Los Angeles Unified School District
Office of Curriculum, Instruction, and School Support
Common Core Algebra 1 Tutorial Lab

COURSE DESCRIPTION

Common Core Algebra 1 Tutorial Lab is designed to provide foundational knowledge and intervention for students taking CC Algebra 1 and for students who are preparing to be enrolled in CC Algebra 1. The course is also used to provide intervention for the students who are enrolled in CC Algebra 1 but are experiencing difficulty in mastering the core standards and academic language of CC Algebra 1. CC Algebra 1 Tutorial Lab is an elective mathematics course provided to students as a second course to support the core CC Algebra 1 course. The course is designed to enhance the student's knowledge of prerequisite skills and academic language that are needed to access the standards-based CC Algebra 1 course.

COURSE SYLLABUS

Students enrolled in this ***intervention course*** need **to be assessed** in an ongoing basis to determine their needs for support and intervention. Teachers are encouraged to tailor instruction through ongoing assessment to provide true differentiated instruction. The outcome of the initial and ongoing assessments are analyze to identify skill and concept requirements necessary for any Common Core State Standard, compare those requirements to the student's existing skill set, and analyze any potential student deficits.

The aim of the intervention in CC Algebra 1 is to provide explicit, systematic, intensive instruction for at-risk populations. As teachers strive to assist struggling students to reach the Common Core State Standards expectations, they must be able to accurately identify areas of student deficit and to match any student to an appropriate academic intervention plan. The idea of the CC Algebra 1 intervention is to create evidence-based intervention plans that customized to individual students and that are tied to specific Common Core Standards.

According to the California CCSS Mathematics Framework (November, 2013), "Universal Access in education is a concept which utilizes strategies for planning for the widest variety of learners from the beginning of the lesson design and not "added on" as an afterthought. Universal Access is not a set of curriculum materials or specific time set aside for additional assistance but rather a schema. For students to benefit from universal access, teachers may need assistance in planning instruction, differentiating curriculum, infusing Specially Designed Academic Instruction in English (SDAIE) techniques, using the California English Language Development Standards (CA ELD standards), and using grouping strategies effectively. " Therefore, through careful planning for modifying curriculum, instruction, grouping, and assessment techniques, teachers can be well prepared to adapt instruction to meet the needs of divers learners in their classrooms.

Multi-tier Mathematics Interventions

Gersten et. al. (2009) in the Practice Guide "Assisting Students Struggling with Mathematics: RtI for Elementary and Middle School" presented evidence for the effectiveness of combinations of systematic and explicit instruction that include teacher demonstrations and think alouds early in the lesson, unit, or module; student verbalization of how a problem was solved; scaffolded practice; and immediate corrective feedback. In instruction that is systematic, concepts are introduced in a logical, coherent order and students have many opportunities to apply each concept. Below are the recommendations applicable to Algebra 1 (Recommendations 3 and 4 received strong evidence rating).

Recommendation 1. Screen all students to identify those at risk for potential mathematics difficulties and provide interventions to students identified as at risk. *It is suggested that you use any of the following instruments to screen students: MDTP, Scholastic Math Inventory, Easy CMB, etc.*

Recommendation 2. Instructional materials for students receiving interventions should focus intensely on in-depth treatment of whole numbers in kindergarten through grade 5 and on rational numbers in grades 4 through 8. These materials should be selected by committee.

Recommendation 3. Instruction during the intervention should be explicit and systematic. This includes providing models of proficient problem solving, verbalization of thought processes, guided practice, corrective feedback, and frequent cumulative review.

Recommendation 4. Interventions should include instruction on solving word problems that is based on common underlying structures. *Teachers may consider using some of the strategies in "Improving Mathematical Problem Solving in Grades 4 Through 8" in teaching students problem solving*.

Recommendation 5. Intervention materials should include opportunities for students to work with visual representations of mathematical ideas and interventionists should be proficient in the use of visual representations of mathematical ideas.

Recommendation 6. Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts.

Recommendation 7. Monitor the progress of students receiving supplemental instruction and other students who are at risk.

Units	Concepts/Clusters	Standards	Resources
Unit 1	**Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**	**Number System** **7.NS.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a. Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* b. Understand p+q as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. c. Understand subtraction of rational numbers as adding the additive inverse, p-q=p+(-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. d. Apply properties of operations as strategies to add and subtract rational numbers. **7.NS.2** Apply and extend previous understanding of multiplication and division and of fractions to multiply and divide rational numbers. e. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1)=1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. f. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then –(p/q)=(-p/q)=(p/-q). Interpret quotients of rational numbers by describing real-world contexts. g. Apply properties of operations as strategies to multiply	**Mathematics Assessment Project** • Using Positive and Negative Numbers in Context • 7NS.2 and 7.NS.3 • Increasing and Decreasing Quantities by a Percent 7NS.2 and 7.NS.3 • Distances on the Number Line 2 7.NS.1a **Illustrative Mathematics** • Comparing Freezing Points 7.NS • Operations on the number line 7.NS • Distances on the Number Line 2 7.NS • Bookstore Account 7.NS, 7.EE • Rounding and Subtracting 7.NS • Distances Between Houses 7.NS • Differences and Distances 7.NS • Equivalent fractions approach to non-repeating decimals 7.NS.2d • Repeating decimal as approximation 7.NS.2d • Sharing Prize Money 7.NS

Units	Concepts/Clusters	Standards	Resources
		and divide rational numbers. h. Convert a rational number to a decimal using long division; know that the decimal from of a rational number terminates in 0s or eventually repeats. **7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers.	
	Understand ratio concepts and use ratio reasoning to solve problems *Ratio reasoning and applying proportional relationships*	**6.RP.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent. d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	**Illustrative Mathematics** • Sharing Costs 6.RP.3 • Snail Pace 6.RP.3 • Percent Cards 6.RP.3c **Mathematics Assessment project** • 6.RP.3 : Sharing Costs • 6.RP.3 : Snail Pace • 6.RP.1, 6.RP.3 : Candies • 6.RP.3c : Percent Cards • Optimizing: Security Cameras:
	Analyze proportional relationships and use them to solve real-world and mathematical problems.	**7.RP.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.* **7.RP.2** Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the	**Illustration Mathematics** • Track Practice 7.RP • Stock Swaps, Variation 2 7.RP • Stock Swaps, Variation 3 7.RP • Sale! 7.RP • Thunder and Lightning 7.RP • Climbing the steps of El 6.RP, 7.RP.3

Units	Concepts/Clusters	Standards	Resources
		origin. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.* d. Explain what a point *(x, y)* on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r)* where *r* is the unit rate. **7.RP.3** Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	Castillo • Dueling Candidates 7.RP • Tax and Tip 7.RP • Friends Meeting on Bikes 7.RP • Comparing Years 7.RP • Chess Club 7.RP • Buying Protein Bars and Magazines 7.RP
	Apply and extend previous understandings of arithmetic to algebraic expressions *Generate equivalent express*	**Expressions and Equations** **6.EE.2** Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.* b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas $V = s^3$ and $A = 6 s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.* **6.EE.3** Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the*	**Illustrative Mathematics** • Distance to School 6.EE.2 • Rectangle Perimeter 16.EE.2 • Equivalent Expressions: 6.EE.4 • 6.EE Rectangle Perimeter 2 6.EE.4 • Morning Walk 6.EE • Fishing Adventures 16.EE • 6.EE Triangular Tables • 6.EE Busy Day **Mathematics Assessment Project** Laws of Arithmetic:

Units	Concepts/Clusters	Standards	Resources
		expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y. **6.EE.4** Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*	
Assess the materials in Unit 1 in an ongoing basis to determine students' needs for support and intervention			
Unit 2	**Understand the connections between proportional relationships, lines, and linear equations** *Analyze proportional relationship and use to solve real-world problems*	**Expressions and equations** **8 EE.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **8.EE.6** Use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation *y = mx* for a line through the origin and the equation *y = mx + b* for a line intercepting the vertical axis at *b*.	**Mathematics Assessment Project** Modeling Car Skid Marks Measure Slope Real-Life Equations Interpreting Distance-Time Graphs **Illustrative Mathematics** Fictional Stairs Corner to Corner **Engage New York** Introduction to Irrational Numbers Using Geometry
	Define, evaluate, and compare functions	**Functions** **8.F.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine*	**Illustrative Mathematics** Battery Charging: 8.F.2 **Mathematics Assessment Project** Modeling Situations with Linear Equations : 8.F.2, 8.F.4

Units	Concepts/Clusters	Standards	Resources
		which function has the greater rate of change. **8.F.3** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.*	**Inside Mathematics** House Prices: 8.F.3, 8.F.4:
	Use functions to model relationships between quantities	**8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two *(x, y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. **8.F.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	**Illustrative Mathematics** • Video Streaming 8.F.4 • High School Graduation 8.F.4 • Chicken and Steak, Variation 1 8.F.4 • 8.F Baseball Cards 8.F.4 • Chicken and Steak, Variation 2 8.F.4 • 8.F Distance across the channel 8.F.4 • Delivering the Mail, Assessment Variation 8.F.5 • Tides 8.F.5 • Distance 8.F.5 • Bike Race 8.F.5 • Riding by the Library 8.F.5
	Apply and extend previous understandings of arithmetic to algebraic expressions *Generate equivalent express*	**Expressions and Equations** **6.EE.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. **6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable	**Illustrative Mathematics** • Log Ride 6.EE.5 • Firefighter Allocation 6.EE.5 • Pennies to heaven 6.EE,NS.5,RP; 8.EE,F • Firefighter Allocation 6.EE.6

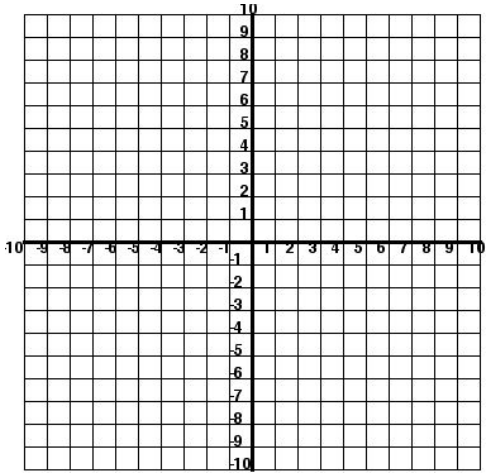
Units	Concepts/Clusters	Standards	Resources
		can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. 7.EE.4: Use variables to represent quantities in real-world and mathematical problems and construct simple equations and inequalities to solve problems about the quantities. 7.EE.1: Apply properties of operations as strategies to add, subtract, factor and expand linear expressions with rational coefficients.	• Morning Walk 6.EE.6 • Anna in D.C. 6.EE.6,RP 7.EE,RP • Fruit Salad 6.RP, 6.EE
	Analyze and solve linear equations and pairs of simultaneous linear equations	**Expressions and Equations** **8.EE.7** Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **8.EE.8** Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.* c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs*	**Illustrative Mathematics** • Coupon versus discount • Solving Equations • Sammy's Chipmunk and Squirrel Observations • How Many Solutions? 8.EE.8 • Fixing the Furnace 8.EE.8 • Cell Phone Plans 8.EE.8 • Kimi and Jordan 8.EE.8 • Folding a Square into Thirds 8.EE.8 • The Intersection of Two Lines 8.EE.8a • Quinoa Pasta 1 8.EE.8c • Summer Swimming 8.EE.8c

Units	Concepts/Clusters	Standards	Resources
		of points, determine whether the line through the first pair of points intersects the line through the second pair.	
Assess the materials in Unit 2 in an ongoing basis to determine students' needs for support and intervention			
Unit 3	**Investigate patterns of association in bivariate data.**	**Statistics and Probability** **8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. **8.SP.2** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. **8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.* **8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*	**LAUSD Concept Lesson** The Power of Diversity: 8 SP **Inside Mathematics** Through the Grapevine: 8 SP 1, 8 SP 2 **Illustrative Mathematics** • Music and Sports • Birds' Eggs 8.SP • Texting and Grades I 8-SP.1 • Hand span and height 8-SP.1 • Animal Brains 8-SP • Birds' Eggs 8.SP.2 • Animal Brains 8.SP.2 • Laptop Battery Charge 8.SP.2 • What's Your Favorite Subject? 8-SP.4 • Music and Sports 8-SP.4

Units	Concepts/Clusters	Standards	Resources
Assess the materials in Unit 3 in an ongoing basis to determine students' needs for support and intervention			
Unit 4	**Solve real-life and mathematical problems using numerical and algebraic expressions and equations**	**Expressions and Equations** **7.EE.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	**Illustrative Mathematics** • Sports Equipment Set 7.EE
	Interpret functions that arise in applications in terms of a context *Use functions to model relationship between quantities*	**Functions - Interpreting Functions** **F.IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*★	
Assess the materials in Unit 4 in an ongoing basis to determine students' needs for support and intervention			
Unit 5	**Work with radicals and integer exponents**	**Expressions and Equations** 8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = {}^{1}/_{3^3} = 1/27$	**Illustrative Mathematics** • Extending the Definitions of Exponents, Variation 1 8.EE • Ants versus humans 8.EE

Units	Concepts/Clusters	Standards	Resources
		8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. 8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.* 8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	• Ant and Elephant 8.EE.3 • Pennies to heaven 6.EE,NS,RP; 8.EE,F • Orders of Magnitude 8.EE.3 • Giantburgers 8.EE.4 • Ants versus humans 8.EE
Assess the materials in Unit 5 in an ongoing basis to determine students' needs for support and intervention			

Mathematical Practices	Implementing Mathematical Practices
1. Make sense of problems and persevere in solving them. 2. Reason Abstractly and quantitatively 3. Construct Viable arguments and critique the reasoning of others. 4. Model with mathematics 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity.	As you begin the year, it is advised that you start with MP1 and MP 3 to set up your expectations of your classroom. This will help you and your students become proficient in the use of these practices. All other practices may be evident based on tasks and classroom activities.

Strategies for Implementing Math Practices	Guiding Questions:
This example is to illustrate how mathematical practice standards can be exemplified in instruction. John and Kim wrote down two different functions that have the same rate of change. The table shown below represents John's function.  Johns Function **x** | **y** 3 | 1 0 | – 2 6 | 4 Draw a Function that could be Kim's function.	MP1: 1. How could you describe what you are trying to find? 2. What do you notice about John's function 3. What information is given in the problem? 4. Describe the relationship between the quantities? 5. Describe what you have already tried? MP3: 1. What mathematical evidence supports your solution? 2. How can you prove that its Kim's function? 3. How did you test whether your approach worked? 4. What is the same and what is different about Kim's function? **Think-Ink-Share** Give students a structure for sharing their solutions and providing sentence starters to guide accountable talk. I think the best way to solve this is…… I would not solve it this way because…… I agree/disagree because…… I don't think that will work because…… Let me show you what I am thinking with a ……. I try……..I think…….will happen

	I solve the problem like this because……