Final Course Outline
Math, Course 3

Date: December 2014

Proposed Grade Level(s): 8

Grading: A-F

Prerequisites: Completion of 7th grade math standards (Course 2)

COURSE DESCRIPTION:

This is a grade level course in full alignment with CA Common Core State Standards. According to the standards, instructional time in 8th grade should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

GENERAL GOALS/PURPOSES:

This course is designed to address the CA Common Core Standards for 8th grade. The content domains for 8th grade include *The Number System, Expressions and Equations, Functions, Geometry,* and *Statistics and Probability.* This is a grade level course that will prepare students for Integrated Math 1 in high school.

CCSS READING/WRITING/SPEAKING/LISTENING COMPONENTS:

Part of the CA Common Core Standards includes *Standards for Mathematical Practice.* These practices describe the "processes and proficiencies" which mathematically proficient students possess. These standards address many literacy strategies including:

- Making sense of math tasks
- Constructing viable arguments
- Communicating understanding orally and through writing
- Writing about math
- Building math vocabulary
- Building academic vocabulary

Mathematical practices provide a vehicle through which students engage with and learn mathematics – with a heavy focus on reading, writing, and explaining.

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 in repeated reasoning.

<u>DETAILED UNITS OF INSTRUCTION/ESSENTIAL QUESTIONS</u>

Units of instruction address the CA Common Core Standards for Math, grade 8. Content standard citations are listed in parentheses. Key for content standards is as follows: NS=Number System, EE=Expressions and Equations, G=Geometry, SP=Statistics and Probability, F=Functions.

Unit 1: The Number System (NS)

Chapter 1: Real Numbers; "Why is helpful to write numbers in different way?"

1. Rational numbers
2. Powers and exponents
3. Multiply and divide monomials
4. Powers of monomials
5. Negative exponents
6. Scientific notation
7. Computing with scientific notation
8. Roots
9. Estimating roots
10. Comparing real numbers

Unit 2: Expressions and Equations (EE)

Chapter 2: Equations in One Variable; "What is equivalence?"

1. Solving equations with rational coefficients
2. Solving two-step equations
3. Writing two-step equations
4. Solving equations with variables on each side
5. Solving multi step-equations

Chapter 3: Equations in Two Variables; "Why are graphs helpful?"

1. Constant rate of change
2. Slope
3. Equations in y=mx form
4. Slope intercepts form
5. Graph a line using intercepts
6. Write linear equations
7. Solve systems of equations by graphing
8. Solve systems of equations algebraically

Unit 3: Functions (F)

Chapter 4: Functions; "How can we model relationships between quantities?"

1. Represent relationships
2. Relations
3. Functions
4. Linear functions
5. Compare properties of functions
6. Construct functions
7. Linear and nonlinear functions
8. Qualitative graphs

Unit 4: Geometry (G)

Chapter 5: Triangles and the Pythagorean Theorem; "How can algebraic concepts be applied to geometry?"
1. Lines
2. Geometric proof (optional)
3. Angles of triangles
4. Polygons and angles (optional, extension)
5. Pythagorean theorem
6. Using the Pythagorean theorem
7. Distance on the coordinate plane

Chapter 6: Transformations; "How can we best show or describe the change in position of a figure?"
1. Translations
2. Reflections
3. Rotations
4. Dilations

Chapter 7: Congruence and Similarity; "How can you determine congruence and similarity?"
1. Congruence and transformations
2. Congruence
3. Similarity and transformations
4. Properties of similar polygons
5. Similar triangles and indirect measurement
6. Slope and similar triangles
7. Area and perimeter

Chapter 8: Volume and Surface Area; "Why are formulas important in math and science?"
1. Volume of cylinders
2. Volume of cones
3. Volume of spheres
4. Surface area of cylinders
5. Surface area of cones
6. Changes in dimensions

Unit 5: Statistics and Probability (SP)

Chapter 9: Scatter Plots and Data Analysis; "How are patterns used when comparing two quantities?"
1. Scatter plots
2. Lines of best fit
3. Two-way tables
4. Descriptive statistics
5. Measures of variation
6. Analyze data distributions

TEXTBOOKS AND RESOURCE MATERIALS:
California Math, Course 3; McGraw Hill, 2015

CONTENT STANDARDS TO BE ADDRESSED:
The Number System (8.NS.1,2)
Know that there are numbers that are not rational, and approximate them by rational numbers.
Expressions and Equations (8.EE.1-8)
Work with radicals and integer exponents.
Understand the connection between proportional relationships, lines, and linear equations.
Analyze and solve linear equations and pairs of simultaneous linear equations.

Functions (8.F.1-5)
Define, evaluate, and compare functions.
Use functions to model relationships between quantities.

Geometry (8.G.1-9)
Understand congruence and similarity using physical models, transparencies, or geometry software.
Understand and apply the Pythagorean Theorem.
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Statistics and Probability (8.SP.1-4)
Investigate patterns of association in bivariate data.

DISTRICT ESLRs TO BE ADDRESSED:
When students exit a secondary mathematics course, they will be:
• **Self-directed Learners** who will be able to use notes and a textbook to assist them in continuing their learning outside of the classroom setting.
• **Efficient Communicators** who can explain mathematical concepts to others and use mathematics to organize and explain data.
• **Quality Producers** who understand the importance of neat, organized work that demonstrates their thinking and understanding of the solution they've formed to solve a problem.
• **Constructive Thinkers** who are able to attack problems with organization, logic, and mathematical skills they've developed in a systematic fashion.
• **Collaborative Workers** who can work in a variety of settings in culturally diverse groups. They will be able to form and use study groups to strengthen their own understanding in addition to providing the same service for classmates.
• **Responsible Citizens** who accept the consequences of their actions and who demonstrate their understanding of their role in the learning process.