

High School Standards

Algebraic Reasoning: Expressions and Equations (HS.AEE)

HS.AEE.A Rewrite expressions in equivalent forms by using algebraic properties to make different characteristics or features visible.

HS.AEE.A.1 Interpret an expression which models a quantity by viewing one or more of its parts as a single entity and reasoning about how changes in these parts impact the whole, and vice versa.

HS.AEE.A.2 Create and recognize an equivalent form of an expression to understand the quantity represented in an authentic context.

HS.AEE.A.3 Rearrange formulas and equations to solve for different variables.

HS.AEE.B Find and verify solutions to an equation, inequality, or system of equations or inequalities.

HS.AEE.B.4 Define variables and create equations with two or more variables to represent relationships between quantities in order to solve problems in authentic contexts.

HS.AEE.B.5 Define variables and create inequalities with one or more variables and use them to solve problems in authentic contexts.

HS.AEE.B.6 Solve systems of linear equations through algebraic means for simple systems and strategically using technology when needed.

HS.AEE.C Analyze the structure of an equation or inequality to determine an efficient strategy to find and justify a solution.

HS.AEE.C.7 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities; interpret solutions as viable or nonviable options in a modeling context.

HS.AEE.C.8 Construct a viable argument to justify a method for solving a simple equation.

HS.AEE.D Make predictions in different applications using expressions, equations, and inequalities to analyze authentic contexts.

HS.AEE.D.9 Understand that the solutions to an equation in two variables is a set of points in the coordinate plane that form a curve, which could be a line.

HS.AEE.D.10 Recognize and explain why the point(s) of intersection of the graphs of $f(x)$ and $g(x)$ are solutions to the equation $f(x)=g(x)$. Interpret the meaning of the coordinates of these points.*

HS.AEE.D.11 Graph and explain why the points in a half plane are solutions to a linear inequality and the solutions to a system of inequalities are the points in the intersection of corresponding half planes. Interpret the meaning of the coordinates of these points in context.

Algebraic Reasoning: Functions (HS.AFN)

HS.AFN.A Describe functions by using both symbolic and graphical representations.

HS.AFN.A.1 Understand a function as a rule that assigns a unique output for every input and that functions model situations where one quantity determines another.

HS.AFN.A.2 Use function notation and interpret statements that use function notation in terms of the context and the relationship it describes.

HS.AFN.A.3 Calculate and interpret the average rate of change of a function over a specified interval.

- HS.AFN.B Distinguish functions as member of the same family by using attributes common to all functions within a given category.*
- HS.AFN.B.4 Compare properties of two functions using multiple representations.
- HS.AFN.B.5 Relate the domain of a function to its graph and to its context.
- HS.AFN.C Represent functions graphically and interpret key features in terms of the equivalent symbolic representation.*
- HS.AFN.C.6 Interpret key features of functions, from multiple representations, and conversely predict features of functions from knowledge of context.*
- HS.AFN.C.7 Graph functions using technology to show key features.
- HS.AFN.D Model a wide variety of authentic situations using functions through the process of making and changing assumptions, assigning variables, and finding solutions to contextual problems.*
- HS.AFN.D.8 Model situations involving arithmetic and geometric sequences. Use a variety of representations including an explicit formula for the sequence, and translate between the forms.*
- HS.AFN.D.9 Identify and interpret the effect on the graph of a function when the equation has been transformed.
- HS.AFN.D.10 Explain why a situation can be modeled with a linear function, an exponential function, or neither.

Numeric Reasoning: Number and Quantity (HS.NQ)

- HS.NQ.A Represent all points on the number line using a complete real number system that included both rational and irrational numbers.*
- HS.NQ.A.1 Establish properties of positive integer exponents. Use these properties to extend the definition of exponentiation to include negative and rational exponents.
- HS.NQ.B Attend to units of measurement needed for solve problems through quantitative reasoning and mathematical modeling.*
- HS.NQ.B.2 Choose and interpret units consistently in formulas, graphs, and data displays, as a way to understand problems and to guide the solution of multi-step problems.*
- HS.NQ.B.3 Define and manipulate appropriate quantities using real numbers to authentically model situations and justify these choices.
- HS.NQ.B.4 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities in modeling situations.

Geometric Reasoning and Measurement (HS.GM)

HS.GM.A Apply geometric transformations to figures through the concept of functions and through the analysis of graphs of functions as geometric figures.

HS.GM.A.1 Apply definitions of rotations, reflections, and translations to transform a figure or map between two figures in authentic contexts.

HS.GM.A.2 Verify experimentally the properties of a dilation given a center and a scale factor. Solve problems in authentic contexts involving similar triangles or dilations.

HS.GM.A.3 Use the slopes of segments and the coordinates of the vertices of triangles, parallelograms, and trapezoids to solve problems in authentic contexts.

HS.GM.A.4 Use definitions of transformations and symmetry relationships to justify the solutions of problems in authentic contexts.

HS.GM.B Construct and communicate geometric arguments through use of proofs, logical reasoning, and geometric technology.

HS.GM.B.5 Apply and justify triangle congruence and similarity theorems in authentic contexts.

HS.GM.B.6 Justify theorems of line relationships, angles, triangles, and parallelograms; and use them to solve problems in authentic contexts.

HS.GM.B.7 Perform geometric constructions with a variety of tools and methods.

HS.GM.C Solve problems and interpret solutions of area and volume of shapes by applying concepts of congruence, similarity, symmetry in authentic contexts.

HS.GM.C.8 Solve authentic modeling problems using area formulas for triangles, parallelograms, trapezoids, regular polygons, and circles.*

HS.GM.C.9 Use volume and surface area formulas for prisms, cylinders, pyramids, cones, and spheres to solve problems and apply to authentic contexts.

HS.GM.C.10 Use geometric shapes, their measures, and their properties to describe real world objects, and solve related authentic modeling and design problems.

HS.GM.C.11 Apply concepts of density based on area and volume in authentic modeling situations.

HS.GM.D Apply concepts of right triangle trigonometry in authentic contexts to solve problems and interpret solutions.

HS.GM.D.12 Apply sine, cosine, and tangent ratios, and the Pythagorean Theorem, to solve problems in authentic contexts.

HS.GM.D.13 Apply the Pythagorean Theorem in authentic contexts, and develop the standard form for the equation of a circle.

HS.GM.D.14 Use the coordinate plane to determine parallel and perpendicular relationships, and the distance between points.

Data Reasoning and Probability (HS.DR)*HS.DR.A Formulate Statistical Investigative Questions*

- HS.DR.A.1 Formulate multivariable statistical investigative questions and determine how data from samples can be collected and analyzed to provide an answer.
- HS.DR.A.2 Formulate summative, comparative, and associative statistical investigative questions for surveys, observational studies, and experiments using primary or secondary data.
- HS.DR.A.3 Formulate inferential statistical investigative questions regarding causality and prediction from correlation.
- HS.DR.A.4 Students use mathematical and statistical reasoning to formulate questions about data to evaluate conclusions and assess risks.

HS.DR.B Collect and Consider Data

- HS.DR.B.5 Articulate what constitutes good practice in designing a sample survey, an experiment, and an observational study.
- HS.DR.B.6 Distinguish between surveys, observational studies, and experiments, and design an appropriate data collection to answer an investigative question of interest.
- HS.DR.B.7 Apply an appropriate data collection plan when collecting primary data or selecting secondary data for the statistical investigative question of interest.
- HS.DR.B.8 Articulate issues of bias and confounding variables in observational studies and their implications for interpretation.

HS.DR.C Analyze, summarize, and describe data

- HS.DR.C.9 Identify appropriate ways to summarize and then represent the distribution of univariate and bivariate data multiple ways with graphs and/or tables.
- HS.DR.C.10 Use statistics appropriate to the shape of the data distribution to compare center and spread of two or more different data sets.
- HS.DR.C.11 Use data to compare two groups, describe sample variability, and decide if differences between parameters are significant based on the statistics.
- HS.DR.C.12 Use technology to subset and filter data sets and transform variables, including smoothing for time series data.

HS.DR.D Interpret data and answer investigative questions

- HS.DR.D.13 Use statistical evidence from analyses to answer the statistical investigative questions.
- HS.DR.D.14 Articulate what it means for an outcome or an estimate of a population characteristic to be plausible or not plausible compared to chance variation.
- HS.DR.D.15 Use multivariate thinking to articulate how variables impact one another, and measure the strength of association using correlation coefficients for regression curves.
- HS.DR.D.16 Communicate results of statistical reasoning or informed data-based decisions in a variety of formats (verbal, written, visual).

HS.DR.E Understand independence and conditional probability and use them to interpret data

- HS.DR.E.17 Describe the possible outcomes for a situation as subsets of a sample space.
- HS.DR.E.18 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.