

Foundations of Advanced Math Scope and Sequence Timeline

Unit R (Review Material)

- Equations and Inequalities in One Variable
 - Solving - all types
 - Using equations and inequalities to solve word problems
 - Solving Absolute Value Equations and Inequalities
 - Graphing Solutions to Inequalities
 - Arithmetic Sequences
- Equations in Two Variables
 - Finding Slope and Intercepts
 - Slope as Average Rate of Change
- Trigonometry Review
 - Definition of Sine, Cosine and Tangent
 - Finding Sides and Angles of a Triangle
 - Word Problems/Applications
- Review of Circles
 - Graphing a Circle
 - Standard vs. Center-Radius Form
 - Completing the Square
- Review of Roots and Radicals
 - Roots as Rational Exponents
 - Simplifying Radicals

14 days - Includes 1 quiz, 1 review day and 1 test

Unit 1 - Quadratic Equations

- Operations with Polynomials
 - Add, Subtract, Multiply
 - Polynomial Long Division
- Methods of Factoring
 - Greatest Common Factor
 - Difference of Two Squares
 - Grouping
 - Trinomials ($a = 1$ and $a \neq 1$)
 - Factor Completely
- Algebraic Methods of Solving a Quadratic Equation
 - Factoring
 - The Quadratic Formula
 - Completing the Square
 - Solving and Graphing Quadratic Inequalities
- Graphs of Quadratic Equations
 - Connection of Roots, Solutions, Zeros and Intercepts
 - Standard Form vs. Vertex Form
 - Focus, Vertex and Directrix
 - Writing the Equation of a Parabola Given Different Information
- Introduction to Imaginary Solutions
 - Identifying Graphs with Real vs. Imaginary Solutions
 - Introduction to the Imaginary Unit (i)
 - The Cyclical Nature of i
 - Add, Subtract and Multiply Complex Numbers
 - Working with Complex Solutions to a Quadratic Equation

21 Days - Includes 2 Quizzes, 1 Review Day and 1 Test

Unit 2 - Families of Functions

- Definition of a Function
 - Vertical Line Test
 - One-to-One Functions
 - Function Notation
 - Evaluating
 - Add and Subtract Functions
 - Inverses
 - Piece-Wise Linear Functions
 - Domain and Range
- Higher-Powered Polynomial Functions
 - Finding Solutions Graphically and Algebraically
 - End Behavior
 - Domain and Range
- Families of Functions
 - Polynomial, Absolute Value, Square Root
 - Revisit End Behavior and Domain and Range
 - Properties of Odd and Even Functions (Graphs Only)
 - Shifting of Functions
 - Horizontal
 - Vertical
 - Compression and Expansion

16 Days - Includes 1 Quiz, 1 Review Day and 1 Test

Unit 3 - Systems of Equations

- Linear System of Equations
 - o Review Solving Linear System in Two Variables
 - Graphically
 - Elimination/Addition
 - Substitution
 - o Linear System in Three Variables
- Solving Linear - Quadratic System
 - o Graphically
 - o Algebraically
- Solving Linear - Circular System
 - o Graphically
 - o Algebraically

13 Days - Includes 1 Quiz, 1 Review Day and 1 Test

Unit 4 - Roots and Rational Equations

- Simplifying Roots
 - o Roots Other Than Square Root
 - o Simplifying with Variables
 - o Rewriting Roots as Rational Powers
 - o Using Exponent Rules to Simplify Rational Powers
 - o Solving Radical Equations
- Rational Equations
 - o Definition of Undefined
 - o Finding a Common Denominator and Eliminating the Denominator
 - o Rational Word Problems

12 Days - Includes 1 Review Day and Test

***** Unit R Through Unit 4 Should Be Complete by Midterm Exams *****

***** Unit 5 Through Unit 8 Should Be Post - Midterm Topics *****

Unit 5 - Exponential Functions

- Review Rational Exponents
 - Introduce Negative Powers
 - Simplifying Expressions with All Types of Powers (Fraction and Negative)
 - Solving Equations with Fractional Powers
- Exponential Equations
 - Graphs - Review Shifting of Graphs, Intercepts and End Behavior
 - Solving by Creating Equal Bases
 - Introduction to Geometric Sequences
- Applications of Exponential Equations
 - Modeling - Growth and Decay
 - Regressions

17 Days - Includes 1 Quiz, 1 Review Day and 1 Test

Unit 6 - Introduction to Logarithms

- Logarithms as the Inverse of Exponential Functions
 - Graphs as Reflection over $y = x$
 - The "What Power" Function (See EngageNY Lesson)
 - Converting Between Log and Exponential Form
 - Solving Basic Log Equations
- Log Rules
 - Multiplication, Division and Power Rules
 - Expanding and Condensing Log Expressions
 - Using Log Rules to Solve Equations (Basic)
- Applications
 - Revisit Exponential Equations - Using Logs to Solve
 - Modeling Exponential Growth and Decay
 - Revisit Average Rate of Change

16 Days - Includes 1 Quiz, 1 Review Day and 1 Test

Unit 7 - Trigonometry

- The Unit Circle
 - o Angles as Rotations
 - o Coterminal Angles
 - o Reference Angles
 - o The Signs of Sine, Cosine and Tangent in the Quadrants
 - o Exact Value of Sine, Cosine and Tangent
 - o Connecting the Coordinates (x,y) to (Cos, Sin)
- Arcs and Sectors
 - o Definition of a Radian
 - o Converting Radians and Degrees
 - o Arc Length and the Formula $\theta = \frac{s}{r}$
- Graphing Sine and Cosine Functions
 - o Amplitude, Frequency, Period and Midline
 - o General Form of an Equation
 - o Identifying and Writing Equations
 - o The Graph of Tangent

25 Days - Includes 2 Quizzes, 1 Review Day and 1 Test

Unit 8 - Introduction to Probability and Statistics

- Probability
 - o Review Basic Probability
 - Counting Outcomes and the Fundamental Counting Principle
 - Basic Set Theory and Notation (And, Or, Complement, etc.)
 - Using Venn Diagrams
 - o Review of Two-Way Tables
 - o Introduce Conditional Probability
 - o Independent vs. Dependent Events*
- Statistics
 - o Gathering Data: Observation, Survey and Controlled Experiments
 - o Review of Center, Shape and Spread
 - o Normal and Skewed Distributions
 - o The Meaning of Standard Deviation
 - o Probability Distributions*
 - o Using the NormalCDF Function on the Calculator*

<p>* Indicates Topics That May Need to be Cut Due to Time Constraints</p>

15 Days - Includes 1 Quiz, 1 Review Day and 1 Test

Timeline Breakdown

Material Total = 149 Days

Midterm and Review = 6 Days

Midterm Week(?) = 3 Days

Final Review and Exam = 9 Days

Final Exams = 9 Days

<u>Total</u> = 176 Days
