High School Functions

The Mathematics Curriculum Framework represents the commitment of the Hinsdale School District to the Common Core State Standards and the ideas of Grant Wiggins and Jay McTighe in their principles of *Understanding by Design.* The Mathematics Curriculum Revision Committee (2015-16) believes that this document provides the necessary framework for teachers to develop mathematical units and lessons based on best practices in curriculum, instruction and assessment.

The Common Core State Standards for Mathematics requires that students develop a conceptual understanding of key concepts, procedural skills and fluency and the ability to use their knowledge to solve real world problems. Teachers are expected to develop lessons that meet these requirements by using a variety of instructional techniques and resources to meet individual student needs.

More information about the Common Core State Standards can be found at:

www.corestandards.org

High School- Functions

Standard F-IF: Interpreting Functions

Understand the concept of a function and use function notation.
Interpret functions that arise in applications in terms of the context.
Analyze functions using different representations.

21st Century Learning Expectations

Hinsdale students will take responsibility for their own learning.
Hinsdale students will demonstrate responsibility for their actions and choices.
Hinsdale students will be able to solve problems.

Enduring Understandings:

Real world situations can be modeled by graphs and equations.
Functions are a mathematical way to describe relationships between two quantities that vary.

Learning Competencies	Essential Questions
Students will be able to • use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context. • recognize recursive sequences. • create and interpret features of graphs and tables for functions that model relationships between two quantities. • find the domain, locate it on the graph and explain what it means. • calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. • graph functions expressed symbolically and show key features of the graph. • write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. • compare properties of functions represented in different ways.	• How can the graphs of linear equations be used to solve real world problems? • In what ways can data be organized and presented so that the information is clear and concise? • How do you solve problems involving functions and their inverses? • What are the necessary technologies to analyze, write, and solve quadratic functions?

High School- Functions

Standard F-BF: Building Functions

Build a function that models a relationship between two quantities.

Build new functions from existing functions.

21st Century Learning Expectations

Hinsdale students will take responsibility for their own learning.

Hinsdale students will demonstrate responsibility for their actions and choices.

Hinsdale students will be able to solve problems.

Enduring Understandings:

Patterns, functions and relationships can be represented graphically, numerically, symbolically or verbally.

Functions can be used to find the solution of given real world problems.

Learning Competencies	Essential Questions
Students will be able to • determine an explicit expression, a recursive process, or steps for calculation from a context. • combine standard function types using arithmetic operations and compositions. • write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. • identify and apply transformations to functions. • find, verify and interpret values of inverse functions. • understand the inverse relationship between exponents and logarithms and use this relationship to solve problems.	• How are operations and properties of complex numbers related to the real numbers? • How do you perform operations on functions? • How can the properties of exponential models be used to analyze situations?

High School- Functions

Standard F-LE: Linear, Quadratic, & Exponential Models

Construct and compare linear, quadratic, and exponential models and solve problems.
Interpret expressions for functions in terms of the situation they model.

21st Century Learning Expectations

Hinsdale students will take responsibility for their own learning.
Hinsdale students will demonstrate responsibility for their actions and choices.
Hinsdale students will be able to solve problems.

Enduring Understandings:

Functions can be represented in a variety of ways.
Real world functional relationships can be represented by equations.

Learning Competencies	Essential Questions
Students will be able to • distinguish and apply linear and exponential models and their inverses. • construct linear and exponential functions. • understand growth patterns of different functions.	• What are some real world examples of linear and exponential functions? • Can different forms of the equations of a line be used to solve real world problems?

High School- Functions

Standard F-TF: Trigonometric Functions

Extend the domain of trigonometric functions using the unit circle.
Model periodic phenomena with trigonometric functions.
Prove and apply trigonometric identities.

21st Century Learning Expectations

Hinsdale students will take responsibility for their own learning.
Hinsdale students will demonstrate responsibility for their actions and choices.
Hinsdale students will be able to solve problems.

Enduring Understandings:

Trigonometric functions model real world problems and solutions.
The bases of trigonometric identities comes from the unit circle and the Pythagorean Theorem.

Learning Competencies	Essential Questions
Students will be able to • understand radian measure of an angle. • extend trigonometric functions to all real numbers. • use special right triangles to determine the values of sine, cosine, and tangent. • use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. • model periodic phenomena with trigonometric functions. • find and use inverse functions to solve trigonometric equations. • prove the Pythagorean identity and use it to solve problems. • prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.	• What are the relationships between trigonometric functions and their inverses? • When can the coordinate plane be used to accurately represent angles and their measure? • How can you analyze trigonometric values of angles that are not special angles?