



Tomah Area School District
High Quality Student Learning
Every Child. Every Day.

Essential Learning

Grade/Course: HS Algebra I

Essential Knowledge:

Solve equations and inequalities in one variable

- Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Solve systems of equations

- Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Represent and solve equations and inequalities graphically

- 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.

Create equations that describe numbers or relationships

- Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Understand the concept of a function and use function notation

- Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Build a function that models a relationship between two quantities

- Combine standard function types using arithmetic operations.
- Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Extend the properties of exponents to rational exponents

- Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Perform arithmetic operations on polynomials

- 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.

Interpret the structure of expressions

- Interpret parts of an expression, such as terms, factors, and coefficients.
- Use the structure of an expression to identify ways to rewrite it. Example: For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.



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Grade/Course: HS Algebra II

Essential Knowledge:

Interpret functions that arise in applications in terms of the context

- For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

Analyze functions using different representations

- Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
- Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

Write expressions in equivalent forms to solve problems

- Factor a quadratic expression to reveal the zeros of the function it defines.

Understand the relationship between zeros and factors of polynomials

- Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.

Use complex numbers in polynomial identities and equations.

- Solve quadratic equations with real coefficients that have complex solutions.
- Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
- Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

Construct and compare linear, quadratic, and exponential models and solve problems

- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).



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Essential Learning

Grade/Course: HS Geometry

Essential Knowledge:

Experiment with transformations in the plane

- Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
- Experiment with transformations in the plane
- Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
- Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
- Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.

Understand congruence in terms of rigid motions

- Understand congruence in terms of rigid motions

Prove geometric theorems

- Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.

Understand similarity in terms of similarity transformations

- Understand similarity in terms of similarity transformations

Define trigonometric ratios and solve problems involving right triangles

- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Understand and apply theorems about circles

- Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

Explain volume formulas and use them to solve problems

- Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.