

GRADE 9 ALGEBRA 1

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EXPECTATIONS

MATH TOOLS

To support curriculum implementation, the Common Core recommends the use of certain math tools at each grade level. CAISL implements these recommendations, with the exception of a graphing calculator, which CAISL chooses to introduce in High School.

MENTAL MATH

To reinforce computational fluency, students are expected to practice mental math calculations based on grade level content on a weekly basis.

INFORMATION TECHNOLOGY EXPECTATIONS

Students will be expected to use a variety of digital tools according to grade level expectations stated in CAISL's Research and Information Technology Integration Scope and Sequence.

See link below:

PERFORMANCE INDICATORS

MATH PRACTICES

Explanations of Math Practices: By the end of the year students will be expected to problem solve, reason mathematically, and communicate efficiently according to grade level expectations. See link below:

https://www.caislisbon.org/uploaded/Curriculum_links/Math/Math_Practice_Progressions_5-12.pdf

PROBLEM SOLVING

Make sense of problems and persevere in solving them.

Look for and make use of structure Deductive Reasoning.

Look for and express regularity in repeated reasoning Inductive Reasoning.

MATHEMATICAL REASONING, COMMUNICATION, AND MODELING

Reason abstractly and quantitatively.

Construct viable arguments and critique the reasoning of others.

Model with mathematics.

Use appropriate tools strategically.

Attend to precision.

MATH CONCEPTS

NUMBER AND QUANTITY

Know and apply the properties of integer exponents to generate equivalent numerical expressions. DOK 1,2 E

Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that square root of 2 is irrational DOK 1

Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. DOK 1,2

Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notations are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology. DOK 1, 2

Define appropriate quantities for the purpose of descriptive modeling. DOK 1,2

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. DOK 1,2

ALGEBRA

Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed. DOK 1,2,3

Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane, derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b . DOK 1,2,3

Analyze and solve pairs of simultaneous linear equations. Solve real-world and mathematical problems leading to two linear equations in two variables. DOK 1,2,3 E

Interpret expressions that represent a quantity in terms of its context. DOK 1,2

Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication, add, subtract, and multiply polynomials. DOK 1

Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. DOK 1,2,3

Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. DOK 1,2

Create linear equations and inequalities in one variable and use them to solve problems. DOK 1,2 E

Create equations in two or more variables to represent relationships between quantities, graph equations on coordinate axes with labels and scales. DOK 1,2 E

Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. DOK 1,2,3

FUNCTIONS

Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. DOK 1,2,3 E

Relate informally the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. DOK 1,2

Describe qualitatively the functional relationship between two quantities by analyzing a graph. DOK 1,2,3

STATISTICS AND PROBABILITY

Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as outliers, positive or negative association, linear association, and nonlinear association. DOK 1

Fit a function to the data, use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear models. DOK 1,2 E

Compute using technology and interpret the correlation coefficient of a linear fit. DOK 1,2

FURTHER CURRICULAR EXPECTATIONS

For the Performance Indicator (Expressions and Equations):

Analyze and solve pairs of simultaneous linear equations. Solve real-world and mathematical problems leading to two linear equations in two variables.

- Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.*
- Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*

For the Performance Indicator (Seeing Structure in Expressions):

Interpret expressions that represent a quantity in terms of its context.

- Interpret parts of an expression, such as terms, factors, and coefficients.