. 0

2. a. \(2a\)

b. \(16b^3\)

c. \(\frac{1}{4}\)

3. \(-2\left(1 + \frac{1}{3}\right), 1.5, \left(-\frac{1}{2}\right)^2, (3.25 \cdot 10^{-1}), \frac{1}{3},\)

\((-4)^0, \frac{1}{3}\)^{-1}

4. a. \(A = 1000(1.02)^t\)

b. \(3.01404.40\)

5. a. \(\frac{x^4z^2}{2x^3}\)

b. \(\frac{2x}{y} + \frac{5y}{x}\)

c. \(-\frac{5z^2}{4xy^2}\)

d. \(x - 1\)

6. a. \(\frac{9}{4}\)

b. \(\frac{3^3}{4}\)

c. \(-\frac{1}{81}\)

d. 12

7. a. \(a = 32, b = \frac{1}{2}\); missing table values: 128, 32, 4

b. \(a = 144, b = \frac{4}{3}\); missing table values: 81, 256

8. a. false: \(\left(\frac{1}{2}\right)^{-2} = \frac{1}{4} > \frac{1}{2}\)

b. true

c. false; \(3^3 + 3^3 \leq 3^4\)
9. a. Let $d$ represent the number of the day, and let $w$ represent the number of weeds. The algebraic model is $w = 14(1.5)^{d-1}$.
   
   b. 9 or 10 weeds. $9(1.5) = 13.5$ and $10(1.5) = 15$

10. a. $A = 750(2)^w$
   b. $P = 250(1.01)^t$

Exercise Set 6

1. Possible answer:

   The graph fails the vertical line test because when $x = -3$, $y = 1$ and $-1$, so it is not a function. The graph shows points with integer coordinates from $-5$ through $5$. The points $(-3,1)$ and $(3,1)$ are on the graph. The range for this relation is $\{-2, -1, 0, 1, 2, 3, 4\}$.

2. a. $-4$
   b. 12
   c. $-1$
   d. 0 and 6
   e. no solution

3. a. function
   
   b. Not a function. The domain value 5 is paired with two different range values, 3 and 5.
   
   c. function
   
   d. Not a function. The points $(1, 1)$ and $(1, -1)$ are on the graph, so the domain value 1 is paired with two different range values, 1 and $-1$.
   
   e. Not a function. The points $(6, -1)$ and $(6, -3)$ are on the graph, so the domain value 6 is paired with two different range values, $-1$ and $-3$.

4. a. $-10 \leq x \leq 10$
   b. $0 \leq y \leq 50$
   c. 35
   d. 0 and 7
   e. yes

5. Possible answers:

   a. i. $y$
   b. ii. independent variable: time (in hours); domain: $0 \leq x \leq 4$
   c. iii. dependent variable: distance (in miles); range: $0 \leq y \leq 160$
   
   b. i. $y$
   b. ii. independent variable: time (in minutes); domain: $0 \leq x \leq 5$
   c. iii. dependent variable: temperature (in °F); range: $70 \leq y \leq 190$
   
   c. i. $y$
   c. ii. dependent variable: number of books; domain: $\{0, 1, 2, 3, 4, 5, 6\}$
   c. iii. dependent variable: weight (in pounds); range: $\{0.25, 0.5, 1.2, 1.7, 2, 5, 7.5\}$

6. a. yes
   
   b. about 1 P.M.
   c. about 5 A.M. to 1 P.M.
   d. about 9 A.M. and 3 P.M.
   e. $25 \leq y \leq 80$
7. a. No. The x-value 3 has two y-values, so the graph would fail the vertical line test.
   b. Yes. No given y-value has more than one x-value, so x can be a function of y.
8. a. \( f(0) = 4 \)  
    b. \( f(4) = -8 \)  
    c. \( f(-0.5) = 5.5 \)  
    d. \( f(-3) = 13 \)  
    e. \( g(0) = 1 \)  
    f. \( g(4) = 13 \)  
    g. \( g(-0.5) = 1.75 \)  
    h. \( g(-3) = 13 \)  
    i. \( h(0) = 1 \)  
    j. \( h(4) = 3 \)  
    k. \( h(-0.5) = 0 \)  
    l. \( h(-3) \) is undefined
   m. The domain of \( f(x) \) is all real numbers. The domain of \( g(x) \) is all real numbers. The domain of \( h(x) \) is \( x \geq -0.5 \).
9. a. linear; increasing: always; decreasing: never; positive: \( x > 12 \); negative: \( x < 12 \)  
    b. nonlinear; increasing: \( x > 0 \); decreasing: \( x < 0 \); positive: always; negative: never  
    c. nonlinear; increasing: \( x > 0 \); decreasing: \( x < 0 \); positive: \( x < -2 \) and \( x > 2 \); negative: \( -2 < x < 2 \);  
    d. linear; increasing: never; decreasing: never; positive: never; negative: always
10. Possible answers:
   a. 
   ![Graph of y = x](image1)
   b. \( y = \sqrt{x}, y = |x| \)
   c. \( y = -x - 2 \)
   ![Graph of y = -x - 2](image2)

**Exercise Set 7**

1. a. \( x^2 - 4x = 12 \)
   \[ x^2 - 4x - 12 = 0 \]
   \[ (x + 2)(x - 6) = 0 \]
   \[ x = -2 \) and \( x = 6 \)
   b. \( 2x^2 + 6x - 3 = x^2 - 2x - 2 \)
   \[ x^2 + 8x - 1 = 0 \]
   \[ x^2 + 8x = 1 \]
   \[ x^2 + 8x + 16 = 17 \]
   \[ (x + 4)^2 = 17 \]
   \[ x + 4 = \pm \sqrt{17} \]
   \[ x = -4 \pm \sqrt{17} \]
   e. \( \frac{2x^2 + x - 1}{1 - x} = 2, \) where \( x \leq 1 \)
   \[ 2x^2 + x - 1 = 2 - 2x \]
   \[ 2x^2 + 3x - 3 = 0 \]
   \[ a = 2, b = 3, c = -3 \]
   \[ x = \frac{-3 \pm \sqrt{3^2 - 4(2)(-3)}}{2(2)} \]
   \[ x = \frac{-3 \pm \sqrt{33}}{4} \]
2. a. \( y = \frac{1}{2} x^2 + 2x - 1 \)
   b. \( y = -x^2 - 4x - 4 \)
   c. \( y = x^2 - 5x \)
3. a. \( b = 1 \)
   b. \((-2, -3)\)
4. \( y = -x^2 + 6x + 16 \)
5. a. 32 ft
   b. 32 ft
   c. 0.5 s
   d. 36 ft
   e. 2 s
6. a. \( \frac{(x - 2)(x + 1)}{x(x + 2)}; x \leq -2 \) and \( 0 \)
   b. \( \frac{3(x - 1)}{(x + 2)(x - 2)}; x \leq -2 \) and \( 2 \)
   c. \( \frac{x - 1}{x + 3}; x \leq -4, -3, \) and \( 2 \)
   d. \( 2; x \leq -5, -1, \) and \( 3 \)
7. \((-2, 0)\) and \((6, 8)\)

8. Divide both sides by \(a\).

3. \(x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = \left(\frac{b}{2a}\right)^2 - \frac{c}{a}\)

4. \(\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}\)

5. Take the square root of both sides.

6. \(x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{2a}}\)

7. \(x = -\frac{b \pm \sqrt{b^2 - 4ac}}{2a}\)

9. a. The equation will vary depending on the choice of axes. If the line connecting the point of the bump and the point of the floor hit is the \(x\)-axis and the vertical line at the net is the \(y\)-axis, then the equation is \(y = -x^2 - 6x + 7\).

b. 16 ft

10. a. \(b > 4\) or \(b < -4\)  b. \(-4 < b < 4\)  c. \(b = 4\)

**Exercise Set 8**

1. a. inductive reasoning  
   b. No; a counterexample  
   c. No; the counterexample used in the proof will vary. One counterexample is \((\frac{1}{2})^2\) is not greater than or equal to \(\frac{1}{2}\). This is a counterexample that disproves the conjecture.

2. \(4x + 3y = -21\)

3. Yes, \(ABCD\) is a parallelogram. Possible reasoning: The slope of side \(AB\) is 1, the slope of side \(BC\) is \(-\frac{1}{3}\), the slope of side \(CD\) is 1, and the slope of side \(DA\) is \(-\frac{1}{3}\). The slopes of opposite sides are the same, so opposite sides are parallel. Therefore, \(ABCD\) is a parallelogram.

4. a. Inductive; Jan makes a conjecture after looking at a number of specific instances.  
   b. yes  
   c. Jan has not proved his conclusion.  
   Possible proof:  
   An odd number can be defined as a number of the form \((2p + 1)\), where \(p\) is any integer. An even number can be defined as a number of the form \(2q\), where \(q\) is any integer.

   If \(s\) is an odd number, it can be written as \((2m + 1)\) for some integer \(m\).

If \(t\) is an odd number, it can be written as \((2n + 1)\) for some integer \(n\).

\(s + t = (2m + 1) + (2n + 1)\)

\(s + t = 2m + 2n + 2\)

\(s + t = 2(m + n + 1)\)

\((m + n + 1)\) is an integer, so \(2(m + n + 1)\) is an even number, by the definition of even numbers.

So the sum of two odd numbers, \(s + t\), is an even number.

d. deductive

5. a. Possible answer:

\[
\frac{x^2 + 4x - 5}{x - 1} = 6
\]

Original equation.

\[
\frac{(x - 1)(x + 5)}{x - 1} = 6
\]

Factor the numerator.

\[
x + 5 = 6
\]

Cancel the common factor \((x - 1)\).

\[
x = 1
\]

Subtract 5 from both sides.

[Note: Students may realize that \(x\) cannot equal 1, because the equation is undefined at that point.]

b. \[
\frac{1^2 + 4(1) - 5}{1 - 1} = \frac{6}{0} = 6
\]

This is not true.

c. There is no solution. The only possible solution is the value for which \(x\) is undefined.

6. a. If a number is an integer, then it is also a rational number.

b. If \(14 - 4x = 2\), then \(x = 3\).

c. If \(p + q = c\), then \(q + p = c\).

7. \(y = -3x + 7\)

8. a. 5  
   b. \(8\sqrt{2}\)  
   c. \(1 + 3\sqrt{3}\)

9. The lines are parallel because they have equal slope. The lines do not intersect.
10. Possible answer:

\[ y = x^2 - 6x + 4 \]  
Original equation.

\[ y + (-4) = x^2 - 6x + 4 + (-4) \]  
Addition property of equality.

\[ y - 4 = x^2 - 6x + 4 + (-4) \]  
Definition of subtraction.

\[ y - 4 = x^2 - 6x + (4 + (-4)) \]  
Associative property of addition.

\[ y - 4 = x^2 - 6x + 0 \]  
Definition of additive inverse.

\[ y - 4 + 9 = x^2 - 6x + 9 \]  
Addition property of equality.

\[ y + 5 = x^2 - 6x + 9 \]  
Combine like terms.

\[ y + 5 = (x - 3)^2 \]  
Rewrite right side in factored form.

\[ y + 5 + (-5) = (x - 3)^2 + (-5) \]  
Addition property of equality.

\[ y + 0 = (x - 3)^2 + (-5) \]  
Definition of additive inverse.

\[ y = (x - 3)^2 - 5 \]  
Definition of subtraction.
Key Curriculum Press recognizes that high-stakes tests are a factor in every school classroom. Yet many students have anxiety about the format of standardized tests. We hope that these practice quizzes and test will help you, the teacher, allay the fears of students and parents and address your own concerns about preparing students for the Algebra I California Standards Test.

Each quiz is two pages long so that you can photocopy it as a single double-sided sheet. The test is four pages long. Answer sheets for the quizzes and test are provided on pages 74 and 75. Using a separate answer sheet will help students become familiar and comfortable with the actual Algebra I California Standards Test format. If you instruct students to write only on their answer sheets, then you can reuse the test pages with other classes. **The use of a calculator is not permitted on the Algebra I California Standards Test, so students should not use them for these practice quizzes and test.**

These practice assessments are built into the detailed pacing guides provided in the *Discovering Algebra* Teacher’s Edition to help with planning. You should use them to assess your students’ mastery of the standards and to familiarize your students to the format of the state exam. However, we recommend that you do not use them as summative assessments for assigning grades to your students. For this purpose, you should use the quizzes and tests in *Assessment Resources* or the *TestCheck™: Test Generator and Worksheet Builder™*.

**Correlation Chart**

Every item on an actual California Standards Test is primarily correlated to one benchmark in the California Content Standards. Similarly, on every practice quiz and the test in this guide, each item is correlated to one benchmark. The correlation chart on pages 58 and 59 will help you determine how your students are achieving the individual benchmarks and the standards as a whole. For this correlation, we have used the California Content Standard numbers. (For a complete listing of the Algebra I California Content Standards, see the correlation on pages 2–9.)

Furthermore, for each quiz or test item, the correlation chart tells you one lesson in *Discovering Algebra* that teaches the fundamental content. This secondary correlation will help you identify lessons, investigations, exercises, and material in the Teaching Resources package that you can use to reteach or reinforce the mathematical concepts.
Reinforcement and Review

If the practice quizzes and test reveal that students need to revisit particular content areas, there are a few resources you might take advantage of.

The Condensed Lessons: A Tool for Parents and Tutors book from the Teaching Resources package provides abbreviated lessons for every lesson in Discovering Algebra. The condensed lessons give you a convenient way to review and reinforce the content underlying items that students miss on a practice Algebra I California Mathematics Standards Test quiz or test. These condensed lessons are available in English and Spanish.

The More Practice Your Skills for California Standards worksheets also provide additional skills practice on the topics of each lesson.

To reassess performance after students have finished reviewing or working through a condensed lesson, you can use the quizzes, tests, exams, and constructive assessment instruments provided in Assessment Resources, or you can create your own tests or worksheets using the TestCheck: Test Generator and Worksheet Builder.

Algebra I California Standards Test

The Algebra I California Standards Test consists of 65 multiple-choice items, each weighted equally. The California Content Standards are categorized into four reporting clusters. The clusters and the number of problems in each cluster are as follows:

<table>
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<tr>
<th>Reporting Cluster</th>
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<tr>
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*Denotes key standards, which comprise about 85% of the questions on the exam.

You can find more information about the California Content Standards and California Standards Test via the California State Board of Education’s website, www.cde.ca.gov/be/st.
## Correlation Chart

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Correlation Chart (continued)

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Quiz 1 (for use after Chapter 3)

Which of the following is not true?

A \( \left(\frac{2}{3}\right)^0 = 1 \)
B \( 3^2 \cdot 3^3 = 3^6 \)
C \( \left(\frac{7^3}{4}\right)^4 = 7^8 \)
D \( \left(\frac{1}{2}\right)^2 + \left(\frac{1}{2}\right)^2 = \left(\frac{1}{2}\right)^1 \)

Which expression is equal to 23?

A \( 3 + 6 \cdot 4 - 15 \div 5 \)
B \( \left[\left(2^2\right)^2 - \left(4^2\right)^1\right] + \left[4 \cdot \left(\frac{1}{2}\right)^2 + (-2)^0\right] \)
C \( 4 \cdot (2 + 3) - (-6) \div 2 \)
D \( \left(3^2 + 4^0\right) \div \left(3^3 - 5^2\right) + 2^3 \cdot 3^1 - 5 \)

The graph shows the relationship between the number of whistles purchased and the total cost.

Which of the following is not true?

A The point (48, 30) is on the graph.
B The equation of the line is \( C = \frac{5}{8}n \).
C $95 would buy 153 whistles.
D The cost per whistle is 62 1/2 cents.

A rock with a mass of 5 kilograms weighs 11 pounds, and a rock with a mass of 8 kilograms weighs 17.6 pounds. If \( x \) represents mass in kilograms and \( y \) represents weight in pounds, \( x \) and \( y \) vary directly. Which of the following is true?

A If \( x = 33 \), then \( y = 15 \).
B \( y = 2.2x \)
C If \( x \) increases, \( y \) decreases.
D \( \frac{x}{y} = \frac{11}{5} \)

Freda drove her new European hybrid car 1425 kilometers on 13 gallons of gas. Using the conversion factor 1.6 kilometers = 1 mile, which calculation gives her rate of gas consumption in miles per gallon?

A \( 1425 \cdot 13 \cdot 1.6 \)
B \( \frac{1425}{13} \cdot \frac{1.6}{1} \)
C \( \frac{1425}{13} \cdot \frac{1}{1.6} \)
D \( \frac{13}{1425} \cdot \frac{1.6}{1} \)

\( p \) and \( q \) are inversely proportional—that is, the product of \( p \) and \( q \) is a constant. Which of the following is true?

A If \( p = 8 \) and \( q = 8 \), then when \( p = 3 \), \( q = 21 \).
B If \( p \) doubles, then \( q \) doubles.
C The graph of the points \( (p, q) \) falls on a straight line.
D If \( p = 8 \) and \( q = 8 \), then \( p = \frac{64}{q} \).
**Quiz 1 (continued)**

**Name_____________________________ Period ___________ Date ______________**

7. Consider statements i–iii.
   
   i. \( \left( \frac{5}{3} \right)^3 = \frac{15}{9} \)
   
   ii. \( 8 \cdot \frac{1}{2} = \frac{1}{2} \)
   
   iii. \( \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} = \frac{15}{16} \)

   How many of the statements are true?
   
   A. None are true.
   
   B. Exactly one is true.
   
   C. Exactly two are true.
   
   D. All are true.

8. The graph shows the relationship between the number of jumping beans purchased and the total cost.

   ![Graph of cost vs. number of jumping beans]

   Which of the following is not true?
   
   A. The graph shows a direct variation.
   
   B. \( \frac{y}{x} \) is a constant.
   
   C. The cost per jumping bean is $0.50.
   
   D. The cost of 25 beans is a quarter of the cost of 100 beans.

9. In order to make the needed amount of money at an outdoor concert, the organizers decide to collect money as people leave the concert and that the price per ticket will be inversely proportional to the number of people attending. If 150 people come, the price per ticket has to be $5.00. What will be the price per ticket if 250 people attend?

   A. $8.33 
   
   B. $2.50 
   
   C. $7.50 
   
   D. $3.00

10. If \( A = \frac{1}{2}(a + b)h \), which of the following is not true?

    A. \( a = \frac{2A}{h} - b \)
    
    B. \( b = \frac{2A - ha}{h} \)
    
    C. \( h = \frac{A}{2(a + b)} \)
    
    D. \( b = \frac{2A}{h} - a \)
Leah asks Tyrone to pick a number, add 3, multiply by 2, then subtract 4, and finally to divide by 5. Which of the following expressions represents what Leah requested?

A \[ x + 3 \cdot 2 - 4 \div 5 \]

B \[ ((2 \cdot x + 3) - 4) \div 5 \]

C \[ (2(x + 3) - 4) \div 5 \]

D \[ (x + 3) \cdot 2 - (4 \div 5) \]

What is the \( x \)-intercept of the line with equation \( 6x - 5y = 24 \)?

A 4

B \(-\frac{24}{5}\)

C 6

D -4

What is the slope of the line with equation \( 2x - 3y - 7 = 0 \)?

A \( \frac{2}{3} \)

B \( \frac{2}{3} \)

C 2

D \( \frac{7}{3} \)

Consider this graph.

What is the equation of the line?

A \(-2x + 5t = -10\)

B \(2x + 5y = 10\)

C \(2x + 5y = -10\)

D \(2x - 5y = -10\)

What is the solution to \( 2(x + 5) - (3x - 1) = 14 \)?

A \(-10\)

B \(-8\)

C \(-5\)

D \(-3\)

Which equation is equivalent to \(-7 + 2(4x - 1) = 1 - (3x - 2)\)?

A \(5x - 14 = 0\)

B \(11x - 12 = 0\)

C \(5x - 11 = 0\)

D \(11x - 6 = 0\)
**Quiz 2 (continued)**

Name ____________________________  Period __________  Date ________________

7 The cost of a phone call is $0.75 plus $0.12 per minute. Fred saw on his phone bill that he was charged $5.07 for a call. Which expression would give Fred the number of minutes of his call?
   A \[
   \frac{5.07 - 0.75}{0.12}
   \]
   B \[
   \frac{5.07 + 0.75}{0.12}
   \]
   C \[
   \frac{5.07 - 0.12}{0.75}
   \]
   D \[
   \frac{5.07 + 0.12}{0.75}
   \]

8 Which point is not on the line \( y = \frac{2}{3}x - 3 \)?
   A \((6, 1)\)
   B \((9, 3)\)
   C \((-3, 0)\)
   D \((0, -3)\)

9 Which equation represents a line parallel to \( 4x - 12y = 9 \)?
   A \( y = 3x + 3 \)
   B \( y = \frac{1}{3}x \)
   C \( y = -\frac{1}{3}x + 5 \)
   D \( y = -3x - \frac{3}{4} \)

10 Which equation represents a line with slope \( \frac{1}{2} \) that passes through the point \((-3, 5)\)?
   A \( y = 5 + \frac{1}{2}(x - 3) \)
   B \( y = 5 + \frac{1}{2}(x + 3) \)
   C \( y = -3 + \frac{1}{2}(x - 5) \)
   D \( y = -3 + \frac{1}{2}(x + 5) \)
Quiz 3 (for use after Chapter 6)

1. Which point lies above the graph of the line $y = -5 + 2x$?
   A. $(2, -5)$
   B. $(4, 3)$
   C. $(-5, -10)$
   D. $(2.5, 0)$

2. For what values of $x$ is $-3(x - 6) + 10 \leq 2x - (4 + x)$?
   A. $x \leq 8$
   B. $x \leq \frac{16}{3}$
   C. $x \leq -1$
   D. $x \leq 8$

3. At which point do $y = 0.5x - 3$ and $y = -1.5x - 6$ intersect?
   A. $(-3.75, -1.5)$
   B. $(-1.5, -3.75)$
   C. $\left(\frac{2}{3}, -\frac{10}{3}\right)$
   D. $(-1.5, -3)$

4. Lee and Lana take turns caring for their grandmother’s yard. It takes Lee 2 hours to do the work when she works alone, and it takes Lana 3 hours to do the work when she works alone. If they work together, how many minutes will it take them to complete the job?
   A. 60
   B. 72
   C. 84
   D. 90

5. What is the solution to the system of equations $x + 5y = 1$ and $2x + 3y = -5$?
   A. $(-4, 1)$
   B. $(-1, -1)$
   C. $(1, -4)$
   D. $\left(4, -\frac{3}{5}\right)$

6. A system of two equations has no solution. One equation is $y = 3x - 5$. Which is a possible equation for the second equation?
   A. $2y = 6x - 10$
   B. $y = 2x - 5$
   C. $y = 3x$
   D. $2y = 3x - 10$

7. Which point lies on the line defined by $-2x - 3y = 6$?
   A. $(0, -2)$
   B. $(6, 0)$
   C. $(0, 6)$
   D. $(-1, -1)$

(continued)
Quiz 3 (continued)

Name ___________________________  Period ___________  Date ________________

8. Which inequality defines the shaded region?

A. \( y \leq -\frac{2}{3}x - \frac{5}{2} \)
B. \( y \geq -\frac{2}{3}x - \frac{5}{2} \)
C. \( y > -\frac{2}{3}x - \frac{5}{2} \)
D. \( y \geq -\frac{2}{3}x - \frac{5}{2} \)

9. A chemist has a 14% acid solution. She needs to dilute some of the solution with water to make 150 mL of 6% acid solution. Which system of equations must she solve to find how much of each liquid to use? Let \( a \) represent the amount of 14% acid solution, and let \( w \) represent the amount of water.

A. \[
\begin{align*}
    a + w &= 150 \\
    0.14a + w &= 0.06(150)
\end{align*}
\]
B. \[
\begin{align*}
    a + w &= 150 \\
    0.14a &= 0.06(150)
\end{align*}
\]
C. \[
\begin{align*}
    0.14a + w &= 150 \\
    a + w &= 0.06(150)
\end{align*}
\]
D. \[
\begin{align*}
    a + w &= 0.06(150) \\
    0.14a + w &= 150
\end{align*}
\]

10. Solve the inequality \( \frac{2x - 3}{3} + 2\left(3 - \left(\frac{1}{2}x - 1\right)\right) < 0 \).

A. \( x < -3 \)
B. \( x > 3 \)
C. \( x < -21 \)
D. \( x > 21 \)
Quiz 4 (for use after Chapter 8)

Solve the equation $|2x + 5| = 17$.

A $x = -6$ or $x = 11$
B $x = 6$ or $x = 11$
C $x = 6$ or $x = -11$
D $x = 6$

Which of the following relations, $(x, y)$, is not a function?

A $(-1, 3), (0, 3), (1, 3), (2, 3), (3, 3)$
B $x = |y + 2|$
C $2x^2 - 4 = y$
D $y = 2x^2 - 4$

What are the domain and range of $y = 2x^2 - 4$?

A $-3 \leq x \leq 6, -3 \leq y \leq 10$
B $-3 \leq x \leq 10, -3 \leq y \leq 6$
C $-3 \leq x \leq 10, 0 \leq y \leq 3$
D $-5 \leq x \leq 12, -4 \leq y \leq 7$

What is the domain of the relation $\{(0, 1), (-1, 3), (2, 3)\}$?

A $-1 \leq x \leq 2$
B $\{1, 3\}$
C $\{-1, 0, 2\}$
D $-1 < x < 2$

Which expression is equivalent to $\frac{(3x^{-2}y^3)^{-2}}{x^3y^{-1}}$?

A $\frac{x}{9y^5}$
B $\frac{x^7}{6y^5}$
C $\frac{9x}{y^5}$
D $\frac{x}{9y^4}$

Evaluate $\frac{-2^2 + (-2)^2}{-2(2^2 + 2(1)^2)}$.

A $\frac{8}{9}$
B $-\frac{8}{9}$
C $-\frac{4}{5}$
D 0

What is the intersection of the graph of $y = 4 - \frac{2x + 3}{x - 1}$ and the graph of $y = 3$?

A $\left(-\frac{2}{3}, 3\right)$
B $(2, 3)$
C $(-4, 3)$
D $(3, -4)$

(continued)
Quiz 4 (continued)

Which table of values satisfies \(y = 4 \left( \frac{1}{2} \right)^x\)?

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For what values of \(x\) is \(|4x + 2| \geq 6|\)?

- A \(x \leq -1\) or \(x \geq 2\)
- B \(x \leq -2\) or \(x \geq 1\)
- C \(-2 \leq x \leq 1\)
- D \(-1 \leq x \leq 2\)

What is the range of the exponential function \(y = 2^{x-1} - 5\)?

- A \(y \geq -5\)
- B \(y > -5\)
- C \(y > 0\)
- D \(y \geq 5\)
Quiz 5 (for use after Chapter 10)

California Standards Multiple Choice Assessment

Name ____________________________
Period ___________ Date _____________

1 \[ \frac{x^2 - 9}{x^2 + 4x + 3} \div \frac{x^2 - 6x + 9}{x^2 + 2x + 1} = \]
A \[ \frac{x - 3}{x + 1} \]
B \[ \frac{x + 1}{x - 3} \]
C \[ \frac{(x - 3)^3}{x + 1} \]
D \[ \frac{-1}{3} \]

2 The graph of the quadratic equation \( y = x^2 + bx - 10 \) has \( x \)-intercepts \(-2\) and \(5\). What is the value of \( b \)?
A \(-7\)
B \(-3\)
C \(3\)
D \(7\)

3 What is the range of \( y = -x^2 - 4x + 5 \)?
A \( y \leq 9 \)
B \( y \geq 7 \)
C \( y \leq 1 \)
D \( y \leq -7 \)

4 For what values of \( x \) is \( \frac{x^2 + 3x + 2}{x^2 - 4} \) equal to 0?
A \(-1\)
B \(-2\)
C \(-1\) and \(-2\)
D \(-2\) and \(2\)

5 \[ \frac{3}{x - 1} - \frac{2}{x + 1} = \]
A \[ \frac{1}{x^2 - 1} \]
B \[ \frac{5x + 2}{x^2 - 1} \]
C \[ \frac{x + 2}{x^2 - 1} \]
D \[ \frac{x + 5}{x^2 - 1} \]

6 A rectangle with area \(3x^2 - 24x + 48\) is three times longer than it is wide. What is the length of the rectangle?
A \( x - 4\)
B \(3x - 12\)
C \(3x + 48\)
D \(x + 3\)

7 What are the \(x\)-intercepts of the parabola with equation \( y = 2x^2 - 3x - 1 \)?
A \[ \frac{-3 \pm \sqrt{17}}{4} \]
B \(1\) and \(\frac{1}{2}\)
C \[ \frac{3 \pm \sqrt{17}}{4} \]
D \(-1\) and \(-\frac{1}{2}\)

8 The quadratic equation \( h = -16t^2 + 32t + 3 \) measures the height in feet of a rock \( t \) seconds after it is thrown into the air. When will the rock reach its maximum height?
A \( t = 1\)
B between \( t = 1 \) and \( t = 2\)
C \( t = 2\)
D between \( t = 2 \) and \( t = 3\)
Quiz 5 (continued)

Name ____________________________    Period _______    Date ______________

9 Which graph is $y = -(x - 2)(x + 1)$?

A

B

C

D

10 Julian is solving $2x^2 + 3x + 1 = 0$ by completing the square. His steps begin:

$2x^2 + 3x + 1 = 0$  Original equation.

$x^2 + \frac{3}{2}x + \frac{1}{2} = 0$  Divide both sides by 2.

$x^2 + \frac{3}{2}x = -\frac{1}{2}$  Subtract $\frac{1}{2}$ from both sides.

What should he do next?

A  Add $\frac{3}{4}$ to both sides.

B  Factor $x$ from the left side.

C  Add $\frac{3}{2}$ to both sides.

D  Add $\frac{9}{16}$ to both sides.
Test (for use after Chapter 10)  

California Standards Multiple Choice Assessment

Name ___________________________  Period _________  Date ____________

1 4(2x - 1) - (x + 3) + 2(x - 3) is equivalent to which expression?
   A 9x - 13
   B 7x - 13
   C 9x - 10
   D 9x - 7

2 If y = 3x² - 6x + 1, then
   A \( x = \frac{6 \pm \sqrt{(-6)^2 - 4(3)(1)}}{2(3)} \)
   B \( x = \frac{-6 \pm \sqrt{(-6)^2 - 4(3)(1)}}{2(3)} \)
   C \( x = \frac{6 \pm \sqrt{(6)^2 + 4(3)(1)}}{2(3)} \)
   D \( x = \frac{6 \pm \sqrt{(-6)^2 - 4(3)(1)}}{2} \)

3 Solve \( |x - 4| + 2 = 8 \).
   A \( x = 2 \) and \( x = 6 \)
   B \( x = -6 \) and \( x = -2 \)
   C \( x = -6 \) and \( x = 2 \)
   D \( x = -2 \) and \( x = 6 \)

4 What is the range of \( y = \frac{1}{2}(x - 3)^2 + 1 \)?
   A \( y \geq -1 \)
   B \( y \geq 3 \)
   C \( y \leq 1 \)
   D \( y \geq 1 \)

5 Which is the equation of a line perpendicular to line \( PQ \)?
   A \( y = -3x + 3 \)
   B \( y = 3x - 2 \)
   C \( y = -\frac{1}{3}x + 1 \)
   D \( y = \frac{1}{3}x + 4 \)

6 Which equation describes the line that is parallel to \( -\frac{3}{2}x + \frac{1}{4}y = -2 \) and passes through the point (1, 5)?
   A \( \frac{3}{2}x + \frac{1}{4}y = \frac{1}{4} \)
   B \( 6x + y = 11 \)
   C \( \frac{3}{2}x - \frac{1}{4}y = -\frac{1}{2} \)
   D \( y = 6x - 1 \)

7 Factor \( 6x^2 - 5x - 4 \).
   A \( (3x + 4)(2x - 1) \)
   B \( (6x - 2)(x + 2) \)
   C \( (6x - 1)(x + 4) \)
   D \( (3x - 4)(2x + 1) \)

8 What are the \( x \)-intercepts of the parabola with equation \( y = -x^2 + 10x - 16 \)?
   A 2 and 8
   B -2 and -8
   C -4 and 4
   D There are no \( x \)-intercepts.

(continued)
Test (continued)

9 Solve \(16 - \frac{x + 2}{x - 3} = 25\).
   A \(-2.9\)
   B \(2.9\)
   C \(2.5\)
   D \(-2.5\)

10 \(4x - 5y = 20\) is defined for the domain \(0 \leq x \leq 10\). What is the range?
   A \(-5 \leq y \leq 17.5\)
   B \(-5 < y < 17.5\)
   C \(-4 \leq y \leq 4\)
   D \(-4 < y < 4\)

11 Which of these relations is not a function?
   A \(y = x^2 + 3x + 5\)
   B \(x^2 - y^2 = 9\)
   C \(32x - 29y + 17 = 0\)
   D \(y = -7\)

12 \(\sqrt{2} \cdot \sqrt{8} + \sqrt{8} - \sqrt{2} = \)
   A \(6\)
   B \(\sqrt{22}\)
   C \(4 + \sqrt{6}\)
   D \(4 + \sqrt{2}\)

13 Joel drives his car at a speed of 50 miles per hour for 30 minutes. He then steps on the brake and slows his speed at a rate of 8 miles per hour each second. What equation can be used to calculate the car’s speed at any time while it is stopping?
   A \(s = 50 - 8t\)
   B \(s = 50 + 8t\)
   C \(s = 50t - 8\)
   D \(s = 30 - 8t\)

14 When solving the equation \(ax^2 + bx + c = 0\) by completing the square, Homero started with the following three steps:
   
   Step 1: \(ax^2 + bx = -c\)
   
   Step 2: \(x^2 + \frac{b}{a} x = -c\)
   
   Step 3: \(x^2 + \frac{b}{a} x + \left(\frac{b}{2a}\right)^2 = -c + \left(\frac{b}{2a}\right)^2\)

   An error first occurs in which step?
   A Step 1
   B Step 2
   C Step 3
   D There is no error.

15 Solve \(3x + 7 < 5(x - 1)\).
   A \(x > 6\)
   B \(x < 6\)
   C \(x > 1\)
   D \(x > -6\)

16 Reduce to lowest terms: \(\frac{x^3 - 4x}{x^2 - 6x + 8}\).
   A \(\frac{x^2 - 4}{x^2 - 6x + 8}\)
   B \(\frac{x - 2}{x + 4}\)
   C \(\frac{-1}{-6x^2 + 2}\)
   D \(\frac{x + 2}{x - 4}\)

17 An upward-facing parabola has vertex \((3.5, -12)\) and one \(x\)-intercept at \(-2\). What are the roots of the parabola’s equation?
   A \(-9\) and \(2\)
   B \(-2\) and \(9\)
   C \(-2\) and \(5\)
   D cannot be determined
The statement “\( \frac{2x + 5}{x + 4} \geq 1 \) is always true” is proven false by considering which counterexample?

A \( x = 3 \)

B \( x = 0 \)

C \( x = -2 \)

D \( x = -5 \)

Solve \( 2x^2 - 3x - 3 = 0 \).

A \( x = \frac{-3 \pm \sqrt{33}}{4} \)

B \( x = \frac{3 \pm \sqrt{33}}{4} \)

C \( x = \frac{-3 \pm \sqrt{-15}}{4} \)

D \( x = \frac{3 \pm \sqrt{-15}}{4} \)

Perform the indicated operation and reduce the answer to lowest terms.

\[
\frac{x^2 - 10x + 25}{x^2 - 10x + 9} \div \frac{x^2 - 25}{x^2 + 4x - 5}
\]

A \( \frac{(x - 5)^3}{(x - 9)(x - 1)^2} \)

B \( \frac{x^2 - 10x + 25}{x^2 + 14x + 45} \)

C \( \frac{x - 5}{x - 9} \)

D \( \frac{x^2 - 25}{x^2 - 4x - 45} \)

What is the \( y \)-intercept of the graph of \( y = -\frac{2}{3}x + 5 \)?

A \( 5 \)

B \( -\frac{2}{3} \)

C \( -\frac{15}{2} \)

D \( \frac{15}{2} \)

Which pair of inequalities defines the shaded region in the graph?

A \( \begin{cases} y \geq 2x - 4 \\ y \geq 8 - 2x \end{cases} \)

B \( \begin{cases} y \leq 2x - 4 \\ y \leq 8 - 2x \end{cases} \)

C \( \begin{cases} x - 2y \leq 4 \\ x + 2y \geq 8 \end{cases} \)

D \( \begin{cases} x - 2y > 4 \\ x + 2y < 8 \end{cases} \)

The graph of the equation \( y = 2x^2 - 4x + c \) intersects the \( x \)-axis at exactly one point. What must be true about \( c \)?

A \( c < 2 \)

B \( c > -2 \)

C \( c = -2 \)

D \( c = 2 \)
Raisins cost $1.25 per pound. Peanuts cost $2.15 per pound. How many pounds of peanuts should you add to 4 pounds of raisins to make a mixture that costs $2.00 per pound?

A 12  
B 16  
C 20  
D 24

Which equation represents a line with the same y-intercept as line AB?

A \( y - 4 = -\frac{1}{3}x \)  
B \( 3x - 2y - 8 = 0 \)  
C \( 4x - y = -4 \)  
D \( 2y = x - 4 \)

Factor \( 6x^3 + 2x^2 - 4x \) completely.

A \( 2x(6x - 1)(x + 2) \)  
B \( 2x(3x + 1)(x - 2) \)  
C \( 2x(3x - 2)(x + 1) \)  
D \( 4x(3x - 1)(x + 1) \)

Which of the following is always true?

A \( (x + 1)^2 + 2 \leq 0 \) 
B \( -(x + 1)^2 + 2 \leq 0 \) 
C \( (x + 1)^2 - 2 \leq 0 \) 
D \( -(x + 1)^2 - 2 \leq 0 \)

The equation \( d = -16t^2 + 32t + 48 \) gives the height in feet of a ball \( t \) seconds after it is kicked off the top of a building. When will the ball hit the ground?

A \( t = 0 \)  
B \( t = 1 \)  
C \( t = 2 \)  
D \( t = 3 \)

Which point is on the line \( -2x + y = 7 \)?

A \( (0, 9) \) 
B \( (-2, 3) \) 
C \( (1, 5) \) 
D \( (0, 0) \)

A triangle has sides \( x + 3 \), \( 2(3x + 7) \), and \( (x - 1) \). The perimeter of the triangle is 32. Solve for \( x \).

A \( x = -1 \) 
B \( x = 5 \) 
C \( x = 2 \) 
D \( x = \frac{1}{2} \)
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