Math 3

Course outline

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| **Unit 1: Functions and Their Inverses**  Estimated Days: 10 |
| This first unit builds upon students’ previous work with modeling functions in Math 1 and Math 2. This unit helps students transition from modeling in the real world to more abstract mathematical concepts like polynomial and rational functions. It develops the notion of the inverse function of quadratic, exponential, and linear functions and introduces piecewise-defined and absolute value functions through multiple representations, i.e. graphing, equations, tables, verbal descriptions, etc. Since students in Math 1 and Math 2 have already worked with linear, quadratic, and exponential functions, this allows teachers a chance to begin with content that is familiar to students. It also assists teachers in identifying misconceptions, obstacles, and gaps in prior learning. |

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| **Unit 2: Exponential and Logarithmic Functions**  Estimated Days: 9 |
| Following the functions unit, this unit continues to build upon familiarity with exponents and exponential functions and introduces logarithmic functions. Additionally, solving exponential and logarithmic equations involves using algebraic operations students have practiced in Math 1 and Math 2, thus this unit seeks to build continued opportunities for students to be successful at the beginning of Math 3. Furthermore, flexibility with exponential and logarithmic models is essential for competence in Precalculus and Calculus; therefore, teachers should stress a modeling approach to this unit. |

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| **Unit 3: Polynomial Functions**  Estimated Days: 9 |
| **Rationale**: Students will begin by continuing their modeling work (connected to the first unit), with expressions or functions that represent familiar topics such as perimeter and area, and volume. Students have worked with quadratics in Math 1 and 2, so the model they create for area will be familiar to them. The modeling of volume would introduce a cubic polynomial and present the opportunity to begin exploring polynomials of higher degree more in depth. The placement of the this unit before Modeling with Geometry is strongly suggested. |

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| **Unit 4: Modeling with Geometry**  Estimated Days: 7 |
| **Rationale**: This unit transitions from polynomial work to geometric concepts that require the use of algebra. It is intentionally placed after the polynomials unit because the polynomials unit is suggested to begin with geometric modeling that results in a polynomial. Teaching this unit right after the conclusion of polynomials, allows you to circle back to the geometric modeling concept and study it to its full depth. The placement of this unit also gives students a break from the *heavy* algebra work of polynomials prior to beginning rational functions. |

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| **Unit 5: Rational Functions**  Estimated Days: 10 Semester or 20 Year Long |
| **Rationale**: This unit is intended to develop students’ understanding of rational functions. It is suggested to be taught in close proximity to the polynomials unit because of the connection of rational expressions to the division of polynomials. This unit should begin with reviewing both simplification of fractions and all arithmetic operations to help students understand the similarities and differences between rational numbers and expressions. |

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| **Unit 6: Reasoning with Geometry**  Estimated Days: 15 Semester or 30 Year Long |
| **Rationale**: This unit transitions into geometric concepts with an emphasis on reasoning, justification, and formalizing proof. Students will extend upon their work with proof in Math 2 (NC.M2.G.CO.9 and NC.M2.G.CO.10) focusing on both paragraph and flow proofs. Students are familiar with the properties of parallelograms from middle school and have categorized parallelograms and informally verified parallelogram properties through coordinate geometry in Math 1. Students will prove more theorems about triangles including the centers of triangles. This concept can be used as a transition into reasoning with circles. The Reasoning with Geometry Unit purposefully concludes with circles. In students’ work with circles, they will develop their understanding of radian measure through proportions in circles. This sets up a connection of circular motion to trigonometric functions in the next unit. |

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| **Unit 7: Trigonometric Functions**  Estimated Days: 10 |
| This unit should immediately follow the Reasoning with Geometry unit. Students’ understanding of radians and the idea of circular motion are connections that can help students better understand trigonometric functions. |

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| **Unit 8: Statistics**  Estimated Days: 5 |
| This unit, Statistics, is more flexible in the pacing, than the other suggested units. Statistics can be taught as a stand-alone unit, since there is less integration and connection between standards. However, it is suggested that you do not break up the coherency of units that have intentionally been suggested to be taught in a certain order. (i.e - do not teach this unit between Reasoning with Geometry and Trigonometric Functions) |