SANTA ROSA CITY SCHOOLS

# Santa Rosa City Schools Course Proposal:
# Integrated Math 1P Focus with Math 2P Foundations

**Proposal Submitted By:** Samuel Martinez and Lara Costanzo

**Needs Statement:** *Discuss how this course fits into your Site and/or the District's goals. Attach minutes of meetings where this course was approved at site or district leadership meetings.*

This course sequence serves as an option for students to meet the graduation requirement of three years of math. Ideal student candidates to be enrolled in this course are those who would benefit from learning more focused Math 1 and Math 2 standards at a deeper level, building stronger foundations for subsequent math courses.

The Integrated Math 1P Focus with Math 2P Foundations course is a two-year course that will satisfy a year of Integrated Math 1P and a year of math beyond Integrated Math 1P. This two-year course will cover all of Math 1 standards and bridge to Math 2 standards by the end of the second year. The titles for the two years will be:

Year 1: Integrated Math 1P Focus
Year 2: Integrated Math 1P+ Focus with Math 2 Foundations

Students' success in the course sequence Integrated Math 1P Focus with Math 2P Foundations allows students to continue with Math 2P and then encourages a fourth year of Math 3P, Algebra with Financial Applications, Statistics for Social Justice, or Statistical Reasoning in Sports or equivalent; increasing their mathematics facility and expanding their post-secondary pathways.

**Graduation Requirements:** *Specify which requirement is met.* ***(High School only)***

Math

**UC A-G Requirements:** *Specify which requirement is met.* ***(High School only)***

C: Math

**Explain the rationale for course addition or modification. How does this fit in with district/site goals. If this course is replacing a current course, which course is it replacing and why? Will this course require new sections? Be explicit.**

Students who take Integrated Math 1P Focus with Math 2P Foundations should have taken Math 8 or equivalent. Integrated Math 1P Focus with Math 2P Foundations can fulfill ten Math 1P credits as well as ten math credits beyond Integrated Math 1P.

The students that choose to enroll in this course would have been enrolled in Math 1P, thus resulting in no additional sections. As students progress though the pathway, some students may choose to take Math 3P

or an equivalent course during their 4th year if they intend to apply to the UC/CSU system, thus after 3 years it may result in the need for a few additional math sections distinct-wide.

This course provides rigorous, relevant, engaging, high-quality, and inclusive instruction that is responsive to the needs of individual students and that is informed by multiple measures of achievement that are economically and culturally inclusive. The mathematics pathways are well articulated from high school to and through postsecondary education and careers, that are personally and socially relevant, and that enable students to move across pathways as their interests and aspirations evolve. Individualized academic, career and other student supports that respect and promote student and family decision-making and that enable students to explore options, make strategic choices, and set and achieve informed goals.

**Learning Outcomes:** *Explain the measurable learning outcomes.*

Students will be supported through the Math 1 CA CCSS standards through a focused and engaging course plan. Students will attain proficiency with the Math 1 standards as well as an introductory level of understanding of key Math 2 standards. The Standards for Mathematical Practice (SMPs) have been very intentionally considered during the planning process and will be specifically addressed with focus during instruction in this course to promote a deep and thorough foundation for students in high school math. The course intentionally builds from a modeling approach to contextualize the learning for students which deepens their understanding and better supports and develops their mathematical thinking.

**Course Description:** *To be used in the course catalog.*

In this two-year course, students will apply the accumulation of learning from Math 7 and 8 to develop a strong understanding of Math 1 topics and preview key Math 2 concepts. Course topics include solidifying fundamental skills in Algebra and deepening understanding in Number and Functions. Mathematical modeling is stressed as a methodology for approaching the solution to problems. Students will explore operations on algebraic expressions, and apply mathematical properties to algebraic equations. This includes being able to read problems, understand the number relationships, and apply that knowledge using multiple representations to create algebraic models from given information. The course will build procedural fluency and help students develop the habits of mind that allow them to communicate with mathematical precision. This course focuses on the following critical areas: linear equations, inequalities, systems (including non-linear systems), functions (linear, exponential, quadratic), transformations, solids and dimensional relationships, statistics, and quadratics (introduction to graphing with transformations, factoring and completing the square with area models).

**Detailed Course Design:** *Course design should include the objectives, activities, assessments, and standards to be addressed in this course.*

**The two-year course will follow this sequence of learning. Details for each module follow the table below.** In addition to the modules referenced in the table, a module that is focused on Geometric Constructions has intentionally been created with flexibility. Teachers may choose to teach it as its own module at any point in the sequence, or they may decide that integrating the constructions throughout other modules fits their instruction plan and students' needs more successfully.

The first year of this course focuses on a solid foundation of Math 1 key concepts, ensuring that students gain a deep, rich, context-based understanding of the Math 1 CA CCSS standards. Year two of the course will reinforce and revisit key Math 1 concepts while building connections to foundational Math 2 topics. Comparison between Math 1 and Math 2 concepts will be explicit and emphasized.

***Content in bold is considered focal content for that semester.**

| Fall Year One | Spring Year One | Fall Year Two | Spring Year Two |
|---|---|---|---|
| *Module 0* - SEL & SMP<br>*Module A* - Sequences<br>*Module B* - Functions<br>*Module C* - Linear Fxns<br>*Module D* - Equations | *Module E* - Inequalities<br>*Module F* - Systems of Equations<br>*Module G* - Symmetry & Transformations<br>*Module H* - Connecting Algebra and Geometry | *Module I* - Modeling with Functions<br>*Module J* - Systems of Inequalities<br>*Module K* - Modeling Data<br>*Module L* - Probability | *Module M* - Congruence and Proofs<br>*Module N* - Connecting Algebra and Geometry<br>*Module O* - Geometric Figures and Proofs<br>*Module P* - Similarity |
| Arithmetic Sequences<br><br>Geometric Sequences (Intro to Exponential)<br><br>Functions & Relations (formalize<br><br>Domain/Range, function notation)<br><br>Building on prior learning<br>• Number System<br>• Ratios, Proportions, %<br>• Expressions<br>• Order of Operations<br>• Distributive Property<br>• Combine Like Terms<br>• Evaluating<br>• Absolute Value<br>• Concept of Slope<br><br>**One Variable Equations**<br>• **Solving & Writing**<br>• **Proportions**<br>• **Variables only one side**<br><br>**Linear Functions (Intro)** | Distance from Zero<br><br>Midpoint<br><br>**Solving Equations with variables on both sides (eliminate fraction/decimal method as a tool)**<br><br>Solving and Graphing 1 Variable Inequalities<br><br>**Linear Functions / Writing Equations (Point-Slope)**<br><br>**Systems Graphing Using Double T-Tables**<br><br>**Graphing 2 Variable Inequalities**<br><br>Linear System Types (one solution, infinite, null set/parallel, perpendicular)<br><br>Transformations Rigid Geometry<br><br>Distance Formula & Pythagorean Theorem (square roots practice) | Exponential Functions (w/ Transformations)<br><br>Graphing Absolute Value Functions<br><br>1 Variable Stats<br><br>2 Variable Stats (2 way tables, lines of fit, scatter plots)<br><br>Probability (independent, conditional, 2 way frequency table)<br><br>Solving Systems of inequalities<br><br>**Solving (linear) Systems with Substitution & Elimination** | **Graphing Quadratics**<br><br>Evaluating with Exponents<br><br>2 Variable Stats (residuals choosing a model)<br><br>Polynomial Operations<br><br>**Factoring and completing the square with Area Model (a = 1)**<br><br>**Transformations of Quadratics (just a and k)**<br><br>Non-linear systems through graphing with technology (Linear, Quad, Abs Val, Inequalities)<br><br>Area and Volume<br><br>Relationships between 2D and 3D<br><br>**Transformations and Similarity (dilations and scale factors, scaffold ratios and proportions)**<br><br>Congruence and parallel |

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|---|---|---|---|
| • **Graphing Slope-Intercept**<br>• **Writing Slope-Intercept** | | | lines Geometry |

**Detailed Content Summary and Primary Text Alignment**

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**Module 0: Mathematical Practices & SEL**

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Overview:
In the first two-weeks of school, these lessons are designed to get to know your students and their in-coming skill level. The tasks build foundational skills needed to develop math content and establish classroom norms that facilitate learning in a way that encourages students to build confidence. With language-rich interactive tasks, students will further develop skills that enable them to participate in mathematical conversations with a positive attitude and growth mindset.

Essential Standards:
This unit focuses on building skills within the Standards for Mathematical Practice of the CA CCSS Math Standards, rather than the Content Standards.

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.

Essential Question:

- In what ways can mathematics be modeled: graphically, numerically, verbally, and algebraically?
- What kind of structured reading and writing activities will foster student language development leading from authentic language towards academic language?
- When attending to precision, which experiences will encourage students' attention to detail?
- How can open-ended (low floor-high ceiling) tasks inspire students to persevere?

Objectives:

- Students will be comfortable sharing ideas without an emphasis on correctness.
- Students model risk-taking behavior by engaging in exploration through productive struggle.
- Students are establishing class norms that further their authentic academic language development.
- Students advance with growth mindset thinking while engaged in collaborative tasks.

Link to Module Plan:
Unit Zero- Math 1 with Math 2 Extension

Module 0 Assignment(s):

1. Welcome! Getting To Know Your Numbers
2. Next three terms / Dot Card / Number Talks
3. Four 4s
4. Paper Folding / Origami
5. Would You Rather Math
6. Dan Meyer: 3-Act Lesson
7. YouCubed Inspirational Math Task
8. Mapshell.com Performance Task

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**Constructions Module** (*Flexible sequencing for this Module)*

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Overview:
This module includes instruction on all of the essential constructions for Math 1 (as well as some of the constructions required for Math 2). The module will approach constructions from a conceptual perspective, focusing on the connections between the constructions and key Geometric ideas, and how the constructions support that Geometric understanding as well as their application in real world contexts. Students may use a variety of methods to perform constructions including compasses, patty paper, and technology resources.

Essential Standards:
G.CO.12
G.CO.13

Essential Question:

- How do constructions help define geometric vocabulary, theorems, and postulates?

Objectives:

- Students will comfortably follow the steps of constructions.
- Students will be able to explain the important characteristics of the constructions and how they help define a geometric idea.
- Students will understand the use of geometric constructions in real-world contexts.

Key Resources:
Open Up Math 1 Unit 7

Link to Module Plan:
Constructions Unit - Math 1 with Math 2 Extension

Constructions Module Assignment(s):

*Open Up Unit 7 Lesson 6*:
In this lesson students justify why various compass and straightedge constructions work. They may draw upon the geometric ideas of this unit and the previous unit to do so. They might support their arguments with such things as: (1) the definitions and properties of the rigid transformations; (2) identifying corresponding parts of congruent triangles, after first justifying

why the triangles are congruent; and (3) using previously justified observations about sides, angles, and diagonals of special types of quadrilaterals.

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**Module A: Sequences**

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Overview:
This unit has two intertwined learning cycles that begin by alternating from arithmetic sequences to geometric sequences, so that students can compare and contrast features represented in both types of sequences with tables, graphs, story contexts, diagrams, and equations. Each concept or skill is developed first with an arithmetic sequence, followed by a geometric sequence. Once the concept or skill is solidified for both an arithmetic and geometric sequence, it is practiced in a lesson that combines the two types of sequences so that students also develop flexibility in their use of representations, judgment, and strategic thinking.

Essential Standards:
A-REI.3
A-SSE.1
N-Q.2
F-BF.1
F-BF.2
F-IF.1
F-IF.2
F-IF.3
F-LE.1
F-LE.2

Essential Question(s):

- What conclusions can be drawn about a sequence, given just a few pieces of information?

Objectives:

- Identify and describe the type of sequence given any representation.
- Find efficient strategies for representing sequences with tables, graphs, and equations, both explicit and recursive and use it to solve problems.

Key Resources:
Open Up Math 1 Unit 1

Link to Module A Plan:
Unit A- Math 1 with Math 2 Extension

Module A Example Assignment(s) May Include:

*Developing concept task:*
Haruko's Hexagons https://mathmedic.com/course/Algebra-1/unit/1/day/3

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**Module B: Intro to Function Families**

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Overview:
In this unit, students broaden their understanding of arithmetic and geometric sequences from the first unit to include linear and exponential functions with a continuous domain. Students continue building fluency in writing explicit function rules for linear and exponential functions. At the same time, students analyze the context to determine if the relationship being described is continuous or discrete. Therefore, these lessons naturally evoke discussions about the domain of a function and how it affects the graph and other representations of the function. In grade 8, students learned about corresponding input and output pairs which prepared them to extend their understanding to the domain in this unit.

Essential Standards:
A-CED.2
A-REI.3
A-SSE.1
N-Q.2
F-BF.1
F-BF.2
F-IF.1
F-IF.2
F-IF.3
F-LE.1
F-LE.2

Essential Question(s):
- How can functions represent situations across mathematical content in areas beyond Algebra?
- How can we use labs and interactive activities to generate models for linear and exponential growth?
- Of what significance are quantities to a given situation and what role do they play in modeling functions?

Objectives:
- Define appropriate quantities for the purpose of descriptive modeling;
- Choose and interpret the scale and the origin in graphs and data displays to connect the domain and range to the context;
- Understand the concept of a function and use function notation;
- Interpret functions that arise in applications in terms of a context;
- Interpret expressions for functions in terms of the situation they model.

Key Resources:
Math Medic Algebra 1 Unit 5
Lessons 5.1-5.4
Open Up Math 1 Unit 2
Lesson 3
Open Up Math 1 Unit 3
Lessons 2-3
Big Ideas Chapter 3
Lessons 3.1-3.3
Supplement with extra lessons on interpreting linear & exponential
**MOWWM Health Unit Topic 1**

Link to Module B Plan:
Unit B- Math 1 with Math 2 Extension

Module B Example Assignment(s) May Include:

*Developing concept task:*
Describing Dots https://mathmedic.com/course/Algebra-1/unit/5/day/7

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**Module C: Linear Functions**

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Overview:
In this unit, students connect their learning of recognizing linear patterns from arithmetic sequences and writing linear functions explicitly to graphing linear functions of the form $y = mx + b$ (slope-intercept form). Students will graph linear functions using slope-intercept form through their understanding of intercepts and rates of change to represent two quantities. Students will interchangeably use a graph of a linear function to write an equation in the slope-intercept form by identifying its slope and y-intercept. This unit will connect to real world context by modeling linear functions that represent the relationship between two quantities, and interpreting the structure of a slope-intercept equation in terms of a context.

Essential Standards:
A-CED.2 (graphing)
F-LE.2 (constructing)
F-LE.5 (interpreting and modeling)
F.IF.9 (multiple representations)

Essential Question:
- How do graphs, tables, and equations work together to describe linear functions?
- What can a graphs' intercepts and rate of change tell us about the quantities involved in a given situation?

Objectives:
- Understand that linear functions grow by equal differences over equal intervals.
- Use graphs, tables, story context, and equations interchangeably to represent a linear function.
- Model a real world context using a linear function.

Key Resources:
Open Up Unit 2
CPM Integrated 1, Chapter 2
Big Ideas Math 1, Chapter 3
Big Ideas Math 1, Chapter 4
Math Medic

Link to Module C Plan:
Unit C- Math 1 with Math 2 Extension

Module C Example Assignment(s) May Include:
How Much Snow is on the Ground? (Math Medic) https://mathmedic.com/course/Algebra-1/unit/2/day/7

**Module D: Equations**

Overview:
In this unit, students expand their understanding of solving equations. In grades 7 and 8 students learned to solve simple one- and two-step equations. They also practiced writing one- and two-step equations based on word problems. Students learn to justify each step of solving an equation based on the structure of the equation instead of a context. Students expand their skills to include solving equations with coefficients represented by letters which further solidifies and deepens their fluency.

Essential Standards:
A-CED.1
A-CED.4
A-REI.1
A-REI.3

Essential Question(s):
- How do I write mathematical sentences in context of a problem I am trying to solve?
- How do I plan and justify a solution process to equations?

Objectives:
- Interpret the structure of a multi-step linear equation to plan and justify a solution process by identifying the order in which a sequence of operations needs to be un-done using inverse operations.
- Justify the steps in solving or rearranging equations using the properties of operations and the properties of equality.

Key Resources:
Open Up Math 1 Unit 4

Link to Module D Plan:
Unit D- Math 1 with Math 2 Extension

Module D Example Assignment(s) May Include:

*Developing concept task:*
Maintaining Balance https://mathmedic.com/course/Algebra-1/unit/3/day/2

**Module E: Solving Inequalities**

Overview:
In this unit, students develop further understanding of the idea of comparing quantities and expressing relationships between them using symbols such as < (less than), > (greater than), ≤ (less than or equal to), and ≥ (greater than or equal to). Students extend their understanding of solving inequalities. Students have previously written and solved simple inequalities in grade 7. In this unit, students develop understanding of why the inequality sign is reversed when they multiply or divide the inequality by a negative number, along

with justifying other properties of inequality.

Essential Standards:
A-REI.1
A-REI.3
A-CED.1

Essential Question:
- What are the properties of inequalities? Are they different from the properties of equations?
- How can inequalities be used to find solutions to real problem situations?

Objectives:
- Use single-variable inequalities to model situations.
- Use properties of inequalities to solve single variable inequalities, including compound inequalities.
- Refine conceptual understanding of inequalities.
- Compare solving equations to solving inequalities.

Key Resources:
Open UP HS Math 1 Unit 4

Link to Module E Plan:
Unit E- Math 1 with Math 2 Extension

Module E Example Assignment(s) May Include:

*Developing concept task:*
Don't Eat the Oreos! https://mathmedic.com/course/Algebra-1/unit/3/day/10

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**Module F: Systems of Equations**

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Overview:
This module is designed to solidify graphical, numerical, and algebraic strategies for solving a system of two linear equations first introduced in 8th grade. Students will use the solution to the system to make decisions relative to a context. While the point of intersection on a graph represents the solution to the system, it can be difficult to identify the exact coordinates of this point of intersection. This unit will end with a new method for solving systems of equations by elimination.

Essential Standards:
A.CED.2
A.CED.3
A.CED.4
A.REI.5
A.REI.6

Essential Question(s):
- How can I use systems of equations to make decisions relative to the context of a question?

- How do I efficiently and accurately find the solution to a system of equations?

Objectives:

- Solve systems of linear equations using tables, graphs, substitution, and elimination and make connections between each strategy.
- Interpret solutions to a system of equations within a context.
- Write a system of linear equations.

Key Resources:
Open Up HS Math 1 Unit 5

Link to Module F Plan:
Unit F- Math 1 with Math 2 Extension

Module E Example Assignment(s) May Include:

*Developing concept task:*
How much should a company charge? https://mathmedic.com/course/Algebra-1/unit/4/day/2

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**Module G: Transformations and Symmetry**

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Overview:
In this unit, students deepen their understanding of rigid-motion transformations by not only performing them, but analyzing their characteristics and writing formal definitions to describe the transformations precisely. Students focus on using rotational symmetries and lines of symmetry to make conjectures about properties of quadrilaterals and regular polygons.

Essential Standards:
G-CO.1
G-CO.2
G-CO.3
G-CO.4
G-CO.5
G-CO.6

Essential Question(s):

- How can I use a sequence of rigid transformations to show that two figures are the same?
- Which shapes are symmetrical when rotated or reflected?

Objectives:

- Explore and describe key features of the rigid transformations: translations, rotations, and reflections.
- Examine slope criteria for determining if two lines in a coordinate plane are parallel or perpendicular.
- Formalize the definitions of translations, rotations, and reflections.
- Develop an understanding of rotational symmetry and lines of symmetry based on rigid transformations.

Key Resources:
Open Up Math 1 Unit 6
Math Medic Geometry Unit 3
Big Ideas

Link to Module G Plan:
Unit G- Math 1 with Math 2 Extension

Module G Example Assignment(s) May Include:

*Developing concept task:*
Lost in Translation https://mathmedic.com/course/Geometry/unit/3/day/2

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**Module H: Connecting Algebra and Geometry**

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Overview:
In this unit, students use the coordinate plane as a tool to deepen understanding and consider how geometry works in terms of equations and coordinates. They use the distance formula and Pythagorean Theorem to compute perimeters of polygons and areas of triangles and rectangles. They use slope criteria of parallel and perpendicular lines, and practice using these ideas to solve problems with linear equations.

Essential Standards:
G-GPE.5
G-GPE.6
G-GPE.7

Essential Question(s):
- How do I use algebraic formulas to find information about geometric figures?
- How do I decide what strategy will work best in a given problem situation?
- How do geometric models describe spatial relationships?
- How can we use mathematical models to describe physical relationships?

Objectives:
- Develop a process for finding the distance between two points in the coordinate plane, based on the Pythagorean Theorem.
- Compute perimeters of polygons
- Compute areas of triangles and rectangles
- Use the slope criteria for parallel and perpendicular lines to solve geometric problems algebraically
- Use the midpoint formula to find a point that is equidistant from two given points

Key Resources:
Open Up Math 1 Unit 8

Link to Module H Plan:
Unit H- Math 1 with Math 2 Extension

Module G Example Assignment(s) May Include:

*Developing concept task:*
Wild Wonders Amusement Park https://mathmedic.com/course/Geometry/unit/2/day/2

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**Module I: Modeling with Linear, Exponential, and Absolute Value Functions**

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Overview:
Students develop a connection between rational exponents and radicals. These lessons extend where students discovered how to find the missing terms of a geometric sequence. In this unit, instead of calculating the constant ratio between consecutive terms, students consider what occurs between two consecutive terms. If the domain of the sequence is continuous, it would make sense to calculate the value of the function halfway between two consecutive terms or a third of the way, etc. Students use their understanding of rational exponents and roots to find equivalent forms of algebraic expressions.
The final three lessons are focused on calling out characteristics of linear and exponential functions and their equations that students might have noticed, but not solidified, during their previous work. For instance, students will focus on how to write equivalent equations for both linear and exponential relationships, and compare the growth rates of linear and exponential relationships. Students will be introduced to the point-slope form of the equation of a line and compare the use of different forms of linear equations for different purposes.
In this unit, students extend their understanding of functions to include absolute value functions. They define absolute value functions, and learn how to write equations and create graphs for these functions. Students see transformations in much the same way that vertex form shows the transformations of $f(x) = x^2$. This connection is extended as students learn to apply transformations to $f(x) = |x|$ and then again to $f(x) = x^2$ in subsequent units.

Essential Standards:
A-REI.1
N-RN.1
N-RN.2
F-IF.2
F-IF.5
F-IF.6
F-IF.7
F-IF.7.a
F-IF.7.e
F-IF.8.b
F-IF.9
A-SSE.1
A-SSE.1.a
A-SSE.2
A-SSE.3.c
A-REI.10
F-BF.2,
F-LE.2
F-LE.3

F-LE.5
A-CED.2

Essential Question:

- How do I choose which type of function and which form is most appropriate for a situation?
- How can we think of absolute value as a function?

Objectives:

- Explore the meaning of a fraction as an exponent.
- Extend the properties of exponents to algebraic work with rational exponents.
- Use properties of rational exponents to represent radical expressions with exponents and to explain the rules for changing the form of radical expressions.
- Model both linear and exponential functions with tables, graphs and equations.
- Make modeling decisions about whether a discrete or continuous model is more appropriate.
- Build fluency in writing linear and exponential equations using different forms.
- Identify information given in a linear or exponential equation and use the information to graph a function.
- Model a context with an absolute value function.
- Analyze the features of $f(x) = |x|$ and explain features such as domain, range, minimum, and continuity.

Key Resources:
Open Up HS Math 1 Unit 2
Open Up HS Math 2 Unit 4

Link to Module I Plan:
Unit I- Math 1 with Math 2 Extension

Module I Example Assignment(s) May Include:

*Developing concept task:*
How Many Gumballs are in the Jar? https://mathmedic.com/course/Algebra-1/unit/6/day/3

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**Module J: Solving Systems of Inequalities**

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Overview:
Over the last two years, students wrote equations for linear relationships from various representations. Students also solved systems of equations by graphing and inspection in their previous coursework. Students' prior experience focused on understanding that the solution to a system of equations is a coordinate point which satisfies both equations simultaneously.

Building on students' prior experiences, this unit begins by introducing students to the idea of constraints and systems of inequalities through a real-world context. Students work within the context of starting a small business. The business context of pet sitting underlies much of the work of the unit. Students refine their strategies for finding the most profitable business outcomes while they build understanding with respect to constraints and systems of equations and inequalities. The first lesson of the unit reviews much of the work students did in grade 8. Then, in the first full learning cycle students focus on writing and solving individual

inequalities in two variables by graphing them as a shaded half plane on a coordinate grid. Students are then introduced to graphing a system of inequalities on the same coordinate plane to show the solution set. In the final learning cycle, students transition from solving systems of inequalities to systems of equations. They extend their strategies for solving linear systems to include elimination.

Essential Standards:
A-CED.2
A-CED.3
N-Q.1
N-Q.2
F-LE.1
F-LE.5
A-SSE.1
A-REI.10
A-REI.12

Essential Question:

- How do I represent the solutions that satisfy all of the constraints being placed on a context?
- How do I represent the complete solution set?

Objectives:

- Interpret and represent linear constraints in various ways using a diagram, a table, a graph, an equation, or an inequality.
- Interpret and graph the solution set for linear inequalities in two variables by determining the boundary line and shading the appropriate half plane that represents the solution.
- Determine restrictions on the solution set of a linear inequality that represents a constraint in a real-world context: discrete points vs. continuous region; first quadrant only, etc.
- Represent constraints symbolically and graphically.
- Solve systems of linear inequalities by finding the overlapping region or intersection of all of the half planes represented by the linear inequalities in the system.
- Determine if the points on the boundary lines of a half plane should be included in the solution set of a linear inequality.

Key Resources:
Open Up HS Math 1 Unit 5

Link to Module J Plan:
Unit J- Math 1 with Math 2 Extension

Module J Example Assignment(s) May Include:

*Developing concept task:*
Planning a Community Garden https://mathmedic.com/course/Algebra-1/unit/4/day/10

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**Module K: Modeling Data**

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Overview:

In this unit, students will focus on data analysis and modeling, enabling them to critically evaluate information, make informed decisions, and communicate findings effectively. Students represent and analyze bivariate numerical data using scatterplots and refine their work with "best fit" lines and calculate the equation for the line of regression. Students will also interpret bivariate categorical data in two-way frequency tables by writing and making arguments about the data, building on the work students did in grade 8 when they learned to make two-way frequency tables. In addition, students analyze univariate numerical data and categorical data by making histograms, box plots, and dot plots and comparing the shape, center, and spread of multiple data sets.

Essential Standards:
S-ID.1
S-ID.2
S-ID.3
S-ID.5
S-ID.6

Essential Question(s):

- How can I analyze and model data to critically evaluate information, make informed decisions, and communicate findings effectively?

Objectives:

- Analyze data represented in different ways.
- Understand that bivariate data is used to find relationships between variables.
- Fit a linear function to data both informally and by using technology.
- Represent data with box plots, dot plots, and histograms.
- Compare data sets represented as box plots, dot plots, and histograms using measures of center and spread and describing shape.
- Make and interpret two-way frequency tables to summarize categorical data.

Key Resources:
Open Up HS Math 1 Unit 9

Link to Module K Plan:
Unit K- Math 1 with Math 2 Extension

Module K Example Assignment(s) May Include:

*Developing concept task:*
How Much Candy Can You Grab? https://mathmedic.com/course/Geometry/unit/10/day/6

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**Module L: Probability**

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Overview:
In this unit, students expand their understanding of probabilities as they focus on conditional probabilities and determining whether events are independent. They practice reading and analyzing tree diagrams,

two-way tables, and Venn diagrams, and calculate the probabilities from the data represented there. They recognize and explain the concepts of conditional probability and independence of events in everyday language and everyday situations.

This unit is made up of a single learning cycle. In the first lesson, students are introduced to conditional probability using a tree diagram. This leads to finding conditional and compound probabilities for data represented with Venn diagrams and two-way tables. As students work with the data, they develop a formal definition of conditional probability and the Addition Rule for probability. Students build on their work with conditional probability to understand the definition of independence and to determine if events are independent.

Essential Standards:
S-CP.1
S-CP.2
S-CP.3
S-CP.4
S-CP.5
S-CP.6
S-CP.7

Essential Question:

- How do I describe probabilities where one event seems related to another?

Objectives:

- Understand the Addition Rule for probability.
- Understand the definition of conditional probability and use conditional probability to draw conclusions.
- Determine if two events are independent and find the probabilities of independent events.
- Use data representations such as two-way tables, Venn diagrams, and tree diagrams flexibly to find probabilities of interest.

Key Resources:
Open Up HS Math 2 Unit 10

Link to Module L Plan:
Unit L- Math 1 with Math 2 Extension

Module L Example Assignment(s) May Include:

*Launch task:*

*Developing concept task:*
Odds or Evens, Who Will Win? https://mathmedic.com/course/Geometry/unit/10/day/11

**Module M: Congruence and Proofs**

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Overview:
This module builds a foundation for proof, that will inform much of the work of this and subsequent geometry units in Math II. Focused on congruence, students are reminded of the definition of congruence and work to find a logically efficient sequence of transformations that would carry one congruent figure onto the other. The work with proofs and congruence is used throughout the remainder of the learning cycle to prove triangle congruence criteria and explore and justify congruence angle relationships.

Essential Standards:
G-CO.5
G-CO.6
G-CO.7
G-CO.8

Essential Question:

- How do a sequence of transformations show that two figures are congruent to each other?

Objectives:

- Develop a sequence of rigid transformations that can be used consistently to show two images are congruent: translate, rotate, and reflect.
- Justify triangle congruence criteria using rigid transformations—ASA, SAS, and SSS—when not all corresponding sides and angles are marked congruent.
- Write and justify congruency statements for pairs of congruent triangles.
- Examine how triangle congruence criteria can be used to justify other properties of geometric figures, such as finding additional congruent parts.

Key Resources:
Open Up HS Math 1 Unit 7

Link to Module M Plan:
Unit M- Math 1 with Math 2 Extension

Module M Example Assignment(s) May Include:

*Developing concept task:*
Congruent or Not? https://mathmedic.com/course/Geometry/unit/3/day/8

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**Module N: Connecting Algebra and Geometry**

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Overview:
Students revisit key geometric concepts and theorems in the coordinate plane that were introduced in Module G last year. This year, emphasis is placed on students working to derive the distance formula using the Pythagorean theorem, develop proofs for the slope criteria of parallel and perpendicular lines, and practice using these ideas to classify quadrilateral types through the style of geometric proof. This unit will

also use Algebraic proof to better prepare students for the variety of styles of proof that they will encounter in Math 2.

Essential Standards:
G-GPE.4
G.GPE.5
G.GPE.6
G-GPE.7
G-CO.3
G-CO.4
G-CO.6
G-CO.9
G-CO.11

Essential Question:

- How do I prove statements (Geometric or Algebraic) using the Algebra or Geometry knowledge I have gained?

Objectives:

- Prove the slopes of perpendicular lines are negative reciprocals using transformations.
- Prove that parallel lines have the same slope using transformations.
- Use coordinates to prove that quadrilaterals are parallelograms, rectangles, rhombi, or squares with the distance, slope, and midpoint formulas.

Key Resources:
Open Up HS Math 1 Unit 8
Open Up HS Math 1 Unit 6

Link to Module N Plan:
Unit N- Math 1 with Math 2 Extension

Module N Example Assignment(s) May Include:

*Developing concept task:*
What am I? https://mathmedic.com/course/Geometry/unit/5/day/4

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**Module O: Geometric Figures and Proofs**

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Overview:
The work in this unit builds on students' understanding of transformations, symmetry, construction, and triangle congruence criteria from Math I. In Math I, students explored the symmetry and unique properties of quadrilaterals. They used construction to deepen their understanding of quadrilaterals, triangles, and angles. Students used transformations to prove congruence of two-dimensional figures, and to establish ASA, SAS, and SSS as criteria for triangle congruence.

In this unit, students will establish parallelism postulates for transformations and use their understanding of

quadrilaterals and triangles, as well as transformations and congruence criteria, to prove theorems about lines and angles. Throughout this work, the underlying purpose is to *begin to* develop students' ability to create formal proofs. Students will generate conjectures and learn how to use definitions, properties, and given information to organize arguments into logical proofs. Creating and organizing proofs not only deepens understanding of geometric figures, properties, and theorems, but it prepares students to create logical arguments in a variety of settings. Logical reasoning and sense making is essential for career and college readiness, as well as for upper level math courses.

This unit is made up of two intertwined learning cycles. The unit begins with lessons focused on developing an understanding of the nature of proof and establishing statements about parallelism under each type of rigid-transformation. Translating proof-ideas into written proofs is solidified and practiced first with theorems about lines and angles, and then properties of parallelograms. The final Practice Understanding lesson practices all of the proof techniques from the unit and applies them to proving theorems about centers of a triangle.

Essential Standards:
G-CO.1
G-CO.6
G-CO.9
G-CO.10
G-CO.11
G-CO.12

Essential Question:

- How do I know something is true? Are there different ways that I know or accept things to be true?

Objectives:

- Examine ways of knowing that the sum of the angles in a triangle is $180°$.
- Record, revise, and refine narrative proofs based on reasoning with a diagram.
- Examine additional strategies for organizing and sequencing statements in a proof, including the use of a two-column format for recording proofs.
- Examine flow diagrams as a tool for seeing structure in geometric figures and supporting the selection, organization and logical sequencing of statements in a proof.
- Build a system of geometry based on definitions, postulates, and theorems, including properties of transformations.
- Generate conjectures about vertical angles, exterior angles of triangles, and relationships between angles formed by parallel lines cut by a transversal by reasoning with a diagram.
- Practice translating proof-ideas into written formats.
- Prove statements about the properties of parallelograms using theorems about angles formed by parallel lines cut by a transversal.

Key Resources:
Open Up HS Math 2 Unit 5

Link to Module O Plan:
Unit O- Math 1 with Math 2 Extension

Module O Example Assignment(s) May Include:

*Developing concept task:*
How do we prove it? https://mathmedic.com/course/Geometry/unit/4/day/3

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**Module P: Similarity**

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Overview:
Students learned about the similarity of two-dimensional figures in grade 8. They studied dilations on a plane, and described them in terms of coordinates. They developed a definition of similarity: two figures are similar if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. Students also learned about and practiced using the Pythagorean theorem in grade 8.

In this unit, students will use dilation to better understand proportionality and similarity. They develop, prove, and use important theorems such as a line parallel to one side of a triangle divides the other two proportionally. They establish Similarity Theorems, such as AA Similarity for triangles. The theorems developed from exploring similarity and proportionality are used throughout geometry, including upper level math courses.
This unit focuses on understanding the essential features of dilation. Dilation is then used to develop understanding about proportionality relationships and theorems for similarity in triangles. Students practice using the similarity relationships and theorems they have developed to find missing angles and lengths in a complex diagram. Students also use similarity to prove the Pythagorean theorem.

Essential Standards:
G-SRT.1
G-CO.10
G-SRT.2
G-SRT.3
G-SRT.4
G-SRT.5

Essential Question:
- How do I use a dilation to enlarge or shrink a figure?
- How do I know if two geometric figures are similar?

Objectives:
- Identify the essential features of a dilation transformation by observing that all pairs of corresponding pre-image / image points lie along lines that pass through the center of dilation, and that the scale factor determines how much farther away an image point is from the center of dilation than its corresponding pre-image point.
- Enlarge or shrink figures by dilation using a given scale factor, and show that such figures are similar by examining the proportionality of the sides.
- Create similar figures by dilation given the scale factor.
- Prove a theorem about the midlines of a triangle using dilations.
- Examine the connections between the definition of similarity in terms of similarity transformations with a definition of similar polygons as polygons whose corresponding angles are congruent and corresponding sides are proportional.

- Determine conditions under which triangles are similar, including AA, SAS, and SSS triangle similarity, and prove these observations as theorems.
- Prove that a line drawn parallel to one side of a triangle that intersects the other two sides divides the other two sides proportionally.
- Look for geometric structures in diagrams that support computational work, such as parallel and perpendicular lines, right triangles, similar or congruent triangles, exterior angles of triangles, and vertical angles.
- Practice using geometric reasoning in computational work.
- Prove the Pythagorean theorem algebraically.

Key Resources:
Open Up HS Math 2 Unit 6

Link to Module P Plan:
Unit P- Math 1 with Math 2 Extension

Module P Example Assignment(s) May Include:

*Developing concept task:*
Supersize Me https://mathmedic.com/course/Geometry/unit/6/day/2

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**Budget:** *Budget figures must be included even if they are an estimate.*

| Projected Costs | Start-up | Ongoing |
|---|---|---|
| **Personnel (Not to include classroom instructor unless a new section is needed)** | | |
| **Instructional Material Supplies per student (textbooks, software, etc.)** | $110 | |
| **Services (training, equipment maintenance, contracts, etc.)** | | |
| **Capital Outlay (remodeling, technology, etc.)** | | |
| **Total Projected Costs** | $11,000 | |

**Instructional Materials:** *Must include estimates for new materials even if none have been selected. Place in the chart above.*

| Type | Publisher | Title | ISBN | Author | Copyright | # Have/Need |
|---|---|---|---|---|---|---|
| Open Source Curriculum/Text | Open Up Resources | Math 1 | | Hendrickson et al. | 2021 | N/A |

**District Department Chair Review and Approvals:**

| Department Chair Signatures | Site | Approved / Not Approved |
|---|---|---|
| | MCHS | Approve |
| | PHS | Approve |
| | SRHS | Approve |
| | RHS | Approve |
| | FRHS | Approve |
| Petrina Huffman | MHS | APPROVE |

| | | | | | | |
|---|---|---|---|---|---|---|
| Open Source Curriculum/Text | Open Up Resources | Math 2 | | Hendrickson et al. | 2021 | N/A |
| Open Source Curriculum | Math Medic | Algebra 1 | | Gallas et al. | 2024 | N/A |
| Open Source Curriculum | Math Medic | Geometry | | Gallas et al. | 2024 | N/A |
| Open Source Curriculum | Math Medic | Algebra 2 | | Hendrickson et al. | 2024 | N/A |
| Textbook/Curriculum | Big Ideas | Math 1 | 978-1-68033-112-7 | Larson et al. | 2016 | 850/100 |

**Funding Source(s) for Costs and Instructional Materials:**

| | |
|---|---|
| **Grants (indicate specific grant and grant timeline)** | |
| **Categorical Funds (include related programs)** | Lottery Funds |
| **Career Technical Education (must be for an approved CTE course)** | |
| **Department Funds** | |
| **Other (be specific)** | |

**Appendix of Additional Documents:**

| **** Required additional documents include meeting minutes where the course was discussed and approved*** |
|---|
| 2023-24 Math Department Chair Meeting Minutes 3-6-24.pdf<br>2023-24 Math Department Chair Meetings 11-14-23.pdf |

**District Principal Review and Approvals:**

| Principal's Signatures | Site | Approved / Not Approved |
|---|---|---|
| Monique Luke | MCHS | Approved |
| | JRHS | Approved |
| | RHS | Approved |
| | EAHS | Approved |
| | PHS | Approved |
| | MHS | APPROVED |