

SECONDARY MATHEMATICS III

Mathematical Practice Standards: Make sense of, communicate, connect and justify mathematical ideas to support understanding and learning across all mathematical concepts

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Solve Algebraic Equations (polynomial, logarithmic, radical, rational, and trigonometric)

- Perform arithmetic operations on polynomials, extending beyond the quadratic polynomials and including rationals and understand the relationship between zeros and factors (SIII.A.APR.1-7)
- Solve polynomial, rational, radical, logarithmic and trigonometric functions (SIII.A.REI.2; SIII.F.BF.4; SIII.F.TF.7; SIII.A.CED.1-4)

Understand, Compare, and Represent Functions (polynomial and inverse)

- Building on prior knowledge of functions, extend to polynomial, rational, trigonometric, logarithmic and inverse functions. Create and interpret various representations of functions (SIII.A.CED.2, 4; SIII.F.IF.6-9; SIII.F.BF.1; SIII.F.LE.3)

Describe Characteristics of Functions

- Building on prior knowledge of key features and transformations of linear, quadratic and exponentials extend to all available function types as well as the normal curve to identify key characteristics (SIII.F.IF.4-7; SIII.F.BF.3; SIII.F.TF.5; SIII.S.ID.4; SIII.A.REI.11)

Extend Congruence and Similarity

- Building off prior knowledge of congruency, similarity and right triangle ratios to extend the domain of trigonometric functions using the unit circle (SIII.F.TF.1-3).
- Apply trigonometry to general triangles (SIII.G.SRT.9-11)

Mathematical Modeling

Mathematical modeling is a “process that uses mathematics to represent, analyze, make predictions or otherwise provide insight into real-world phenomena” (GAIMME, 2016). It is a conceptual priority at the high school level and is a curricular goal that is incorporated regularly. Standards that are marked with a (□) indicate distinct opportunities to engage with modeling in the Utah Core Standards. Modeling activities may extend across multiple standards. The following relate to modeling in Secondary Mathematics III:

- Produce, interpret, and use expressions, equations and functions to model real-world phenomena (SIII.A.SSE.1,4; SIII.A.CED.1-4; SIII.F.IF.4-6; SIII.BF.1; SIII.F.TF.5,7);
- Graph and analyze functions (SIII.F.IF.4-9; SIII.BF.1; SIII.F.TF.5);
- Relate characteristics of functions to graphical key features and quantitative relationships (SIII.A.REI.11; SIII.F.IF.4-7; SIII.F.TF.5); and
- Apply geometric concepts in modeling situations (SIII.G.MG.1-3).

“Modeling can be used to motivate curricular requirements and can highlight the importance and relevance of mathematics in answering important questions” (GAIMME, 2016).