Murrieta Valley Unified School District **Board Submission: April 2015**
HIGH SCHOOL COURSE OUTLINE

Course Title: Transitional Math

Department: Mathematics

Course #: 2214

Grade Level/s: 9

Length of Course: Year

Prerequisite/s: By placement

UC/CSU (A-G) Req: None

Brief Course Description: The purpose of Transitional Math is to reinforce foundational skills and concepts necessary for success in Math I. In Transitional Math, students study real numbers, expressions and equations, congruency and similarity of figures, functions (with absolute values) and linear relationships, the Pythagorean theorem, perimeter, area and volume of shapes. Students routinely use the standards for mathematical practice to make sense of problems, justify solutions and conclusions, model with mathematics, and strategically use technology to analyze and solve real-world problems.

I. GOALS

The students will:

A. Extend understanding of numerical manipulation to algebraic manipulation

B. Synthesize understanding of functions

C. Deepen and extend understanding of linear relationships

D. Apply linear models to data that exhibit linear trends

E. Establish criteria for congruence based on rigid motions

F. Apply the Pythagorean theorem to the coordinate plane

These goals are aligned with the California State Standards, including the Standards of Mathematical Practices.

II. OUTLINE OF CONTENT FOR MAJOR AREAS OF STUDY

Semester 1

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A. Number and Quantity
1. Define quantities and interpret expressions (N.Q.2, A.SSE.1)
2. Interpret expressions and use units to understand problems (A.SSE.1, N.Q.1)
3. Use units as a way to understand problems (N.Q.1)
4. Explain each step in the process of solving linear and absolute value equations (A.REI.1)
5. Solve literal linear and absolute value equations (A.REI.1, A.REI.3, A.CED.4)

B. Systems of Equations
1. Write and solve equations in two variables; graph equations on coordinate axes with labels and scales (A.CED.2)
2. Represent constraints by equations and by systems of equations (A.CED.3)
3. Solve systems of linear equations in two variables exactly and approximately (e.g. with graphs) (A.REI.6)
4. Solve systems of linear equations by elimination (A.REI.5, A.REI.6)

C. Area, Perimeter and Volume
1. Determine the formulas for the area and circumference of a circle and apply them to solve problems (7.G.B.4)
2. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms (7.G.B.6)
3. Determine the formulas for the volumes of cones, cylinders, spheres and apply them to solve problems. (8.G.C.9)
4. Use coordinates to compute perimeters of polygons, areas of triangles and rectangles (e.g., using the distance formula) (G.GPE.B.7)

D. Linear Relations and Functions
1. Define linear relations based upon the pattern of change (F.LE.1, F.LE.2)
2. Identify rates of change in linear functions (F.LE.1, F.LE.2)
3. Interpret equations that model linear functions (A.SSE.1a, A.CED.2, F.LE.5)
4. Evaluate the use of various forms of linear functions (A.SSE.1, A.CED.2, F.LE.5)
5. Solve linear equations (A.REI.3)
6. Solve one-variable equations involving absolute value, graphing the solutions and interpreting them in context (A.REI.3.1)

Semester 2

A. Features of Functions
1. Define a function (F.IF.1)
2. Use a story context to graph and describe key features of functions (F.IF. 4)
3. Use tables and graphs to interpret key features of functions (F.IF. 4, F.IF. 5)
4. Features of functions using various representations (F.IF. 4, F.IF. 5)
5. Interpret linear and absolute value functions using notation (F.IF.2, F.IF.4, F.IF.5, F.IF.7, A.REI.11, A.CED.3)
6. Use graphs to solve problems given in function notation (F.BF.1b, F.IF.2, F.IF.4, F.IF.5, F.IF.7, A.REI.11, A.CED.3)
7. Identify whether or not a relation is a function given various representations (F.IF.1)

8. Match features and representations of specific linear and absolute value functions (F.IF.2, F.IF.4, F.IF. 5, F.IF.7, A.REI.11, A.CED.3)

F. Congruence & Similarity (Extension from Grade 8)
1. Extend on the understanding that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. (8.G.A.2)
2. Extend on being able to describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (8.G.A.3)
3. Extend on the understanding that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (8.G.A.4)

G. Congruence & Similarity
1. Develop the definitions of rigid-motion transformations: translations, reflections and rotations (G.CO.1, G.CO.4, G.CO.5)
2. Examine the slope of perpendicular lines (G.CO.1, G.GPE.5)
3. Determine which rigid-motion transformations carry one image onto another congruent image (G.CO.4, G.CO.5)
4. Write and apply formal definitions of the rigid-motion transformations: translations, reflections and rotations (G.CO.1, G.CO.2, G.CO.4, G.GPE.5)
5. Describe rotational symmetry and lines of symmetry in special types of quadrilaterals (G.CO.3, G.CO.6)
6. Examine characteristics of regular polygons that emerge from rotational symmetry and lines of symmetry (G.CO.3, G.CO.6)
7. Make and justify properties of quadrilaterals using symmetry transformations (G.CO.3, G.CO.4, G.CO.6)
8. Describe a sequence of transformations that will carry congruent images onto each other (G.CO.5)
9. Writing procedures for compass and straightedge constructions (G.CO.12, G.CO.13)
10. Examine why compass and straightedge constructions produce the desired objects (G.CO.12, G.CO.13)

H. Connecting Algebra & Geometry
1. Use coordinates to find distances and determine the perimeter of geometric shapes relating to the Pythagorean Theorem (G.GPE.7)
2. Prove slope criteria for parallel and perpendicular lines (G.GPE.5)
3. Write the equation $f(t) = m(t) + k$ by comparing parallel lines and finding k (e.g. the y-intercept) (F.BF.1, F.BF.3, F.IF9)
4. Determine the transformation from one linear function to another function (F.BF.1, F.BF.3, F.IF9)
5. Translate linear functions using multiple representations (F.BF.1, F.BF.3, F.IF9)

III. ACCOUNTABILITY DETERMINANTS

A. Key Assignments

1. In the task “Serving Up Symbols” from Number and Quantity Unit, students will develop an understanding of the use of variables given a story context. Students are asked to interpret expressions written with variables, which will open up strategies for using units to analyze expressions. Students will also combine variables to make meaningful expressions and describe the meaning of the expressions they have written.
2. In the task “Too Big or Not Too Big, That is the Question” from Systems of Equations Unit, students will examine and extend many ideas, strategies and representations related to solving systems of equations.
3. In the Explorations in Core Math 8 Performance task for Area, Perimeter & Volume Unit, students will use their knowledge of formulas for volumes of cylinders to solve real-world problems and justify their reasoning.
4. In the task “Interpreting Functions” from Linear Relations and Functions Unit, students distinguish between input and output values when using notation, evaluate functions for inputs in their domains, determine the solution where the graphs of *f(x) and g(x)* intersect based on tables of values and by interpreting graphs and combine standard function types using arithmetic operations (finding values of *f(x)+ g(x))*.
5. In the task “To Function or Not To Functions” from Features of Functions Unit, students will analyze various naming conventions of function (“versus”, “with respect to”, “over”, “dependent on”) and determine whether or not each situation is a function, then justify their answer.
6. In the task “Symmetries of Regular Polygons” from Congruence and Similarity unit, students continue to focus on classes of geometric figures that can be carried onto themselves by a transformation—figures that possess a line of symmetry or rotational symmetry. Students solidify the idea of “symmetry” relative to finding lines that reflect a figure onto itself, or determining if a figure has rotational symmetry by finding a center of rotation about which a figure can be rotated onto itself. They also look for and describe the structure that determines if a figure possesses some type of symmetry.
7. In the task “Go the Distance” from Connecting Algebra and Geometry Unit, students will develop the distance formula, based upon students’ understanding of the Pythagorean theorem. Students are asked to calculate distances between points using triangles, and then to formalize the process to the distance formula. At the end of the task, students will use the distance formula to find the perimeter of a hexagon.

B. Assessment Methods
   1. Daily Student Observations, Classroom Participation, Effort and Achievement
   2. Classwork/Homework
   3. Performance Tasks
   4. Projects
   5. Quizzes
   6. End of Unit Tests
   7. Semester Final Exams
   8. District-wide Benchmark Exams

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IV. INSTRUCTIONAL MATERIALS AND METHODOLOGIES

A. Required Textbook(s)
Bellman, Allan, et al. California Algebra 1. Boston: Pearson Prentice Hall, 2009.

B. Supplementary Materials
1. Big Ideas Math, Course 3: A Common Core Curriculum. Big Ideas Learning, LLC. 2015
2. Hendrickson, Honey, et al. Secondary One Mathematics: An Integrated Approach. Mathematics Vision Project, 2013. This is an e-book located at http://www.mathematicsvisionproject.org
3. Holt McDougal, Explorations in CORE Math for Common Core Algebra 1. Houghton Mifflin Harcourt Publishing Company, 2010
4. Holt McDougal, Explorations in CORE Math for Common Core Algebra 1. Houghton Mifflin Harcourt Publishing Company, 2010
5. www.geogebra.org
6. www.illustrativemathematics.org

C. Instructional Methodologies
1. Guided Inquiry
2. Direct Instruction
3. Cooperative Learning
4. Discourse
5. Problem-Based Learning
6. Visual Representations and Concrete Models

D. These instructional methodologies will be implemented using the *Rotational/Remediation Model*. In this model, students will rotate through three different stations. Online tools allow more advanced students to move through at their own pace and struggling students can use the technology features for remediation and to work their way through more difficult problems. Technology provides the teacher with immediate results when students are having difficulty and in turn provides small group instruction time. Teacher provides instructional scaffolds to build student self efficacy and proficiency.
1. Station 1: Technology (Think Through Math Program will work on specific gaps and conceptual understanding)
2. Station 2: Teacher Instruction of Math I standards (for procedural understanding and transition preparation)
3. Station 3: Activities and student collaboration (to address the Standards of Mathematical Practice, in preparation for transition)

***Stations 2 and 3 can be juxtaposed as needed