

Secondary Math II

Block 1: Quadratic Functions and Modeling (9 weeks)

Part A: Exploring Quadratic and Exponential Relationships

Build a function that models a relationship between two quantities. [Focus on quadratic or exponential relationships]. (F.BF.1ab)

Interpret functions that arise in applications in terms of a context.[Focus on quadratic; compare with linear and exponential] (F.IF.4, F.IF.5, F.IF.6)

Part B: More About Functions

Analyze functions using different representations. [Compare/contrast ABS, step, and piecewise functions with linear, quadratic, and exponential functions. Consider domain and range in all cases. Extend work with exponential functions with integer exponents.](F.IF.7ab, F.IF.8ab, F.IF.9)

Build new functions from existing functions. [Focus on quadratics and include absolute value functions; for inverse functions, restrict to linear, and simple domain restrictions such as finding the inverse of $f(x)=x^2, x>0$] (F.BF.3, F.BF.4)

Part C: Building and Using Models

Construct and compare linear, quadratic, and exponential models and solve problems. (F.LE.3)

Block 2: Quadratic Equations (9 weeks)

Part A: Expanding our Number System

Extend the properties of exponents to rational exponents (N.RN.1, N.RN.2)

Use properties of rational and irrational numbers (N.RN.3)

Perform arithmetic operations with complex numbers (N.CN.1, N.CN.2) [Limit to multiplications that involve i^2 as the highest power of i]

Perform arithmetic operations on polynomials [linear or quadratic in a positive integer power of x] (A.APR.1)

Part B: Quadratic and Exponential Expressions

Interpret the structure of expressions. [Focus on quadratic and exponential expressions; exponents extended to rational exponents, emphasizing those represent square and cube roots] (A.SSE.1ab, A.SSE.2)

Create equations that describe numbers or relationships [extend linear/exponential to quadratic and to formulas involving squared variables](A.CED.1, A.CED.2, A.CED.4)

Write expressions in equivalent forms to solve problems [balance conceptual understanding of what each form reveals with procedural skill in factoring and completing the square. Extend work with quadratics to include relationship between coefficients and roots, and once roots are known, a quadratic equation can be factored.] (A.SSE.3abc)

Part C: Solving Quadratic Equations

Solve equations and inequalities in one variable. [Solving any quadratic equation with real coefficients including those with complex solutions.] (A.REI.4)

Use complex numbers in polynomial identities and equations [Limit to quadratics with real coefficients] (N.CN.7, N.CN.8(+), N.CN.9(+))

Solve systems of equations. [Include systems consisting of one linear and one quadratic equation. Include systems that lead to work with fractions. For example, finding the intersections between $x^2 + y^2 = 1$ and $y = (x + 1)/2$ leads to the point $(3/5, 4/5)$ on the unit circle, corresponding to the Pythagorean triple, $3^2 + 4^2 = 5^2$.] (A.REI.7)

Block 3: Circles and Geometric Reasoning (9 weeks)

Part A: Graphing Quadratic Relationships

Translate between the geometric description and the equation for a conic section. [Connect the equations of circles and parabolas to prior work with quadratic equations. The directrix should be parallel to a coordinate axis.] (G.GPE.1, G.GPE.2)

Part B: Proving geometric theorems

Prove geometric theorems [Encourage multiple ways of writing proofs, such as narrative paragraphs, using flow diagrams, in two-column format, and using diagrams without words. Students should be encouraged to focus on the validity of the underlying reasoning while exploring a variety of formats for expressing that reasoning. G.CO.10 may be extended to include concurrence of perpendicular bisectors and angle bisectors for preparation for G.C.3 in Circles] (G.CO.9, G.CO.10, G.CO.11)

Part C: Circles and their properties

Understand and apply theorems about circles. (G.C.1, G.C.2, G.C.3, G.C.4+)

Use coordinates to prove simple geometric theorems algebraically [Include simple proofs involving circles.] (G.GPE.4, G.GPE.6)

Block 4: Similarity, Right Triangle Trigonometry, and Probability (9 weeks)

Part A: Similarity

Understand similarity in terms of similarity transformations. (G.SRT.1ab, G.SRT.2, G.SRT.3)

Prove theorems involving similarity (G.SRT.4, G.SRT.5)

Explain volume formulas and use them to solve problems. [Informal arguments for area and volume formulas can make use of the way in which area and volume scale under similarity transformations]

when one figure in the plane results from another by applying a similarity transformation with scale factor k , its area is k^2 times the area of the first. Similarly, volumes of solid figures scale by k^3 under a similarity transformation with scale factor k .] (G.GMD.1, G.GMD.3)

Find arc length and areas of sectors of circles. [Emphasize the similarity of all circles. Note that by similarity of sectors with the same central angle, arc lengths are proportional to the radius. Use this as a basis for introducing radian as a unit of measure. It is not intended that it be applied to the development of circular trigonometry in this course.] (G.C.5)

Unit 2: Right Triangle Trigonometry

Define trigonometric ratios and solve problems involving right triangles (G.SRT.6, G.SRT.7, G.SRT.8)

Prove and apply trigonometric identities. [Limit angle to between 0 and 90 degrees; Connect with the Pythagorean theorem and the distance formula.] (F.TF.8, F.TF.9+)

Unit 3: Probability

Use the rules of probability to compute probabilities of compound events in a uniform probability model. (S.CP.6, S.CP.7, S.CP.8+, S.CP.9+)

Understanding independence and conditional probability and use them to interpret data. [Build on work with two-way tables to develop conditional probability and independence]. (S.CP.1, S.CP.2, S.CP.3, S.CP.4, S.CP.5)

Use probability to evaluate outcomes of decisions. [sets stage for work in Math III where ideas of statistical inference are introduced] (S.MD.6+, S.MD.7+)