Grade 8 Mathematics

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

Grade 8 Mathematics

Standard 8.NS: The Number System

Know that there are numbers that are not rational, and approximate them by rational numbers.

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:

Not all numbers are rational.
Numbers are used in almost every area of mathematics.
Real numbers are the numbers used every day as part of the real number system.

Learning Competencies	Essential Questions
Students will be able to • approximate irrational numbers using their understanding of square and cube roots. • extend their understanding of the number system by investigating the relationship between the sides of a right triangle. • create equivalent expressions using integer exponents. • apply their understanding of exponents to express and compare numbers. • understand irrational numbers and when to use them in solving problems.	• How are rational and irrational numbers related? • How can lengths and distances be expressed –exactly or approximately –using understanding of square roots/irrational numbers? • How do we determine whether two expressions involving exponents are equivalent? • How can we express very small or very large numbers using exponential (scientific) notation?

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Standard 8.EE: Expressions and Equations

Work with radicals and integer exponents.
Understand the connections between proportional relationships, lines, and linear equations.
Analyze and solve linear equations and pairs of simultaneous linear equations.

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:

Mathematics can be used to provide models that help us interpret data and make predictions.

Learning Competencies	Essential Questions
Students will be able to • compare proportional relationships using a variety of representations of these relationships (graph, table, symbols). • understand and represent slope as a unit rate, and apply their knowledge of right triangles to represent slope. • relate the slope with its concept as a rate and its visual representation as a set of right triangle that are similar for each line. • interpret slope and intercept using real world applications (e.g. bivariate data). • create equivalent equations to solve for an unknown. • employ graphical, tabular and symbolic representations to express linearity and determine the number of solutions. • interpret a linear equation in a real world application by deriving the equation.	• What is the meaning of the slope and intercept of a line, in the context of the situation? • How will I explain how I know that a pair of linear equations has one solution, no solutions, or infinitely many solutions? • How can I create an equation with given information from a table, graph, or problem situation?

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Standard 8.F: Functions

Define, evaluate, and compare functions.

Use functions to model relationships between quantities.

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 model relationships between quantities.

Functions can be used to describe how changing one variable can affect another variable.

Learning Competencies	Essential Questions
Students will be able to • understand that a function is a relationship with a unique output for each input. • develop their ability to make connections between multiple representations of functions and interpret the features of functions in terms of real world contexts. • construct a function to model a linear relationship. • identify (from a graph, table, y=mx+b, etc.) and interpret the rate of change and initial value of a linear function in terms of the situation.	• How would you interpret the features (e.g. rate of change, initial value, increasing/decreasing) of a function, in a real world context? • How would you determine, depict, and describe "patterns of association" between two quantities, in bivariate data?

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Standard 8.G: Geometry

Understand congruence and similarity using physical models, transparencies, or geometry software.

Understand and apply the Pythagorean Theorem.

Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.

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:

Congruent objects can be transformed on top of each other.

Similar objects are combination of rigid motions and dilation.

Geometry occurs in many situations, from architecture to floor patterns.

Learning Competencies	Essential Questions
Students will be able to • use, apply and explain the properties of rotations, reflections, dilations and translations. • explain the connection between triangles and parallel lines. • use and apply the Pythagorean Theorem to find unknown measures, prove triangles right, and distances on the coordinate plane. • know and use formulas for volumes of basic shapes to solve real-world and mathematical problems.	• When using transformations, how are the angles, lengths, or figures changing or staying the same? • What happens when an object is dilated? • How could an object be transformed to enlarge or reduce its size? • How can you determine the distance between two points in a coordinate plane?

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Standard 8.SP: Statistics and Probability

Investigate patterns of association in bivariate data.

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 of data can be used to inform decision making.
There are different types of graphs that are dependent upon the data gathered.

Learning Competencies	Essential Questions
Students will be able to • construct, interpret and describe clustering, outliers, positive or negative association, linear association, and non-linear association using scatter plots. • use and apply linear models. • understand and use patterns of association and two-way tables.	• How do you use patterns to understand data? • What's the impact of including outliers? • Why is it important to have solid data?