Course No: N 240
N 241

Orange Unified School District

FOUNDATIONS OF ALGEBRA

Year Course

GRADE LEVEL: 9

PREREQUISITES: CST General Math: 276 – 413; Algebra Readiness Test < 90%

INTRODUCTION TO THE SUBJECT:

This course is designed for students functioning at the Proficient/Basic range of skills in general mathematics. The goal of this course is to deepen student understanding of the specific topics in mathematics that are necessary for success in Algebra I. Student learning will focus on the sixteen targeted standards for algebra readiness as delineated by the *Mathematics Framework for California Public Schools.* In addition, students will strengthen the foundational skills and concepts necessary for success in higher math classes.

ADOPTED TEXT: *A Blueprint for the Foundation of Algebra,* Peterson; Mind Research Institute ©2007.

SUPPORT MATERIALS: ST Math (computer software)

ESSENTIAL LEARNINGS: Students will

- Add, subtract, multiply and divide rational numbers and take positive rational numbers to whole number powers.
- Convert fractions to decimals and percents and use these representations in estimations, computations and applications.
- Convert terminating decimals into fractions in simplest form.
- Understand positive and negative whole-number exponents. Simplify and evaluate expressions that include exponents.
- Multiply and divide expressions involving exponents in a common base.
- Use variables and appropriate operations to write an expression, an equation, and inequality, or a system of equations or inequalities as mathematical models.
- Simplify numerical expressions by applying properties of rational numbers.
- Solve two-step linear equations and inequalities, interpret the solutions in context and verify the reasonableness of the results.
- Solve multi-step equations involving rate, average speed, distance, and time or direct variation.
- Use Pythagorean Theorem and its converse to find missing side of a right triangle and the length of other segments.
- Graph linear functions and find and interpret the slope.
- Plot the values of quantities whose ratios are constant; fit a line to the plot and understand that the slope of the fitted line equals the ratio of the quantities.
- Use measures expressed as rates and products to solve problems.
- Use dimensional analysis to check the reasonableness of the answer.
- Simplify expressions before solving linear equations and inequalities in one variable.
- Solve multistep problems involving linear equations and inequalities in one variable and provide justification for each step.

COURSE OVERVIEW AND APPROXIMATE UNIT TIME ALLOTMENTS:

FIRST SEMESTER

ASSESSMENT BLUEPRINT:

Semester	Standard	# of Questions
1	2NS.4.2 Recognize fractions of a whole and parts of a group	2
	4NS.1.1 Read/write whole numbers in the millions	2
	4NS.1.9 Identify fractions and decimals on a number line	2
	4NS.3.4 Multi-digit division by one-digit	3
	5NS.1.2 Fraction/decimal/percent equivalents	3
	5NS.1.4 Prime factorization	3
	5NS.2.3 Fractions	3
	5AF.1.2 Write/evaluate algebraic expressions	3
	5AF.1.3 Distributive property	3
	6NS.1.1 Compare/order fractions	3
	6NS.2.1 Multiplication/division of fractions	3
	6AF.1.3 Order of Operations	3
	7AF.1.3 Simplify algebraic expressions	3
	7MG.1.3 Rates	3

Chapters 1 & 2 – Algebraic Reasoning 13 Days

Lesson	Topic	Standards	Days
0	Introduction to *A Blueprint for the Foundation of Algebra*	7AF.1.1 7AF.1.3	1
1, 2	Your First Trip to the Number Line; Where are the Whole Numbers?		1
3	Unknown Locations		1
4	What is an Identity?		1
5	Multiplication by a Whole Number		1
Lab	LAB DAY		1
6, 7	Units; Units of Area		1
8	Describing Situations w. Expressions & Equations (SUPPLEMENT)		2
9	Describing Situations with Identities		1
Lab	LAB DAY		1
	Review		1
	Test		1

Chapter 3 – Place Value 7 Days

Lesson	Topic	Standard	Days
10	Expanded Form	7AF.1.3	1
11, 12	Naming the Powers of Ten; Working Efficiently w. Powers of Ten		1
13, 14	Multiplication Using Place Value; Estimating w. Powers of Ten		1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 4 – Rates and Ratios 7 Days

Lesson	Topic	Standard	Days
15, 16	Converting Units; Finding Rates from Situations	7AF.4.2 7MG.1.3	1
17	Generalizing Rates		1
18	Expanding the Meaning of Multiplication		1
19	Multiplication with Rates		1
Lab	LAB DAY		1
	Review		1
	Test		1

Chapter 5 – Division 10 Days

Lesson	Topic	Standard	Days
20	The Inverse of Multiplication	7AF.4.2	1
21	Dividing Whole Numbers		1
22	Remainders		1
23	Finding the Difference		1
24	Long Division		1
15	Solving Problems with Division		1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 6 – Fractions 11 Days

Lesson	Topic	Standard	Days
26	Numbers in Between Whole Numbers	7AF.4.2 7 MG.1.3	1
27	Fractions of Units		1
28	Commutative Property of Multiplication		1
29	Fractions and Area		1
30	Equivalent Fractions		1
31	Dividing Fractions		1
32	Equivalent		1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 7 – Prime Factorization 8 Days

Lesson	Topic	Standard	Days
33, 35	Divisibility; Testing for Divisibility	7NS.2.4	1
34, 36	Prime Numbers, Prime Factorization		1
37	Factoring Powers of Ten		1
38	Repeated Factors		1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 8 – Fraction Sums and Differences 7 Days

Lesson	Topic	Standard	Days
39	Simplifying Fractions	7NS.1.2 7NS.2.1 7NS.2.2 7AF.1.3 7AF.4.2	1
40	Common Denominators		1
41, 43	Adding Fractions, Fractional Differences		1
42	Mixed Numbers		1
Lab	LAB DAY		1
	Review		1
	Test		1

Chapters 9 & 10 – Decimals; Operations with Decimals 15 Days

Lesson	Topic	Standard	Days
44, 45	Denominators of 10; Denominators of 100	7NS.1.2 7NS.1.3 7NS.1.5 7AF.4.2	1
46	Denominators of 1,000		1
47	Decimal Fractions		1
48	Decimal Notation		1
49	Expressing Decimals as Fractions		1
50	Addition with Decimals		1
51, 52	Multiplication with Decimals; Multiplication Using Place Value		1
53	Rates with Decimals		1
54	Dividing Decimals		1
55	Expressing Fractions as Decimals		1
Lab	LAB DAYS		3
	Review		1
	Test		1

Semester 1 Final Exam <u>on Chapters 1-10 only</u>

<u>SECOND SEMESTER</u>

ASSESSMENT BLUEPRINT:

Semester	Standard	# of Questions
2	5AF.1.4 Identify/graph ordered pairs on coordinate plane	3
	6NS.1.3 Proportions	2
	6AF.1.1 One-step linear equations	5
	7NS.1.2 Rational number operations including exponents	5
	7NS.2.1 Negative exponents	3
	7AF.1.3 Properties	4
	7AF.3.3 Graphing linear equations	4
	7AF.4.1 Two-step linear equations/inequalities	5
	7MG.3.3 Pythagorean Theorem	5

Chapter 11 – Equivalent Expressions with Equivalent Equations 10 Days

Lesson	Topic	Standard	Days
56	Dividing Using equivalent Expressions	7NS.1.2 7NS.1.3 7AF.1.3	1
57	Generating Equivalent Expressions		1
58	Factors and Terms		1
59	Simplifying Expressions		1
60	Equivalent Equations		1
61	Inverse Property of Multiplication		1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 12 – Negative Numbers 7 Days

Lesson	Topic	Standard	Days
63	Integers	7NS.1.2 7AF.1.3 7AF.4.2 7MG.1.3	1
64, 65	Negative Units; Negative Solutions		1
66	SKIP LESSON 66; Use Supplemental Lesson		1
67	Negative Rates		1
Lab	LAB DAY		1
	Review		1
	Test		1

Chapter 13 – Equations with Rational Numbers 11 Days

Lesson	Topic	Standard	Days
68	Negative Fractions	7NS.1.2 7NS.1.3 7AF.1.1 7AF.1.3 7AF.4.1 7AF.4.2 7MG.1.3	1
69	Rational Numbers		1
70	Multiplying by Rational Numbers		1
71	Building Equations		1
72	Solving Equations		1
73	Unit Analysis		1
Lab	LAB DAYS		3
	Review		1
	Test		1

Chapter 14 – The Coordinate Plane 11 Days

Lesson	Topic	Standard	Days
74	Plotting Inputs and Outputs	7AF.3.3 7AF.4.1 7AF.4.2 7MG.1.3	1
75	The Coordinate Plane		1
76	Graphing with Rates		1
77	Offsetting Rates		1
78	The Slope is the Rate		2
79	An Equations for a Line		1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 15 – Geometric Context of Ratios and Proportions 10 Days

Lesson	Topic	Standard	Days
80	Locations on a Plane		1
81	Scaling Shapes		1
82	Similar Triangles		1
83	Lines from Similar Triangles	7AF.3.3	1
84	Equivalent Equations for a Line	7AF.3.4	1
85	Rates, Ratios, and Similar Triangles	7AF.4.2	1
Lab	LAB DAYS		2
	Review		1
	Test		1

Chapter 16 – Geometric Context of Ratios and Proportions 10 Days

Lesson	Topic	Standard	Days
86	Pythagorean Theorem		2
87	Approximating Square Roots	7NS.2.1	1
88	Integer Exponents	7AF.2.1	1
89	Rules of Exponents	7MG.2.2	1
90	Exponents, Roots, and Inverse Operations	7MG.2.3	1
Lab	LAB DAYS	7MG.3.3	2
	Review	Alg.2.0	1
	Test		1

1 week Review for CST and CST

Supplement with Grade 6 PS Standards (Ex: median, mean, mode, range and box-and-whisker plots) and Solving Inequalities involving multiplying and dividing with negatives. CST tested standards not covered in this course include: 7NS 1.1, 7NS1.6, 7NS1.7, 7NS2.5, AF1.2, 7AF2.2, 7AF3.1, 7MG1.1, 7MG1.2, 7MG2.1, 7MG2.4, 7MG3.2

Chapter 17 – Advanced Concepts and Skills 11 Days

Lesson	Topic	Standard	Days
91	Estimating Values from Graphs	7NS.1.2	1
92	Working with Systems of Equations	7NS.1.3	2
93	Working with Inequalities	7AF.1.5	1
94	Products of Units	7AF.3.3	1
95	Multi-digit Divisors	7AF.4.1	1
96	Repeating Decimals	7AF.4.2	1
Lab	LAB DAYS	MG.1.3	2
	Review	Alg.4.0	1
	Test	Alg.5.0	1

Chapter 18 – Advanced Concepts and Skills **11 Days**

Lesson	Topic	Standard	Days
97	Two-Step Equations		1
98	From Words to Equations	7NS.4.1	1
99	Simplifying Before Solving	7AF.1.1	1
100	Reciprocals	7AF.4.1	1
101	Simplifying Exponential Expressions	Alg.2.0	1
Lab	LAB DAYS	Alg.4.0	2
	Review	Alg.5.0	1
	Test		1

Semester 2 Final Exam on Chapters 11-18 only

DATE OF LAST CONTENT REVISION: February 2010

DATE OF CURRENT CONTENT REVISION: February 2010

DATE OF BOARD APPROVAL: May 8, 2008

CALIFORNIA STANDARDS TEST
GENERAL MATHEMATICS
(Revised blueprint adopted by the State Board of Education 10/02)

CALIFORNIA CONTENT STANDARDS: GRADE 7	# of Items	%
Number Sense	**24**	**37%**
Standard Set 1.0 Students know the properties of, and compute with, rational numbers expressed in a variety of forms:		
1.1 Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.	**1**	
1.2* Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers.	**4**	
1.3 Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.	**4**	
1.5* Know that every rational number is either a terminating or repeating decimal and be able to convert terminating decimals into reduced fractions.	**2**	
1.6 Calculate the percentage of increases and decreases of a quantity.	**1**	
1.7* Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.	**2**	

CALIFORNIA CONTENT STANDARDS: GRADE 7	# of Items	%
Standard Set 2.0 Students use exponents, powers, and roots and use exponents in working with fractions:		
2.1 Understand negative whole-number exponents. Multiply and divide expressions involving exponents with a common base.	**1**	
2.2* Add and subtract fractions by using factoring to find common denominators.	**4**	
2.3* Multiply, divide, and simplify rational numbers by using exponent rules.	**2**	
2.4 Use the inverse relationship between raising to a power and extracting the root of a perfect square integer; for an integer that is not square, determine without a calculator the two integers between which its square root lies and explain why.	**1**	
2.5* Understand the meaning of the absolute value of a number; interpret the absolute value as the distance of the number from zero on a number line; and determine the absolute value of real numbers.	**2**	
Algebra and Functions	**21**	**32%**
Standard Set 1.0 Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:		
1.1 Use variables and appropriate operations to write an expression, an equation, an inequality, or a system of equations or inequalities that represents a verbal description (e.g., three less than a number, half as large as area A).	**3**	
1.2 Use the correct order of operations to evaluate algebraic expressions such as 3(2x + 5)2.	**3**	
1.3* Simplify numerical expressions by applying properties of rational numbers (e.g., identity, inverse, distributive, associative, commutative) and justify the process used.	**2**	
1.5 Represent quantitative relationships graphically and interpret the meaning of a specific part of a graph in the situation represented by the graph.	**1**	
Standard Set 2.0 Students interpret and evaluate expressions involving integer powers and simple roots:		
2.1 Interpret positive whole-number powers as repeated multiplication and negative whole-number powers as repeated division or multiplication by the multiplicative inverse. Simplify and evaluate expressions that include exponents.	**1**	
2.2 Multiply and divide monomials; extend the process of taking powers and extracting roots to monomials when the latter results in a monomial with an integer exponent.	**1**	
Standard Set 3.0 Students graph and interpret linear and some nonlinear functions:		
3.1 Graph functions of the form y = nx2 and y = nx3 and use in solving problems.	**1**	
3.3* Graph linear functions, noting that the vertical change (change in y-value) per unit of horizontal change (change in x-value) is always the same and know that the ratio (“rise over run”) is called the slope of a graph.	**2**	
3.4* Plot the values of quantities whose ratios are always the same (e.g., cost to the number of an item, feet to inches, circumference to diameter of a circle). Fit a line to the plot and understand that the slope of the line equals the quantities.	**1**	

CALIFORNIA CONTENT STANDARDS: GRADE 7	# of Items	%
Standard Set 4.0* Students solve simple linear equations and inequalities over the rational numbers:		
4.1* Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of the results.	**4**	
4.2* Solve multistep problems involving rate, average speed, distance, and time or a direct variation.	**2**	
Measurement and Geometry	**11**	**17%**
Standard Set 1.0 Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems:		
1.1 Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).	**1**	
1.2 Construct and read drawings and models made to scale.	**1**	
1.3* Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.	**2**	
Standard Set 2.0 Students compute the perimeter, area, and volume of common geometric objects and use the results to find measures of less common objects. They know how perimeter, area, and volume are affected by changes of scale:		
2.1 Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.	**1**	
2.2 Estimate and compute the area of more complex or irregular two- and three-dimensional figures by breaking the figures down into more basic geometric objects.	**1**	
2.3 Compute the length of the perimeter, the surface area of the faces, and the volume of a three-dimensional object built from rectangular solids. Understand that when the lengths of all dimensions are multiplied by a scale factor, the surface area is multiplied by the square of the scale factor and the volume is multiplied by the cube of the scale factor.	**1/2****	
2.4 Relate the changes in measurement with a change of scale to the units used (e.g., square inches, cubic feet) and to conversions between units (1 square foot = 144 square inches or [1 ft2] = [144 in2], 1 cubic inch is approximately 16.38 cubic centimeters or [1 in3] = [16.38 cm3].	**1/2****	

CALIFORNIA CONTENT STANDARDS: GRADE 7	# of Items	%
Standard Set 3.0 Students know the Pythagorean theorem and deepen their understanding of plane and solid geometric shapes by constructing figures that meet given conditions and by identifying attributes of figures:		
3.2 Understand and use coordinate graphs to plot simple figures, determine lengths and areas related to them, and determine their image under translations and reflections.	**1**	
3.3* Know and understand the Pythagorean theorem and its converse and use it to find the length of the missing side of a right triangle and the lengths of other line segments and, in some situations, empirically verify the Pythagorean theorem by direct measurement.	**3**	
CALIFORNIA CONTENT STANDARDS: GRADE 6	**# of Items**	**%**
Statistics, Data Analysis, and Probability	**9**	**14%**
Standard Set 1.0 Students compute and analyze statistical measurements for data sets:		
1.1 Compute the range, mean, median, and mode of data sets.	**1**	
Standard Set 2.0 Students use data samples of a population and describe the characteristics and limitations of the samples:		
2.5* Identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.	**1**	
Standard Set 3.0 Students determine theoretical and experimental probabilities and use these to make predictions about events:		
3.1* Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.	**1**	
3.3* Represent probabilities as ratios, proportions, decimals between 0 and 1, and percentages between 0 and 100 and verify that the probabilities computed are reasonable; know that if P is the probability of an event, 1-P is the probability of an event not occurring.	**1**	
3.5* Understand the difference between independent and dependent events.	**1**	
CALIFORNIA CONTENT STANDARDS: GRADE 7		
Statistics, Data Analysis, and Probability		
Standard Set 1.0 Students collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set by hand and through the use of an electronic spreadsheet software program:		
1.1 Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.	**1**	
1.2 Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).	**1**	
1.3* Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.	**2**	

Mathematical Reasoning		
Standard Set 1.0 Students make decisions about how to approach problems:	Embedded	
1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.		
1.2 Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.		
Standard Set 2.0 Students use strategies, skills, and concepts in finding solutions:		
2.1 Use estimation to verify the reasonableness of calculated results.		
2.3 Estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.		
2.4 Make and test conjectures by using both inductive and deductive reasoning.		
Standard Set 3.0 Students determine a solution is complete and move beyond a particular problem by generalizing to other situations:		
3.1 Evaluate the reasonableness of the solution in the context of the original situation.		
3.3 Develop generalizations of the results obtained and the strategies used and apply them to new problem situations.		
GENERAL MATHEMATICS TOTAL	**65**	**100%**