

# Secondary Math I Essential Understandings

## Unit 1: Solving Equations and Inequalities

**Essential Understanding Number 1: Students will be able to solve any linear equation or inequality and explain each step involved in the process.**

- I CAN solve two-step equations, justify the steps involved and verify the solutions
- I CAN solve multi-step equations, justify the steps involved and verify the solutions
- I CAN solve multi-step inequalities, justify the steps involved and verify the solutions
- I CAN justify the solutions of equations and inequalities through explanations, properties and proofs
- I CAN use the skills for solving equations to solve literal equations
- I CAN evaluate solutions of equations and inequalities
- I CAN use equations to solve real-world problems.

## Unit 2: Writing Expressions, Equations and Inequalities

**Essential Understanding Number 2: Students will be able to write an expression, equation or inequality to model real life problems.**

- I CAN identify and explain the different parts of expressions, equations, inequalities and formulas
- I CAN write expressions and equations to model real-life situations
- I CAN understand and apply the steps for solving problems
- I CAN write linear inequalities to model real-life situations
- I CAN write equations for solving problems involving perimeter and area
- I CAN write equations for solving problems involving angle relationships
- I CAN write equations for solving problems involving travel
- I CAN write equations for solving problems involving proportions
- I CAN write equations for solving problems involving percent

## Unit 3: Functions

**Essential Understand Number 3: Students will be able to interpret, define, evaluate and graph any function.**

- I CAN understand the definition of a function, identify its parts and write a relation in function notation
- I CAN identify linear functions represented in equations, tables, graphs or situations
- I CAN identify exponential functions represented in equations, tables, graphs or situations
- I CAN perform operations on and evaluate linear and exponential functions
- I CAN graph linear functions using input-output pairs
- I CAN graph exponential functions using input-output pairs
- I CAN compare linear and exponential functions

## Unit 4: Linear and Exponential Functions

**Essential Understanding Number 4: Students will be able to model any linear or exponential function given a situation.**

- I CAN write linear and exponential equations in function notation to describe what is happening in a table
- I CAN write linear and exponential equations in function notation to describe what is happening in a graph
- I CAN define and express a recursive sequence as a function and generate a sequence given an explicit function
- I CAN write arithmetic and geometric sequences both recursively and with an explicit formula
- I CAN compare linear and exponential functions and use them to solve problems

## Unit 5: Analyzing Algebraic Models

**Essential Understanding Number 5: Students will be able to analyze an algebraic graphical model, interpret data and draw conclusions.**

- I CAN define slope as the rate of change of a function and find the slope of a line given two points
- Honors: I CAN represent the average rate of change in an exponential function as the slope of the secant line
- I CAN identify key features in a table of values and relate them to key features on a graph, using interval notation and symbols of inequality
- I CAN identify the x- and y-intercepts in an equation in standard form and use them to graph the equation
- I CAN identify the slope and y-intercept in an equation in slope-intercept form and use them to graph and write equations
- I CAN write an equation a point and the slope or two points using the point-slope form of the equation
- I CAN explain what happens to a linear or exponential function when it is translated vertically
- I CAN compare slopes, intercepts and growth rates of functions modeled with different representations
- I CAN graph linear and exponential functions using technology
- I CAN use graphs of linear and exponential functions to solve real-world problems

## Unit 6: Analyzing Statistical Models

**Number 6: Students will be able to analyze a statistical model, interpret data and draw conclusions.**

- I CAN find the median, quartiles and range of a data set
- I CAN find the mean and standard deviation of a data set
- I CAN represent, describe and interpret data using dot plots, histograms and box plots
- I CAN identify, compare, summarize and interpret similarities and differences between shape, measures of center and spread of data sets
- I CAN create scatter plots, explain the meaning of the slope and intercepts and find trend lines and residuals
- I CAN compute and analyze the correlation coefficient
- I CAN create two-way frequency tables, find and interpret joint, marginal and conditional relative frequencies and understand and explain the difference between correlation and causation

## **Unit 7: Systems of Equations and Inequalities**

**Essential Understanding Number 7: Students will be able to solve systems of equations and inequalities and interpret their solutions graphically**

- I CAN solve a system of equations by graphing and explain the meaning of the solution
- I CAN solve a system of equations by the substitution method
- I CAN solve a system of equations by the elimination method
- I CAN graph linear inequalities
- I CAN solve a system of linear inequalities by graphing
- I CAN use systems of equations and inequalities to solve real-world problems

## **Unit 7H: Vectors and Matrices (Honors Only)**

**Essential Understanding Number 7H: Students will be able to use vectors and matrices to model and solve problems**

- I CAN explain what vector quantities are and find the magnitude of a vector
- I CAN add and subtract vectors and multiply vectors by a scalar.
- I CAN represent real-world contexts with geometric vector models
- I CAN organize and interpret data into matrices and use matrix notation
- I CAN add and subtract matrices
- I CAN multiply matrices and explain the meaning of matrix multiplication in the real world
- I CAN find inverses, identities and determinants in  $2 \times 2$  matrices
- I CAN find inverses, identities and determinants in  $3 \times 3$  matrices
- I CAN define, represent and transform vectors using matrices
- I CAN transform geometric figures using  $2 \times 2$  matrices and find the area of a triangle using determinants
- I CAN solve systems of two equations using matrices
- I CAN solve systems of three equations using matrices

## **Unit 8: Geometric Figures**

**Essential Understanding Number 8: Students will be able to identify and model geometric figures.**

- I CAN define and use definitions to identify and model angles, circles, perpendicular and parallel lines, rays and line segments using mathematical notation
- I CAN state and use the properties of angle and segment bisectors, midpoints, triangles, quadrilaterals and other polygons
- I CAN use coordinates to prove geometric theorems involving lines, segments and angles
- I CAN prove that the slopes of parallel lines are equal and that the product of the slopes of perpendicular lines is  $-1$  and write equations of parallel and perpendicular lines
- I CAN use slope criteria for parallel and perpendicular lines to solve geometric problems
- I CAN classify geometric figures using coordinate geometry and use the distance formula to compute perimeters and areas
- Honors: I CAN make conjectures and make counter-examples for conjectures

Honors: I CAN write conditional statements and their converses, inverses and contrapositives and analyze the truth values

Honors: I CAN use the Law of Syllogism to create an argument

Honors: I CAN explain the meaning of “if and only if” statements

## **Unit 9: Congruence**

**Essential Understanding Number 9: Students will be able to model congruence using geometric figures.**

I CAN represent, predict the effect of and develop definitions for rotations, reflections and translations

I CAN make mappings using inputs and outputs

I CAN transform figures using geometric descriptions of rigid motions and describe the rotations and reflections that take figures onto themselves

I CAN identify corresponding parts of two triangles and use them to show that two triangles are congruent

I CAN prove triangles are congruent using ASA, SAS and SSS and explain why SSA and AAA cannot be used to prove congruence

I CAN construct congruent segments and angles, bisect segments and angles and parallel and perpendicular lines

I CAN construct an equilateral triangle, a square and a regular hexagon

I CAN inscribe an equilateral triangle, a square and a regular hexagon in a circle.