



TAMALPAIS UNION HIGH SCHOOL DISTRICT

Course of Study Integrated Math II

Overview Information

Title of Course: Integrated Math II	
Course Author(s): Julie Norwood	School-s where the course will be taught: Redwood High School
Length of Course: 1 year	Subject Area and Discipline: Mathematics. Completion of this two-year sequence fulfills the TUHSD Algebra 1-2 and Geometry requirement.
Grade Levels: 9-10	Is this course an integrated course? Yes
Is this course being submitted for possible UC honors designation? No	Are you seeking UC approval? If so, in what area (A-G)? C
Prerequisites (required or recommended): Integrated Math I	Co-requisites (required or recommended): none
Check all that apply: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> UC A-G course <input checked="" type="checkbox"/> Graduation Requirement <input type="checkbox"/> Elective <input type="checkbox"/> Honors/AP <input type="checkbox"/> ROP <input type="checkbox"/> CTE 	

Introduction to the Course

Course Overview:

Integrated Math II is the second course in the sequence, following the successful completion of Integrated Math I. This continues a student's path to traditional Algebra and Geometry. This two-year sequence will fulfill the first two years of the three years of college-preparatory mathematics required by UC/CSU. Integrated Math I and Integrated Math II will fulfill the California state graduation requirement. Upon completion, students will be prepared to take a second-year Algebra course. Geometry and Algebra topics will be intertwined and connected in a meaningful way. Algebra will be spiraled throughout both years to reinforce essential skills and provide a strong foundation for success in 2nd year Algebra. The teaching methods used and the pace of instruction

will be tailored to meet the student's needs. Foundational and pre-requisite skills will be embedded in each new concept taught. The course aims to engage students in the eight mathematical practices outlined in the common core standards throughout the learning experiences. The course will focus on building the student's capacity for persistence, patience, growth mindset, and motivation through a culturally responsive curriculum using real-world problems within each unit. The course will use collaborative learning communities to provide students the opportunity to engage in mathematical tasks that involve problem-solving, communicating their reasoning, and making connections of personally relevant social contexts of mathematics.

The Standards for Mathematical Practice - California Common Core

Mathematical Practices for all students to develop throughout this course.

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.

Technology Course Outcomes:

Calculator: Students will be able to use a calculator as needed in order to solve problems where a calculator is required. Calculator fluency will be built into units where this skill lends itself.

Technology: Students will use Delta math, Geometry software, Desmos, and/or a graphing calculator when that technology enhances learning.

Integrated Math II Unit 1: Exponents and Exponential Functions

Unit 1 summary: Students will learn the properties of exponents and learn how to write, evaluate, and solve an exponential equation. Students will be able to graph exponential equations with translations. Properties of exponents will extend to rational exponents. An emphasis will be placed on how exponential functions grow compared to linear functions. We will use real-life situations to model mathematical thinking.

Unit 1 Common Core Standards

- Linear, quadratic, and Exponential models F-LE
- The real number system N-RN

- Seeing structure in Expressions A-SSE
- Creating Equations A-CED
- Interpreting Functions F-IF

Unit 1 Outcomes: Students will be able to do the following:

Operations with exponents:

- Simplify exponential expressions using basic exponent rules
- Understand negative exponents.
- Extend the properties of exponents to rational exponents
- Use properties of rational and irrational numbers
- Rewrite expressions involving radicals and rational exponents

Exponential Equations:

- Write an equation that can be modeled by an exponential equation in the form $y=a(1 \pm r)^t$
- Find values for “y” in the above equation when given r and t.
- Solve an exponential equation in which the bases of the two equations are powers of the same number.
- Recognize situations that change at a constant rate vs situations that change by a constant percent rate.
- Graph a simple exponential equation with translations.
- Understand key features of an exponential equation
- Write equations from real-life situations given a graph, table, or points. Understand which situations grow exponentially and which situations grow linearly.

Sample assignment: Students will build tables and graph simple exponential equations focusing on the pattern of growth. Students will compare functions with bases between zero and 1 with bases bigger than one. Students will use transformations to graph and will begin to understand the idea of an asymptote.

Sample assessment: The assessment will contain many skills essential to understanding exponential functions, including graphing exponential functions, writing equations from word problems, and solving for unknown variables. Assessment will be scaffolded, containing a variety of difficulty levels, to give all students access to the assessment while still challenging students.

[Sample math 3-4 unit 1 assignment](#)

[Sample math 3-4 unit 1 assessment](#)

Integrated Math II Unit 2: Congruence

Unit 2 summary: Students will prove theorems about lines and angles including angles formed when parallel lines are cut by a transversal and vertical angles. Students will learn properties of triangles and parallelograms. Using the AA, SSS and SAS similarity theorems, they will learn to prove triangles are similar, as well as apply these principles to determine angle and side measurements. They will learn to use proportions to find the lengths of similar triangles. Students will extend their knowledge of similarity to determine if triangles are congruent by SAS, SSS, SAA. Students will understand the concept of dilation in the context of similar shapes.

Unit 2 Common Core Standards

- Congruence G-CO
- Expression Geometry Properties with Equations G-GPE

Unit 2 Outcomes:

Students will be able to do the following

Similarity

- Determine if two triangles are similar using AA, SSS and SAS similarity theorems.
- Find missing angles and side lengths of similar triangle by using proportions
- Find missing angles and side lengths of similar figures (other than triangles)
- Understand dilation of a line segment is longer or shorter in the ratio given by a scale factor and extend that understanding to two-dimensional shapes

Triangle Congruence

- Use congruence properties to prove that triangles are congruent using SAS, SAS and SAA. Students may use two - column proofs or flow charts.
- Use triangle congruence to extend into other proofs, like CPCTC or proving a triangle is isosceles

Parallel lines cut by a transversal

- Prove theorems about angles and lines including vertical angle, alternate interior angles, same side exterior, corresponding, and more

Quadrilaterals

- Students will prove theorems about parallelograms including that opposite sides are congruent, opposite angles are congruent, and that the diagonals bisect each other.
- Use coordinate geometry to prove shapes are rectangles, squares etc

This unit is very dense so here is a sample assignment and assessment on one of the standards.

Sample assignment:

Congruence: Students will explore triangle congruence by doing a hands on activity where students are given angles and segments on clear plastic. Students can make triangles out of these pieces to determine what requirements are needed for triangle congruence. For example, if two students are both given angles measuring 30 degrees, 50 degrees and 100 degrees, students will discover that they can create many different size triangles so AAA is not a congruence property. Special attention will be paid to SSA.

Sample assessment: Congruence The end of unit assessment will incorporate problems tied to the congruence standard and will integrate algebra as well. Students will need to understand if triangles are congruent, be able to write a proof (in any style) to show triangle congruency and if triangles are proven to be congruent, students will be expected to solve for missing sides and angles using algebra.

[Sample math 2 Unit 2 Assignment:](#)

[Sample math 2 Unit 2 Assessments:](#)

Integrated Math II Unit 3-Complex number system and polynomials

Unit 3 Summary: Students will spend a considerable amount of time in this unit, extending their knowledge from Integrated Math I. The focus will be on solving quadratics using a variety of different techniques and introducing students to the complex number i . Students will solve quadratics with real

and imaginary solutions and understand how the graph of a quadratic is related to solving a quadratic for zero. Students will explore polynomial expressions and equations with a focus on performing basic operations. Students will expand on many of the concepts taught in year 1 (such as literal equations, systems of equations, solving and comparing the growth patterns of linear vs quadratic vs exponential equations) Students will begin exploring the concept of an inverse function.

Unit 3 Common Core Standards

- The complex number system N-CN
- Seeing Structure in Expressions A-SSE
- Arithmetic with Polynomials and Rational Expression A-APR
- Creating Equations A-CED
- Reasoning with Equations and Inequalities A-REI
- Linear, Quadratic and Exponential Models F-LE

Unit 3 Outcomes: Students will be able to the following:

Complex number system

- Understand the meaning and purpose of the number i as well as basic properties. Students will know that $i^2 = -1$, that $a+bi$ is a complex number with “ a ” the real component and that complex numbers have commutative, associative, and distributive properties.

Quadratics and Polynomials

- Solve a quadratic by factoring, squaring both sides, and the quadratic formula. Including quadratics with imaginary solutions.
- Know the fundamental theorem of Algebra and extend that understanding to polynomials
- Rewrite quadratics in all three forms by factoring or completing the square
- Be able to add, subtract, and multiply polynomials
- Reinforce the concepts and determine the type of function (linear, quadratic, exponential) based of the growth pattern
- Continue work with literal equations adding those with quadratic terms
- Apply quadratic functions to physical problems such as projectile motion

Systems

- Expand on systems of equations taught in year 1 but including systems that include quadratics.
- Find the points of intersection with a line and a circle by understand how to rewrite the circle as two functions

Inverses

- Students will explore the relationship between a function and its inverse. This includes understanding relationships between each point, between domain and range, and symmetry.
- Students will be able to find inverses of simple functions, such as linear and power functions.

Sample assignment: Once students have had time to practice solving quadratics by factoring, quadratic formula and square rooting, an assignment will be given that requires students to determine not only the solution to a quadratic equation, but the best method to solve. Students will need to determine if a quadratic is factorable or if quadratic formula is required. Quadratics with imaginary solutions will be included and students will be asked to explain how zeros are related to x-intercepts.

Sample assessment: Before students move on to higher degree polynomials and systems, students will be assessed on quadratics. Students will be asked to solve a quadratic, using a variety of solving techniques, as well as graph a quadratic in standard, factored or vertex form. There will be several problems that will produce imaginary zeros and students will be expected to differentiate between an x-intercept and a zero.

[Sample Unit 3 Assignment](#)

[Sample Unit 3 Assessment](#)

Integrated Math II Unit 4: Triangles and Trigonometry

Unit 4 summary: Students will be introduced to types of triangles based on the relationships with sides and angles. Students will understand basic properties such that if two sides of a triangle are congruent then their sides opposite are congruent as well. Students will use trigonometry in this unit to find the area of triangles and regular polygons. Students will also explore properties of trig that extend beyond triangles into the unit circle. Special triangles will be used when appropriate to solve for missing sides and when finding the area of equilateral triangles and regular hexagons.

Unit 4 Common Core Standards

- Similarity, Right Triangle and Trigonometry G-SRT
- Congruence G-CO
- Trigonometric Functions F-TF

Unit 4 Outcomes: Students will be able to:

Trigonometry:

- Students will prove the pythagorean identity $\sin^2(x) + \cos^2(x) = 1$
- Students will understand the relationship between the sine and cosine of complementary angles.
- Students will be able to find the sine, cosine or tangent of an angle.
- Students will be able to find an angle using trig when given side lengths

Understand properties of triangles:

- Understand triangle sum
- Understand the types of triangles (Isosceles, equilateral, right etc)
- Understand the definition and properties of a median
- Understand that a line parallel to one side of a triangle divides the other two proportionally
- Students will understand and use the pythagorean theorem to find the missing side of a triangle
- Students will derive and use the trig ratios for special triangles

Right triangle trig

- Students will be able to solve for a missing side of a right triangle using trigonometry
- Students will be able to find a missing angle of a right triangle using trigonometry
- Students will use trigonometry and other skills to find the area of triangle, regular polygons and quadrilaterals.

Sample Assignment: Once students have become proficient in the finding missing sides and angles using trigonometry, students can extend this knowledge to finding areas of regular polygons. This included shapes such as the hexagon where only knowledge of special triangles is required and shapes such as the pentagon where trigonometry is required. Later this knowledge can be extended to find the surface area and volume of shapes.

Sample Assessment: An assessment for this unit will have a variety of trigonometry problems of varying difficulty level. Some questions will test the students ability to use trig to find a missing side or angle. The test will also test multi-step problems just as finding the area of a regular polygon. In addition to regular polygons, students will be assessed on their knowledge of the types of triangles and properties of triangles.

[Sample Unit 4 Assignment](#)

[Sample Unit 4 Assessment:](#)

Integrated Math II Unit 5: Circle properties

Unit 5 summary: Students will learn vocabulary such as secant, tangent and chord. They will apply relationships between angles, arcs, radii and chords to find arch length and the area of a sector. Students will understand the equation of a circle and how it is derived from the pythagorean theorem.

Unit 5 Common Core Standards

- Circles G-C
- Congruence G-C0
- Expressing Geometric Properties with Equations

Unit 5 Outcomes:

- Prove that all circles are similar.
- Find the area and circumference of a circle
- Derive the equation of the circle using the Pythagorean theorem.
- Construct the inscribed and circumscribed circles of a triangle
- Prove properties of a quadrilateral inscribed in a circle
- Construct a tangent line to a circle
- Students will understand the relationship between central and inscribed angles and their arc measures.
- Students will be able to find arc length and the area of a sector
- Students understand properties and definitions related to tangent lines, secant lines and chords

Sample Assignment: Students will use their compass, ruler, and protractor to construct circles, inscribed angles, central angles, and inscribed shapes. Students will “discover” that inscribed angles are half the measure of their arc and that central angles are equal to the measure of their arcs. By inscribing triangles, quadrilaterals, and other polygons inside the circle, students can use prior knowledge to find area and missing angles. This assignment will be a way for students to connect to circle properties which can be challenging for students to remember.

Sample Assessment: Students will be given a variety of problems in which they will be finding missing arc lengths and missing angle measures. Some problems will test one concepts (like inscribed angles) while many problems will test multiple concepts within the problem. Many concepts will be covered in this tests including tangent lines, secant lines, area of a sector.

[Sample Unit 5 Assignment](#)

[Sample Unit 5 Assessments:](#)

Integrated Math II Unit 6: Surface area and Volume

Unit 6 summary: Students will learn how to work with 3-D shapes including how to find surface area

and volume. Students will learn to draw the shapes and a focus will be placed on relating previously learned formulas and skills and applying them to cones, pyramids, prisms and spheres.

Unit 6 Common Core Standards

- Geometric measurement and Dimension G-GMD

Unit 6 Outcomes:

- Surface area and volume
- Students will use their knowledge of area to be able to find the surface area of three dimensional shapes
- Students will use trig when necessary to find the area of regular polygons that are bases of the three-dimensional shapes
- Students will understand volume and be able to find the volume of prisms with any base.
- Students will be able to find the volume of pyramids of any base
- Students will be able to find the volume of cones and spheres.
- Understand the proportional relationship between area and volume - such as if you double the height of the cone how will that affects its surface area and volume

Sample assignment: Students will draw a net to scale and then find the volume and surface area using measurements. Students in their group can make the same shape but smaller or larger. Students can then, as a group, compare how changing the size of a proportional shape affects surface area and volume.

Sample assessment: Students will be expected to find the surface area and volumes of several 3-d shapes. They will be given a cone, cylinder, prism and pyramid. At least one shape will have a base area that requires special triangles or trig. Students will also be expected to understand the relationship between the surface area and volume of proportional shapes. For example if two shapes are similar and one is twice as tall as the other, how much more volume does the taller shape have?

[Sample Unit 6 Assignments:](#)

[Sample Unit 6 Assessments:](#)

Integrated Math II Unit 7: Statistics and Probability

Unit 7 summary: Students will extend their knowledge from Math 1 to include conditional probability and 2-way frequency tables with an emphasis on using conditional probability and independence in everyday situations.

Unit 7 Common Core Standards

- Conditional Probability and the Rules of Probability S-CP
- Using probabilities to make fair decisions S-MD

Unit 7 Outcomes: Statistics and Probability

- Understand when two events are independent or dependent
- Understand the conditional probability of A given B
- Construct and interpret 2-way frequency tables
- Use permutations and combinations to compute probabilities
- Use probabilities to make fair decisions

Sample assignment: This topic is challenging for students because there are so many different ways to ask questions. A sample assignment would have lots of practice on each listed concept. Practice would include the difference in independent vs dependent events, when to use combination or permutation, conditional probability, how to use and create a 2- way frequency table and how to use probability to make a fair decision.

Sample assessment: The assessment would be similar to the assignment. Doing an assignment in pairs can help students talk through some of the challenges of this unit.

[Sample Unit 7 Assignments:](#)

[Sample Unit 7 Assessments:](#)

Board Approval Date: 5.20.25

Updated:

UC (C) Approval Date: 6.5.25