

Texas Essential Knowledge & Skills Overview Algebra I, Geometry, Algebra II

	Algebra I	Geometry	Algebra II
Number, Operations, and Quantitative Reasoning	<p>Solving Problems with Real Numbers, Using Equations & Their properties</p> <ul style="list-style-type: none"> Use symbols to represent unknown and variables Find specific function values, simplify polynomial expressions transform, and solve equations, and factor as necessary Use commutative, associative, and distributive properties in problem solving 		<p>Solving Problems with Real Numbers, Using Equations & Their properties</p> <ul style="list-style-type: none"> Solve equations, inequalities, and systems using algebraic methods, quadratic, square root, rational, exponential, logarithmic) Interpret and analyze solutions to quadratic equations including the use of complex numbers and the discriminant
	Algebra I	Geometry	Algebra II
Patterns, Relationships, and Algebraic Thinking	<p>Patterns, Relationship, Making Predictions</p> <ul style="list-style-type: none"> Represent, interpret, and make inferences from functional relationship Represent relationships among quantities in multiple ways, including using concrete models, diagrams, and verbal descriptions Look for patterns and represent generalizations algebraically Determine whether situations can be represented by linear functions Develop slope as a rate of change, relate direct variation to linear functions and solve problems involving proportional change Use patterns to generate and apply laws of exponents Use concrete models and algebraic methods to analyze data and represent situations involving inverse variation and exponential growth and decay 	<p>Patterns, Relationship, Making Predictions</p> <ul style="list-style-type: none"> Formulate and test conjectures about geometric properties using constructions, explorations, patterns, and concrete models Make and verify conjecture about geometric properties using coordinate, transformational or axiomatic approaches Select and appropriate representation (concrete, pictorial, graphical, verbal, or symbolic) to solve problems Use slopes and equation of lines to investigate geometric relationship Use proportional relationships to find areas of sectors and arc lengths, justify right triangle rations, trigonometric rations, and Pythagorean triples, describe and apply the effect of perimeter, area , and volume when dimensions are changes, solved problems involving similar figures Use similarity and congruence properties to explore and justify conjectures 	<p>Patterns, Relationship, Making Predictions</p> <ul style="list-style-type: none"> Analyze situations modeled by functions (quadratic, square root, rational, exponential) to solve problems Use direct and inverse variation models
	Algebra I	Geometry	Algebra II

Equations and Functions

- Formulate equations, inequalities, or systems of solve problems modeled by linear functions
- Represent relationships among quantities in multiple ways, including equations and inequalities
- For given situations, determine the reasonableness of and interpret graphs, domain and range values, and solutions to equations, inequalities, or systems,
- Translate among and uses multiple forms of linear functions, including algebraic and verbal
- Investigate methods and solve linear equations, inequalities, and systems using concrete models, graphs, tables, and appropriate algebraic methods
- Solve quadratic equations using concrete models, tables, graphs, and algebraic methods
- Use concrete models and algebraic methods to analyze data and represent situations involving inverse variation and exponential growth and decay

Attributes of Functions

- Describe independent and dependent quantities for functions and identify reasonable domain and range for given situations
- Identify and sketch parent functions $y=x$ and $y=x^2$
- Interpret the meaning of slope and intercepts using data, symbolic representation or graphs; determine slope and y-intercept on graphs and applied situations
- Graph and write equations of lines given points, slopes, and/or intercepts
- Investigate, describe, and predict the effects of changes in a and c on $y=ax^2 + c$
- Analyze graphs of quadratic functions in problem situations and relate solutions to quadratic equations to the roots of their functions

Algebra I

Equations and Functions

- For given situations, determine reasonableness of and interpret domain and range values and solutions to equations inequalities, an systems
- Formulate equations, inequalities, or systems to solve problems modeled by functions
- Solve equations, inequalities, and systems modeled by functions using graphs, tables, and appropriate algebraic methods, including matrices
- Relate algebraic and verbal representations of quadratic square root, and rational functions to other representations
- Compare and translate between algebraic and graphical solutions of quadratic equations

Attributes of Functions

- Identify mathematical domain and range, including limitations and asymptotic behavior
- Identify and sketch parent functions, connect $y=$ and $f(x)=$ notations, identify conic sections from equations
- Describe graphs using parent functions (linear, quadratic, square root, exponential, logarithmic) and quotients (rational) and predict the effects of parameter changes
- Recognize inverse relationships of functions
- Determines a quadratic function from its roots of graph
- Develops logarithms using the relationship between exponential functions and their inverses

Geometry

Algebra II

Measurement

Solving Problems Using Measurement

- Extend and use measurement concepts of area, perimeter, and volume to polygons, circles, and 3-dimensional solids, develop use and extend the Pythagorean Theorem
- Describe and apply the effect on perimeter, area and volume when dimensions are changed

Geometric Structure

- Develop an awareness of the structure of a math system, recognize the historical development of geometric systems, and compare and contrast Euclidean and non-Euclidean geometries
- Formulate and test conjectures about geometric properties using construction, explorations, patterns, and concrete models
- Use axiomatics to make and verify conjectures about geometric properties
- Construct and justify statements about geometric figures and their properties, including triangle, congruence relationships, and determine if converses are true or false
- Demonstrate what it means to prove mathematically that statements are true
- Use inductive and deductive reasoning to formulate conjectures and prove statements

Algebra I

Geometry

Algebra II

Transformations

- Investigate, describe and predict the effects of changes in m and b on $y = mx + b$
- Investigate, describe, and predict the effects of changes in a and c on $y = ax^2 + c$

Geometric Models & Graphing

- Represent, interpret and make inferences from functional relationships
- Represent relationships among quantities in multiple ways, including graphs, and tables
- Identify and sketch parent functions $y=x$ and $y = x^2$
- Interpret situations or create situations for graphs
- Translate among and uses multiple forms of linear functions, including graphs
- Use graphs to interpret the meaning of slope and intercepts of linear functions, determine slope and intercepts, and predict the effect of changing slope and y-intercept in applied situations
- Graph and write equations of lines given points, slopes, and /or intercepts
- Investigate methods and solve linear equations, inequalities , an systems, including using concrete models and graphs
- Analyze graphs of quadratic functions in problem situations and relate solutions to quadratic equations to the roots of their functions
- Solve quadratic equations, including using concrete models and graphs
- Use graphs to analyze data and represent situations involving inverse variation and exponential growth and decay

Transformations

- Use transformations and constructions to make and verify conjectures about geometric properties
- Use properties of transformations and their compositions to make connections between math and the real world
- Use similarity and congruence transformations to explore and justify conjectures

Geometric Models & Graphing

- Use coordinates and constructions to make and verify conjectures about geometric properties
- Select an appropriate representation(concrete, pictorial, graphical, verbal, or symbolic) to solve problems
- Analyze and solve problems using the relationshipbetween3-dimensional objects and related 2-dimensional representations (cross-sections and other slices, nets, and perspective views)
- Use coordinates to represent geometric figures, develop and use formulas, and use analytic geometry to investigate geometric relationships
- Develop, extend, and use the Pythagorean Theorem
- Analyze the characteristics of 3-dimensional figures and their parts

Transformations

- Describe graphs using parent functions (linear, quadratic, square root, exponential, and logarithmic) and quotients (rational), and predict the effects of parameter changes
- Recognize inverse relationships of functions
- Sketch graphs of conics by relating parameter changes in the equation to changes in the graph

Geometric Models & Graphing

- Collect, record, organize data, make scatterplots and describe with a parent function, interpret results, and make predictions to model and solve problems
- Solve equations, inequalities, an systems modeled by functions using graphs and tables
- Identify and sketch parent functions
- Describe an conic section as the intersection of a plane an a cone, identify an sketch conics, identify symmetries from graphs
- Relate graphical representations of quadratic, square root, and rational function to other representations
- Determine quadratic functions from roots or a graph
- Compare and translate between algebraic and graphical solutions of quadratic equations

Probability & Statistics

Displaying & Interpreting Data

- Gather and record data or use data sets to determine, interpret and make inferences from functional relationships between quantities
- Represent relationships among quantities in multiple ways, including graphs and tables
- Collect and organize data, make and interpret scatterplots, and model, predict, and make decisions and critical judgments to solve problems
- Translate among and use multiple forms of linear functions, including tables of data
- Use tables of data to interpret the meaning of slope and intercepts of linear functions, determine slope and intercepts and predict the effect of changing slope and y-intercept in applied situations
- Investigate methods and solve linear equations, inequalities, an systems, including using concrete models and tables
- Solve quadratic equations, including using concrete models and tables
- Use tables to analyze data and represent situations involving inverse variation and exponential growth and decay

Displaying & Interpreting Data

- Formulate and test conjectures about geometric properties using constructions, explorations, patterns, and concrete models

Displaying & Interpreting Data

- Collect, record, organize data, make scatterplots and describe with a parent functions, interpret results, and make predictions to model and solve problems
- Solve equations, inequalities, and systems modeled by functions using graphs and tables
- Relate tabular representations of quadratic, square root, and rational function to other representations