Math 8 Overview

Our mathematics department offers Math 8, by invitation, to students who would most benefit from an additional year of preparation before engaging the Algebra I course.

Reasoning about expressions and equations, including modeling data with a linear equation, and solving linear equations and systems of linear equations

Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions (y/x = m or y = mx) as special linear equations (y = mx + b), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount m·A. Students also use a linear equation to describe the association between two quantities in bivariate data (such as arm span vs. height for students in a classroom). At this grade, fitting the model, and assessing its fit to the data are done informally. Interpreting the model in the context of the data requires students to express a relationship between the two quantities in question and to interpret components of the relationship (such as slope and y-intercept) in terms of the situation.

Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Students solve systems of two linear equations in two variables and relate the systems to pairs of lines in the plane; these intersect, are parallel, or are the same line. Students use linear equations, systems of linear equations, linear functions, and their understanding of slope of a line to analyze situations and solve problems.

Grasping the concept of a function and using functions to describe quantitative relationships

Students grasp the concept of a function as a rule that assigns to each input exactly one output. They understand that functions describe situations where one quantity determines another. They can translate among representations and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations.

Analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem

Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students understand the statement of the Pythagorean Theorem and its converse, and can explain why the Pythagorean Theorem holds, for example, by decomposing a square in two different ways. They apply the Pythagorean Theorem to find distances between points on the coordinate plane, to find lengths, and to analyze polygons. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Grade 8 Topics

Number Sense • Rational and Irrational Numbers • Squares and Square Roots • Operations with Integers • Exponents, Laws of Exponents • Scientific Notation	**Equations and Expressions** • Equation Solving • Translating Expressions & Equations • Problem Solving with Equations • Adding and Subtracting Polynomials
Functions • Defining functions • Evaluating Functions • Domain & Range	**Linear Functions** • Slope • Parallel and Perpendicular Lines • Slope-intercept form of line • Graphing equations • Horizontal and Vertical Lines • Writing function rules • Comparing Rates of Change • Systems of Equations
Geometry - Angles • Angle pairs • Supplementary, Complementary • Parallel Lines cut by a Transversal • Triangles: Sum of Interior and Exterior Angles • Angles in Polygons	**Geometry – Transformations** • Translations • Reflections • Rotations • Dilations • Compound Transformations • Similarity and Congruence
Geometry – Solids • Prisms • Cylinders • Spheres • Cones • Pyramids	**Geometry – Triangles and the Coordinate Plane** • Distance in the coordinate plane • Pythagorean Theorem • Right Triangles
Families of Functions • Graphing Linear Functions and Solving Linear Systems on TI84 • Graphing Absolute Value Functions on TI84 • Graphing Quadratic Functions on TI84 • Real World Applications of Functions	**Statistics** • Scatterplots and Bivariate Data • Line of Best Fit • Two-Way Frequency Tables • Relative Frequency