

## Algebra I Curriculum Guide

### Sequoia Union High School District

#### **ALGEBRA I**

##### **Description:**

First-year college-preparatory mathematics sequence. Includes extension of the study of real numbers; instruction in set notation, operations and structure of the real number system factorization, quadratic functions, and others.

##### **Prior Learnings/Prerequisites:**

Suggested Prerequisite: Eighth-grade teacher or department recommendation.

**Grade Level:** 9, 10, 11, 12

**Length of Course:** 1 year

**Units:** 10

##### **Meets Requirements for:**

- \* SUSHD Graduation
- \* UC "a-g" Requirements

##### **Teacher Participants:**

Amber Beardsley  
Zaida Bowers  
Pete Cocconi  
Samer Malouf  
Kelley O'Hern

##### **Course Texts**

Algebra - Addison Wesley (AAW)  
College Preparatory Math -Mathematics 1 - Algebra 2nd Edition (CPM1)  
Algebra I - Paul Forester/Addison-Wesley 1990 (APF)

| Content standards and Benchmarks  | Curriculum Coverage Instructional Materials   | Depth 0 to 5 | Sample Performance Activities  |
|---|---|--------------|--|
| <p><b>Standard 1: Students know how to simplify and evaluate algebraic expressions and formulas.</b></p> <p><b>Description:</b></p> |   |              | Simplify the following polynomial by combining like terms: $2x^2 + 3x^2 = 5x = 8 = 2$  |
| 1. Simplify polynomials by using the axioms and properties of algebra and the order of operations.                                  | AAW: Ch 5, Polynomials<br>CPM1: Units 1, 2<br>APF: 3.4, 3.5, 5.2, 5.3, 5.4                    | 5            | Completely factor a second degree trinomial such as: $2x^2 - 2x - 12$<br><br>Multiply two binomials together such as: $(x + 2)(x - 3)$   |
| 2. Know how to add, subtract, multiply and divide polynomials.  | AAW: Ch 5, 10, Polynomials<br>CPM1: Units 1, 6, 8, 10<br>APF: 3.5, 3.1, 3.2                   | 5            | Subtract two trinomials such as: $(2x^2 + 3x + 5) - (8x^2 - 2x + 7)$ .<br><br>Factor a binomial with a common factor such as: $x^2 - x^3$  |
| 3. Factor polynomials using GCF, difference of squares, perfect trinomial square, and trial and error.                              | AAW: Ch 6, Factoring Polynomials<br>CPM1: Units 8, 9, 10<br>APF: 3.4, 5.4, 5.5, 5.6, 5.7, 5.9 | 5            | Express a monomial containing a negative exponent using positive exponents as in: $x^{-4}$   |
| 4. Use formulas to solve problems.  | AAW: Ch 1, 3 Using Formulas<br>CPM1: Units 9, 10<br>APF: 4.5, 6.8, 6.10                       | 5            | Determine the value of a monomial raised to the zero power such as: $50^0$   |
|   |   |              | Evaluate a polynomial for a given value of the variable as in the following:<br>Evaluate $x^2 + 2x - 5$ if $x = -3$<br><br>Suppose the temperature at the rim of a volcano one day prior to eruption is given by the formula $T = 8000t^{-3} + 40t - 50$ where $t$ represents the hours left until eruption. How much hotter is it at the rim 1 hour prior to eruption than at 24 hours prior to eruption? |

| Content standards and Benchmarks  | Curriculum Coverage<br>Instructional Materials                                   | Depth<br>0 to 5 | Sample Performance Activities  |
|---|--|-----------------|--|
| <b>Standard 2: Students know how to evaluate numerical expressions.</b>                                   |  |                 | Evaluate $2(3 + 4)$ using the order of operations and then by using the distributive property. Verify that the results are the same. Evaluate the following numerical expressions:<br>$2 + 3 + (4 - 1)^2$<br>$6 - 2(3 + 3^2)$<br>Evaluate the following numerical expressions:<br>(a) $-8 + (-10)$ b) $(-6)(-8)$ c) $-4 \frac{1}{5} + (6)$ d) $(-1)^4$<br>e) $-16 + -2$ f) $10 - (-6)$ g) $2 \frac{1}{3} + (-1 \frac{1}{4})$<br>h) $-6 \frac{1}{4} + 10$<br>Evaluate the following numerical expression using the commutative and associative axioms:<br>$2 + (-8) + 13 + (-10) + 5$ |
| <b>Description:</b><br>1. Use the proper order of operations to correctly evaluate numerical expressions. | AAW: Ch 1, Introduction to algebra<br>CPM1: Units 1, 2<br>APF: 1.1, 8.1          | 5               |  |
| 2. Use the axioms and properties of algebra in order to evaluate expressions.                             | AAW: Ch 1, 2, Integers & rational numbers<br>CPM1: Units 1, 2<br>APF: 2.6, 8.1   | 5               |  |
| 3. Know how to add, subtract, multiply and divide real numbers.   | AAW: Ch 2, Rational numbers<br>CPM1: Unit 1<br>APF: 2.1, 2.2, 2.3, 2.4, 2.5, 8.1 | 5               | Solve the following by creating a numerical expression and then evaluating it. If it was $36^\circ$ on Monday and the temperature dropped $5^\circ$ Tuesday and rose $15 \frac{1}{4}^\circ$ on Wednesday, what was Wednesday's temperature? In the 10 weeks that Maria invested in PBHG mutual funds in the stock market, she realized the following weekly gain/losses: $+\$100, -\$250, +\$444, -\$345.75, -\$100, -\$552, +\$825, -\$50, -\$1000, +\$125$ . Did Maria's investment make or lose her money? How much? If she started with $\$5000$ , what was her final balance?   |
| 4. Know how to simplify and combine radical expressions.  | AAW: Ch 11, Radical Expressions and Equations<br>CPM1: Unit 9<br>APF: 5.10, 6.2  | 5               | Simplify and combine the following radical expressions:<br>a) $\sqrt{25}$ b) $\sqrt{9+16}$<br>c) $\sqrt{18}$ d) $\sqrt{9 \cdot 16}$<br>e) $\sqrt{72} + \sqrt{48} - \sqrt{98}$<br>f) $\sqrt{18} - \sqrt{2}$   |

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|--|--|-----------------|---|
| <b>Standard 3: Students know how to simplify and evaluate algebraic expressions and formulas.</b><br><br><b>Description:</b>                                   |  |                 | Solve linear equations such as:<br>$2(x + 3) + 89 = 4x - 6$ and give justification for each step.<br>$3x - 2 = 11$  |
| 1. Solve simple linear equations with variables on one or both sides of the equation using algebraic methods.  | AAW: Ch 7, Linear equations & Graphs<br>CPM1: Units 4, 8<br>APF: 1.6, 1.7, 2.7, 4.1, 4.2, 4.3, 4.4 | 5               | Solve absolute value equations and inequalities such as:<br>$2x - 3 = 8$ $\left  \frac{1}{3}x + 4 \right  < 6$<br>$ 5x + 6  > 2$  |
| 2. Solve absolute value equations of degree one.   | AAW: Ch 9, Inequalities & Absolute values<br>CPM1: None<br>APF: 6.3, 6.4                           | 5               | Find the ordered pair that satisfies the following system of linear equations using graphing, substitution and elimination techniques:<br>$2A + 3B = 8$<br>$-4A + 2B = 10$  |
| 3. Solve quadratic equations using factoring, and the quadratic formula, noting the relationship that exists between the discriminant and nature of the roots. | AAW: Ch 13, Quadratic equations<br>CPM1: Units 8, 10<br>APF: 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10    | 5               | Solve quadratic equations such as:<br>$\frac{1}{4}x^2 + 4x + 8 = 0$<br>Suppose a couple has \$10,000 to invest. An investment advisor suggests to them that they split the amounts into two investments. She encourages them to invest part of it in a conservative fund that pays 5% simple interest annually. The rest should be invested in a riskier account that pays 12.5% simple interest annually. Their goal is to earn \$1200 in interest in one year. Write a system of equations representing this situation and solve it to decide how much to invest in each account. Find y when x = 5 for the equation $v = 3x - 8$ . |
| 4. Solve inequalities and absolute value inequalities using conjunction and disjunction.   | AAW: Ch 9, Inequalities & Absolute values<br>CPM1: None<br>APF: 13.2, 13.3, 13.4                   | 3               |   |
| 5. Solve an elementary simultaneous system of 2 equations in 2 unknowns using graphing, substitution and elimination techniques.                               | AAW: Ch 8, Systems of equations<br>CPM1: Units 6, 7, 8, 11<br>APF: 8.7, 8.8, 8.9, 8.10             | 5               |   |

| Content standards and Benchmarks   | Curriculum Coverage<br>Instructional Materials                                   | Depth<br>0 to 5 | Sample Performance Activities   |
|--|--|-----------------|---|
| <b>Standard 4: Students know how to simplify and evaluate algebraic expressions and formulas.</b>  |  |                 |   |
| <b>Description:</b>  |  |                 |   |
| 1. Graph any polynomial relation by plotting points.   | AAW: Ch 7, Graphs & Linear equations<br>CPM1: Unit 3<br>APF: 8.3 Handouts        | 5               | On the number line graph the solution to the following absolute value inequalities:<br>$ 2x - 1  < 8$<br>$ 2x - 1  > 5$<br>On the number line graph the solution to the following inequality:<br>$-2x - 1 < 10$   |
| 2. Find the equation and graph a line using point-slope, slope-intercept and the two point methods.  | AAW: Ch 7, Equations & slope<br>CPM1: Units 6, 7<br>APF: 8.6 Handouts            | 5               | Graph the relation $y = 2x^2 + 4x - 2$ in the xy coordinate plane. Find the equation of the line in slope intercept form passing through (3, 4) and (-8, 5). Write the correct inequality for the following situation and then solve:<br>If you work as a computer repair person, you charge a certain amount per hour worked plus a fixed amount for the service call. Suppose that the rate is \$20 per hour, plus \$25 for the service call. What range of times could you work to earn at most \$100? (At least \$400?)<br>Graph the solution to the system.<br>$2x + 8y < 4$<br>$-5x - 6y > 3$ |
| 3. Be able to find the equation of a line perpendicular/parallel to a given line that passes through a given point.                                    | AAW: Ch 7, Parallel & perpendicular lines<br>CPM1: Unit 7<br>APF: 8.6, 8.7       | 2               | Graph $y = \frac{1}{2}x$ , $y = 2x$ , $y = \frac{1}{2}x$ , $y = -2x$ and write a general statement which compares the graphs and the slopes of these lines. Graph $2x + 3y = 6$ and identify the x and y intercepts and verify that (6, -2) is a point on this line.  |
| 4. Identify the boundary lines and the region of intersection when graphing a system of linear inequalities of two variables.                          | AAW: Ch 9, Graphing systems of linear equations<br>CPM1: None<br>APF: 13.6, 13.7 | 2               |   |
| 5. Know the difference in how the graphs are created when plotting a disjunction versus a conjunction in an absolute value inequality in one variable. | AAW: Ch 9, Compound sentences  | 4               |   |
| 6. Understand how the various characteristics of the graph reflect the relationship that exists between the variables.                                 | AAW: Ch 7, Problem solving<br>CPM1: Units 6, 7<br>APF: Ch 8, Handouts            | 2               |   |
| 7. Verify that a point lies on a line given the equation and find the x and y intercept.   | AAW: Ch 7, Graphing equations<br>CPM1: Units 6, 7<br>APF: 8.4, 8.6, 8.7 Handouts | 4               |   |

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|---|--|-----------------|---|
| <p><b>Standard 5: Students know how to simplify and evaluate algebraic expressions and formulas.</b></p> <p><b>Description:</b></p> |  |                 |   |
| 1. Recognize when a solution makes sense using techniques such as estimation.   | AAW: Ch 1, 4, 5, 7, 10, Problem solving<br>CPM1: Units 3, 5<br>APF: 1.9, 2.8, 4.6, 6.9, 8,10 | 3               | Allen Bluespan borrows \$20,000 from his mother to purchase some stock. He agrees to work off this debt at his mother's software store by selling computer goods at the rate of \$300 an hour. How many hours must Allen work to bring his debt to below \$4000? Use a chart or table which shows the actual debt remaining at that time. |
| 2. Identify and eliminate the extraneous information in a problem.  | AAW: Ch 1, 2, 4, 5, 7, 10, Problem solving<br>APF: 1.9, 2.8, 4.6, 6.9, 8,10                  | 2               | Fred baked a cake that was 40% chocolate and 60% raspberry. The diameter of the cake was 8 1/2". Anita took 1/6 of the cake and Barry took 60% of what remained. What fraction of the original cake is left? What information above is extraneous?  |
| 3. Identify and assign a variable to the quantity being sought.   | AAW: Ch 1, 2, Writing equations<br>CPM1: Units 2, 6<br>APF: 1.9, 2.8, 4.6, 6.9, 8,10         | 5               | A large inhabited island has a total area of 20,000 square miles. Each person on the island requires an average of 2 square miles of living space for housing, food production, and other activities. The population doubles every 30 years.  |
| 4. Employ organizational methods such as charts, tables and diagrams to help set up the appropriate equation.                       | AAW: Ch 1, 3, 4, 5, Problem solving<br>CPM1: Units 6, 8<br>APF: 1.9, 2.8, 4.6, 6.9, 8,10     | 5               | What will the population be in 2020? Explain why the above problem is unsolvable.   |
| 5. Show why their solutions are correct, and explain the mathematical reasoning behind their solution.                              | AAW: Ch 8, Problem solving<br>CPM1: Units 1, 9<br>APF: 1.9, 2.8, 4.6, 6.9, 8,10              | 3               | Fred and Sally leave Chicago at the same time heading in opposite directions. Fred travels east at 40 mph and Sally west at 60 mph. Their cell phones have a range of 1000 miles. In how many hours will they be out of phone range   |

| Content standards and Benchmarks   | Curriculum Coverage<br>Instructional Materials                                 | Depth<br>0 to 5 | Sample Performance Activities  |
|--|--|-----------------|--|
| <p><b>Standard 6: Students will represent functional relationships in several ways (numerically, symbolically and graphically).</b></p> <p><b>Description:</b></p> |  |                 | Does the following relation define a function and, if so, what function?   |
| 1. Know the concept of dependent and independent variables.  | AAW: Ch 7 Graphs & Linear equations<br>CPM1: Units 3, 7<br>APF: 8.10           | 5               | Pa Bell charges \$ .20 plus \$ .10 a minute for a phone call from California to Nevada. Plot this information making sure you have the correct dependent and independent variables. Use a reasonable domain. Write the equation. 30 is what percent of 50? 60% of what number is 54? |
| 2. Discover the pattern that exists between two dynamic quantities and express it algebraically.   | AAW: Ch 8, Motion problems<br>MA:<br>CPM1: Units 4, 7<br>APF: 8.10             | 3               |  |
| 3. Know the definition of function.  | AAW: Ch 12. Relations & functions<br>CPM1: Units 2, 3<br>APF: 14.1, 14.2, 14.3 | 5               |  |
| 4. Identify the equation of a function, given a table of values.   | AAW: Ch 12, Functions & graphs<br>CPM1: Units 3, 7<br>APF: 8.3                 | 3               |  |
| 5. Identify the effects of parameter changes on a function.  | AAW: Ch 12, Functions & graphs<br>APF: 14.1, 14.2, 14.3                        | 3               |  |

| Content Standards and Benchmarks  | Curriculum Coverage<br>Instructional Materials   | Depth<br>0 to 5 | Sample Performance Activities   |
|---|--|-----------------|---|
| <b>Standard 7: Students know how to reason logically and can apply a variety of mathematical methods to solve problems.</b> |  |                 | <p>Mariah is exactly eight years older than her cousin, Louis. Copy and complete the table below.</p> <p>Find the ration in decimal form of Mariah's age to Louis' age for each part of ages listed in the table.</p> <p>Write a formula for the ratio of Mariah's age to Louis' age when Louis is <math>y</math> years old.</p>                                      |
| <b>Description:</b>   |  |                 |   |
| 1. Demonstrate an understanding of the relationships in data sets.  | AAW: Ch 15, Probability & statistics<br>CPM1: Unit 5<br>APF: STAR Review Packet (attached)     | 3               |   |
| 2. Identify the effect of the mean, median, mode or range on a set of data.   | AAW: Ch 15, Probability & statistics<br>APF: STAR Review Packet (attached)                     | 3               | Siskel and Ebert are movie-rating critics. Gene Siskel gave four thumbs-up to every five thumbs-up given by his partner, Roger Ebert. If Mr. Siskel gave sixty-eight thumbs up, how many movies did Mr. Ebert rate favorable?   |
| 3. Demonstrate an understanding of the laws of probability.   | AAW: Ch 15, Probability & statistics<br>CPM1: Units 1, 8<br>APF: STAR Review Packet (attached) | 3               | collect data from your classmates about their favorite sport. Make a frequency table for this set of data. Find the mean, median, mode and range.   |
| 4. Identify and find properties of two and three dimensional objects.   | STAR Review Packet (attached)  | 1               | Booker T. Washington High School is having its annual String Carnival. The ninth grade class has decided to have a game booth. To win a small stuffed animal, a player will have to draw 2 marbles of the same color from a box containing 3 marbles - 1 red, 1 white, and 1 yellow. First a marble is drawn, put back in the box, and then s second marble is drawn. |
| 5. Make translations between algebraic and geometric representations of figures.  | CPM1: Unit 5<br>APF: STAR Review Packet (attached)   | 1               | <ul style="list-style-type: none"> <li>* What are the possible outcomes?</li> <li>* What is the probability of winning the game?</li> <li>* First, draw a tree diagram to see the possibilities of drawing 2 marbles of the same color.</li> </ul>  |

| Content standards and Benchmarks  | Curriculum Coverage<br>Instructional Materials   | Depth<br>0 to 5 | Sample Performance Activities  |
|---|--|-----------------|--|
| 6. Estimate the area under a curve, determine the maximum and minimum points of a graph and find the slope of the line tangent at any point of the graph. | APF: STAR Review Packet (attached)   | 1               | <p>If the area of a compact disc is about 19.6 square inches, what is the diameter of the disc?</p> <p>Luis Hernandez has money saved from summer work at a graphic design studio. He wants to put some of it in a six month certificate of deposit (CD) account that pays 6% annual interest. He wants to keep some money and is hoping to earn \$225 in interest to buy a color printer. Write an equation to show how much money Luis should put in the CD.</p> <p>Solve each proportion.<br/> <math>2/3 = 8/x</math><br/> <math>3/15 = 1/x</math><br/> <math>1.1/0.6 = 8.47/n</math></p> |
| 7. Solve problems involving sequences with recurrence relationships.  | APF: STAR Review Packet (attached)   | 1               |  |
| 8. Find the percentage of increase or decrease in a quantity or price.  | AAW: Ch 3, Prob solving using percents<br>APF: STAR Review Packet (attached)             | 3               |  |
| 9. Solve equation involving simple and compound interest.   | AAW: Ch 3, Ready for equations,<br>Problem solving<br>APF: STAR Review Packet (attached) | 3               |  |
| 10. Read and interpret the graph of a trigonometric function and solve elementary.  | Not Part of Algebra I Curriculum   | 0               |  |

| <b>Core Textbooks and Instructional Material</b>  | <b>Prevention, Intervention and Extension Strategies</b>   | <b>Potential Articulation with Other Programs</b>   |
|---|--|---|
| <p>(See attached approved district list.)</p> <p><b>(SEQ)</b> <u>Mathematics 1 - Algebra 2nd Edition</u> College preparatory mathematics, Sallee, Kyan, Kasimatis, Hoey, Copyright 1998</p> <p>Algebra I (second edition), Paul Foerstar, Addison-Wesley 1990</p> | <p>(Include strategies to address students in ESL, GATE, Special Ed., etc. How is instruction individualized?)</p> <p><b>(CPM1)</b></p> <ul style="list-style-type: none"> <li>* Sheltered classes for ESL students</li> <li>* Problems of the week-Gold Metal problems. Must do all of them to receive an A. They are much more thought provoking and require more work than a normal assignment.</li> <li>* Work in groups. This helps all students. It reinforces, for the GATE student. It helps the special ED student understand more and it helps the ESL student with English and to feel more comfortable.</li> </ul> <p>1. Math Tutorial M-Th 3:00-5:00<br/>2. STAR Review packet (developed by WHS Math Dept) to cover standard 9 for Algebra I</p> | <p>(Community College, Tech Prep, ROP, Distance Learning, etc.)</p>   |
| <p><b>Possible Correlation to Other Subject Areas</b></p> <p>(Where could content, skills, resources, teaching strategies overlap?)</p> <p><b>(SEQ)</b> Improves reading skills because the book has so many hard problems.</p>                                   | <p><b>Professional Resources</b></p> <p>(Websites, books, consultants, videos, etc.)</p> <p><b>(CPM1)</b> You must go through a week long training in the summer and 4 to 5 day long in services during the school year. There is a support network of CPM trainers and teachers that help when needed.</p>  | <p><b>Other Pertinent Information</b></p> <p><b>(SEQ)</b> There is a parent guide for those who request it.</p> |