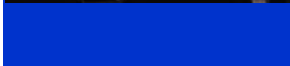
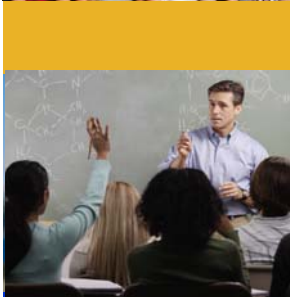




Oklahoma State Department of Education



The Parent's Guide to
HIGH SCHOOL
MATH
STANDARDS
Priority
Academic Student Skills
(PASS)

Sandy Garrett, State Superintendent



<http://www.sde.state.ok.us>

(405) 521-3361

A Message from
Sandy Garrett
State Superintendent



As Oklahoma's elected education leader and advocate for children, I am committed to ensuring that all students in our state have the essential skills needed for a high quality life.

Oklahoma's *Priority Academic Student Skills (PASS)* serve as a set of specific school standards covering all areas of a student's academic growth: English language arts, mathematics, science, social studies, the arts, and world languages. Oklahoma's *PASS* documents were developed by and for educators. These detailed sets of standards guide teachers and school leaders as they plan curriculum, instruction, and assessment for your student. The complete *PASS* documents are available on the Oklahoma State Department of Education Web site <www.sde.state.ok.us>.

Your student's school needs you as a partner in building these essential skills. To help you, we have created parent guides, which summarize Oklahoma's *PASS*, explaining essential skills and concepts your student will learn at each grade level. We encourage you to use these guides as a reference in conversations with your student's teachers and principals. We also encourage you to use the guides to talk with your children every day about what they are learning in school.

All the Best!

A handwritten signature in black ink that reads "Sandy Garrett". The signature is written in a cursive, flowing style.

ALGEBRA I

OVERVIEW OF ESSENTIAL SKILLS AND KNOWLEDGE

The math framework is what students should know, understand, and be able to do in mathematics. Students combine process and content as they use reasoning and critical thinking skills to develop their understandings of Algebra.

The mathematics process standards are:

- ◆ Problem Solving.
- ◆ Communication.
- ◆ Reasoning.
- ◆ Connections.
- ◆ Representation.

The Algebra content standards are:

- ◆ Number Sense and Algebraic Operations.
- ◆ Relations and Functions.
- ◆ Data Analysis, Probability and Statistics.



ALGEBRA I

Problem Solving – The student will use a variety of problem-solving approaches to ask and answer questions about mathematics and the real world.

- ◆ Apply a wide variety of problem-solving strategies to solve problems from within and outside mathematics.
 - ◆ Identify a problem in a real-world situation, determine the necessary data to solve the problem, and apply appropriate strategies to solve the problem.
-

Communication – The student will use a variety of techniques to communicate mathematically.

- ◆ Use mathematical language and symbols to read and write mathematics and to converse with others.
 - ◆ Demonstrate mathematical ideas orally and in writing.
 - ◆ Develop mathematical definitions and use appropriate terminology.
-

Reasoning – The student will use a variety of mathematical reasoning skills to solve problems.

- ◆ Use logical reasoning in mathematical contexts and real-world situations.
 - ◆ Prepare suppositions, test conjectures, verify conclusions, and justify solutions to mathematical problems.
 - ◆ Justify mathematical statements through proofs.
-

Connections – The student will make connections between different aspects of mathematics, other disciplines, and the real world.

- ◆ Link mathematical ideas to the real world (example: statistics help qualify the confidence we have when drawing conclusions based on a sample).

ALGEBRA I

- ◆ Apply mathematical problem-solving skills to other subjects, such as science and social studies, and to problems encountered in daily life.
- ◆ Relate areas of mathematics to one another.

Representation – The student will use a variety of representations to express data and mathematical ideas.

- ◆ Use a variety of algebraic, graphic, and numeric representations to model and interpret mathematical and real world situations.
- ◆ Use mathematical representations as tools for organizing, recording, and communicating.

Number Sense and Algebraic Operations – The student will use expressions and equations to model number relationships.

- ◆ Use equations and expressions to represent word phrases and sentences.
- ◆ Solve multistep equations and equations involving multiple variables.
- ◆ Use formulas and mathematical concepts to solve multistep problems arising in mathematics, science, statistics, and the real world.
- ◆ Simplify and evaluate expressions, including linear, absolute value, radical, rational, and polynomial expressions.

Relations and Functions – The student will use relations and functions to model number relationships.

- ◆ Apply the concepts of relations and functions to solve problems.
- ◆ Solve and graph linear equations and inequalities.
- ◆ Develop, analyze, and interpret the concept of slope in mathematical and real-world contexts.

ALGEBRA I

- ◆ Solve systems of equations (sets of multiple equations with multiple variables).
- ◆ Solve and graph nonlinear functions, including exponential and quadratic functions.

Data Analysis, Probability and Statistics – The student will use data analysis, probability, and statistics to formulate and justify predictions from a set of data.

- ◆ Represent data using a variety of tables, graphs, or symbols and understand that different modes of representation often convey different messages.
- ◆ Make inferences, predictions, and arguments based on data from graphs, tables, and charts.
- ◆ Solve multistep problems involving probability measures of central tendency (mean, median, and mode).
- ◆ Collect data involving two variables, create a scatter plot to display the data, interpret the results using a linear equation, and determine if the equation is the best model for the data.



GEOMETRY

OVERVIEW OF ESSENTIAL SKILLS AND KNOWLEDGE

The math framework is what students should know, understand, and be able to do in mathematics. Students combine process and content as they use reasoning and critical thinking skills to develop their understandings of Geometry.

The mathematics process standards are:

- ◆ Problem Solving
- ◆ Communication
- ◆ Reasoning
- ◆ Connections
- ◆ Representation

The Geometry content standards are:

- ◆ Logical Reasoning
- ◆ Properties of 2-Dimensional Figures
- ◆ Triangles and Trigonometric Ratios
- ◆ Properties of 3-Dimensional Figures
- ◆ Coordinate Geometry

GEOMETRY

Problem Solving – The student will use a variety of problem-solving approaches to ask and answer questions about mathematics and the real world.

- ◆ Apply a wide variety of problem-solving strategies to solve problems from within and outside mathematics.
 - ◆ Identify a problem in a real-world situation, determine the necessary data to solve the problem, and apply appropriate strategies to solve the problem.
-

Communication – The student will use a variety of techniques to communicate mathematically.

- ◆ Use mathematical language and symbols to read and write mathematics and to converse with others.
 - ◆ Demonstrate mathematical ideas orally and in writing.
 - ◆ Develop mathematical definitions and use appropriate terminology.
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Reasoning – The student will use a variety of mathematical reasoning skills to solve problems.

- ◆ Use logical reasoning in mathematical contexts and real-world situations.
 - ◆ Prepare suppositions, test conjectures, verify conclusions, and justify solutions to mathematical problems.
 - ◆ Justify mathematical statements through proofs.
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Connections – The student will make connections between different aspects of mathematics, other disciplines, and the real world.

- ◆ Link mathematical ideas to the real world (example: minimizing surface area of a rectangular prism can save money in packaging cereal).

GEOMETRY

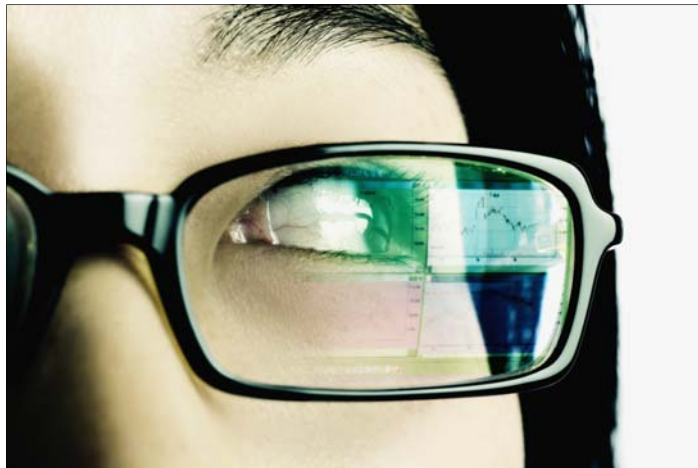
- ◆ Apply mathematical problem-solving skills to other subjects, such as science and social studies, and to problems encountered in daily life.
- ◆ Relate areas of mathematics to one another.

Representation – The student will use a variety of representations to express data and mathematical ideas.

- ◆ Use a variety of algebraic, graphic, and numeric representations to model and interpret mathematical and real world situations.
- ◆ Use mathematical representations as tools for organizing, recording, and communicating.

Logical Reasoning – The student will use deductive and inductive reasoning to solve problems.

- ◆ Use logical reasoning to make and test conjectures, formulate counter examples, and follow logical arguments.
- ◆ State, use, and examine the validity of “if-then” and related statements.
- ◆ Compare properties of Euclidean and non-Euclidean geometries (example: compare properties of two-dimensional geometry to properties of elliptical geometry as shown on a globe).



GEOMETRY

Properties of 2-Dimensional Figures - The student will use the properties and formulas of geometric figures to solve problems.

- ◆ Use geometric tools, such as protractors, compasses, and rulers, to construct a variety of figures.
- ◆ Use the relationships formed by special pairs of angles and intersecting lines to solve problems.
- ◆ Describe and use properties of two-dimensional figures to solve problems, such as determining missing angle and segment measurements.
- ◆ Use the relationships of similar and congruent two-dimensional figures to solve problems and verify using formal arguments and proofs.
- ◆ Use the relationships of angles and segment lengths created by circles and intersecting lines to solve problems.

Triangles and Trigonometric Ratios - The student will use the properties of right triangles and trigonometric ratios to solve problems.

- ◆ Use the Pythagorean Theorem, trigonometric ratios, and relationships of special right triangles to find missing measurements and to solve real-world problems.
- ◆ Verify results of problems involving the Pythagorean Theorem, trigonometric ratios, and relationships of special right triangles using formal arguments and proofs.

Properties of 3-Dimensional Figures - The student will use the properties and formulas of geometric figures to solve problems.

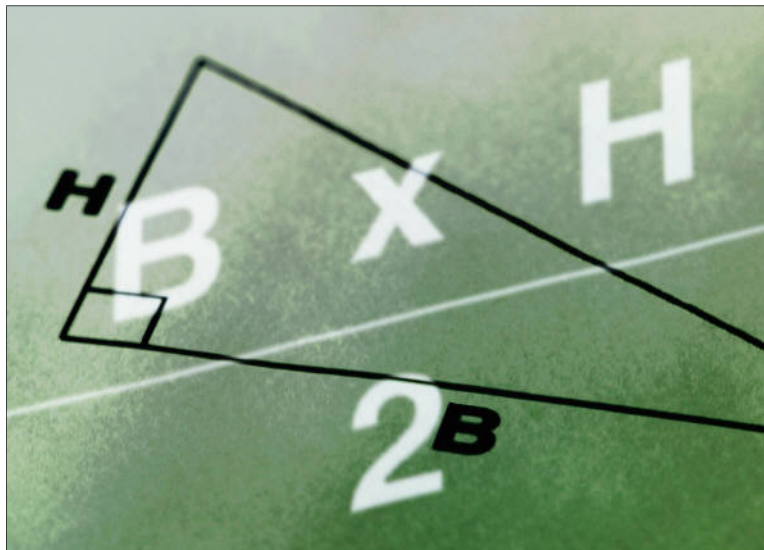
- ◆ Describe and use properties of three-dimensional figures to solve problems, such as determining missing angle and segment measurements.

GEOMETRY

- ◆ Use the relationships of similar and congruent three-dimensional figures to solve problems.
- ◆ Create two-dimensional representations of three-dimensional figures (for example, blueprints of a house and sketches of three-dimensional figures from various perspectives).

Coordinate Geometry - The student will solve problems with geometric figures in the coordinate plane.

- ◆ Solve problems using a coordinate grid, such as finding the distance between two points, determining the midpoint of a line segment, and calculating the slope of various lines.
- ◆ Given a set of points on a coordinate grid, determine the type of figure formed and verify using mathematical arguments.
- ◆ Describe the effect of basic transformations – translation (slide), reflection (flip), and rotation (turn) – on objects and figures.
- ◆ Use reflection (flip), rotation (turn), and translation (slide) to transform geometric figures on a coordinate grid.



ALGEBRA II

OVERVIEW OF ESSENTIAL SKILLS AND KNOWLEDGE

The math framework is what students should know, understand, and be able to do in mathematics. Students combine process and content as they use reasoning and critical thinking skills to develop their understandings of Algebra.

The mathematics process standards are:

- ◆ Problem Solving
- ◆ Communication
- ◆ Reasoning
- ◆ Connections
- ◆ Representation

The Algebra content standards are:

- ◆ Number Systems and Algebraic Operations
- ◆ Relations and Functions
- ◆ Data Analysis and Statistics

ALGEBRA II

Problem Solving – The student will use a variety of problem-solving approaches to ask and answer questions about mathematics and the real world.

- ◆ Apply a wide variety of problem-solving strategies to solve problems from within and outside mathematics.
- ◆ Identify a problem in a real-world situation, determine the necessary data to solve the problem, and apply appropriate strategies to solve the problem.

Communication – The student will use a variety of techniques to communicate mathematically.

- ◆ Use mathematical language and symbols to read and write mathematics and to converse with others.
- ◆ Demonstrate mathematical ideas orally and in writing.
- ◆ Develop mathematical definitions and use appropriate terminology.

Reasoning – The student will use a variety of mathematical reasoning skills to solve problems.

- ◆ Use logical reasoning in mathematical contexts and real-world situations.
- ◆ Prepare suppositions, test conjectures, verify conclusions, and justify solutions to mathematical problems.
- ◆ Justify mathematical statements through proofs.



ALGEBRA II

Connections – The student will make connections between different aspects of mathematics, other disciplines, and the real world.

- ◆ Link mathematical ideas to the real world (example: functions can be used to predict cost, revenue, and profit of various business endeavors).
- ◆ Apply mathematical problem-solving skills to other subjects, such as science and social studies, and to problems encountered in daily life.
- ◆ Relate areas of mathematics to one another.

Representation – The student will use a variety of representations to express data and mathematical ideas.

- ◆ Use a variety of algebraic, graphic, and numeric representations to model and interpret mathematical and real world situations.
- ◆ Use mathematical representations as tools for organizing, recording, and communicating.



ALGEBRA II

Number Systems and Algebraic Operations – The student will perform operations with rational, radical, and polynomial expressions, as well as expressions involving complex numbers.

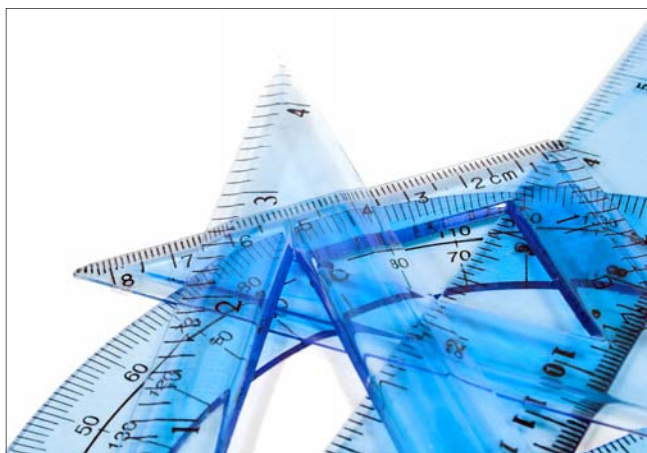
- ◆ Use the relationship between radical expressions and expressions with rational exponents and perform operations on radical expressions and expressions with rational exponents.
- ◆ Perform operations on polynomial and rational expressions, including complex fractions.
- ◆ Understand when solving problems requires the use the complex and imaginary numbers.
- ◆ Perform operations on expressions involving complex and imaginary numbers to solve problems.

Relations and Functions – The student will use the relationships among the solution of an equation, zero of a function, x-intercepts of a graph, and factors of a polynomial expression to solve problems involving relations and functions.

- ◆ Apply the concepts of relations and functions to solve problems.
- ◆ Solve and graph systems of equations (sets of multiple equations with multiple variables) to answer questions about situations in the real world.
- ◆ Solve and graph quadratic functions and equations to answer questions about situations in the real world.
- ◆ Graph and interpret the relationship between exponential and logarithmic functions to answer questions about situations in the real world.
- ◆ Solve and graph polynomial equations and functions to answer questions about situations in the real world.

ALGEBRA II

- ◆ Solve and graph rational equations and functions to answer questions about situations in the real world.
- ◆ Identify, graph, and write the equations of the conic sections (circle, ellipse, parabola, and hyperbola).



Data Analysis and Statistics - The student will use data analysis and statistics to formulate and justify predictions from a set of data.

- ◆ Collect data involving two variables; create a scatter plot to display the data; interpret the results using a linear, exponential, or quadratic equation; and determine if the equation is the best model for the data.
- ◆ Analyze data from a sample using appropriate measures of central tendency (mean, median, mode, and weighted average); measures of variability (range, variance, and standard deviation); and the effects of outliers.
- ◆ Identify and use arithmetic and geometric sequences and series to solve problems.

HELPFUL NUMBERS

Curriculum

Assistant State Superintendent, (405) 521-4514

Team Leader, (405) 522-3521

Director, Arts in Education, (405) 521-3034

Director, Reading and Literacy, (405) 521-2537

Director, Language Arts, (405) 522-3522

Director, World Languages, (405) 521-3035

Director, Mathematics, (405) 522-3525

Director, Social Studies, (405) 522-3523

Director, Science, (405) 522-3524



OKLAHOMA STATE DEPARTMENT OF EDUCATION

SANDY GARRETT
STATE SUPERINTENDENT
OF PUBLIC INSTRUCTION

