



Arizona Mathematics Standards

Eighth Grade

ARIZONA DEPARTMENT OF EDUCATION
HIGH ACADEMIC STANDARDS FOR STUDENTS
December 2016

Eighth Grade: Overview

1. Develop understanding of rational numbers.
 2. Develop understanding of expressions and equations, including solving linear equations, linear inequalities, and systems of equations.
 3. Develop understanding of the concept of a function and use functions to describe quantitative relationships, including modeling an association in bivariate data with a linear equation.
- (1) Students use their understanding of multiplication and apply properties to develop understanding of radicals and integers. They use their knowledge of rational numbers to develop understanding of irrational numbers.
 - (2) Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y = mx + b$) understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input x -coordinate changes by an amount A , the output y -coordinate changes by the amount $m \cdot A$. Students fluently solve linear equations and linear inequalities in one variable. They solve systems of two linear equations in two variables to analyze situations and solve problems. Students understand when they use properties of equality and logical inference, they maintain the solutions of the original equation.
 - (3) Students grasp the concept of a function as a rule that assigns to each input exactly one output. They can translate verbal descriptions and partial representations of functions (noting that tabular and graphical representations may be partial representations), and they describe how aspects of the function are reflected in the different representations. Students use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For scatter plots that suggest linear association, students informally fit a straight line and assess the model fit by judging the closeness of the data points to the line.

The Standards for Mathematical Practice complement the content standards so that students increasingly engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years.

Content Emphasis of Arizona Mathematics Standards:

The content emphasis provides planning guidance regarding the Major and Supporting Clusters found within the standards. The Major and Supporting Clusters align with the Blueprint for AzMERIT. Please consider the following designations when planning an instructional scope for the academic year.

Arizona considers Major Clusters as groups of related standards that require greater emphasis than some of the other standards due to the depth of the ideas and the time it takes to master these groups of related standards.

Arizona considers Supporting Clusters as groups of related standards that support standards within the major cluster in cross-grade levels. Supporting Clusters also encompass prerequisite and extension of grade level content.

Arizona is suggesting instructional time encompass a range of at least 65% for Major Clusters and a range of 25% for Supporting Cluster instruction. See [Introduction](#) page 12 for more information.

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Eighth Grade Standards Overview

Grade level content emphasis indicated by: Major Cluster **X** Supporting Cluster

Arizona is suggesting instructional time encompass a range of at least 75% for Major Clusters and a range of 25-35% for Supporting Clusters instruction. See [Introduction](#), page 12 for more information.

The Number System (NS)

Ef Understand that there are irrational numbers, and approximate them using rational numbers.

Expressions and Equations (EE)

Ef Work with radicals and integer exponents.

Ef Understand the connections between proportional relationships, lines, and linear equations.

Ef Analyze and solve linear equations, inequalities, and pairs of simultaneous linear equations.

Functions (F)

Ef Define, evaluate, and compare functions.

Ef Use functions to model relationships between quantities.

Geometry (G)

- x Understand congruence and similarity.
- x Understand and apply the Pythagorean Theorem.
- x Solve realworld and mathematical problems involving volume of cylinders, cones, and spheres.

Statistics and Probability (SP)

- x Investigate patterns of association in bivariate data.
- x Investigate chance processes and develop, use, and evaluate probability models.

Standards for Mathematical Practices (MP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

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The Number System (NS)

<p>8.NS.A Understand that there are irrational numbers, and approximate them using rational numbers.</p>	<p>8.NS.A.1</p>	<p>Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion. Know that numbers whose decimal expansions do not terminate in zeros or in a repeating sequence of fixed digits are called irrational.</p>
	<p>8.NS.A.2</p>	<p>Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate their values.</p>

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8.EE.C

Analyze and solve linear equations, inequalities, and pairs of simultaneous linear equations.

8.EE.C.7

Fluently solve linear equations and inequalities in one variable.

a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solution. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Geometry (G)

8.G.A
Understand congruence and similarity.
8.G.A.1

Verify experimentally the properties of rotations, reflections, and translations. Properties include: lines are taken

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Statistics and Probability (SP)

8.SP.A Investigate patterns of association in bivariate data.	8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
	8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
	8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
	8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two

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Standards for Mathematical Practice

8.MP.1

Make sense of problems and persevere in solving them.
Mathematically proficient students explain to themselves the meaning of a problem, look for entry points to begin work on the problem, and plan and choose a solution pathway. While engaging in productive struggle to solve a problem, they continually ask themselves, "Does this make sense?" to monitor and evaluate their progress and change course if necessary. Once they have a solution, they look back at the problem to determine if the solution is reasonable and accurate. Mathematically proficient students check their solutions to problems using different methods, approaches, or representations. They also compare and understand different representations of problems and different solution pathways, their own and those of others.

8.MP.2

Reason abstractly and quantitatively.
Mathematically proficient students make sense of quantities and their relationships in problem situations. Students can contextualize and decontextualize problems involving quantitative relationships. They contextualize quantities, operations, a
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8.MP.5	<p>Use appropriate tools strategically.</p> <p>Mathematically proficient students consider available tools when solving a mathematical problem. They choose tools that are relevant and useful to the problem at hand. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful; recognizing both the insight to be gained and their limitations. Students deepen their understanding of mathematical concepts when using tools to visualize, explore, compare, communicate, make and test predictions, and understand the thinking of others.</p>
8.MP.6	<p>Attend to precision.</p> <p>Mathematically proficient students clearly communicate to others using appropriate mathematical terminology and craft explanations that convey their reasoning. When making mathematical arguments about a solution, strategy, or conjecture, they describe mathematical relationships and connect their words clearly to their representations. Mathematically proficient students understand meanings of symbols used in mathematics, calculate accurately and efficiently, label quantities appropriately, and record their work clearly and concisely.</p>
8.MP.7	<p>Look for and make use of structure.</p> <p>Mathematically proficient students use structure and patterns to assist in making connections among mathematical ideas or concepts when making sense of mathematics. Students recognize and apply general mathematical rules to complex situations. They are able to compose and decompose mathematical ideas and notation into familiar relationships. Mathematically proficient students manage their own progress, stepping back for an overview and shifting perspective when needed.</p>
8.MP.8	<p>Look for and express regularity in repeated reasoning.</p> <p>Mathematically proficient students look for and describe regularities as they solve multiple related problems. They formulate conjectures about what they notice and communicate observations with precision. While solving problems, students maintain oversight of the process and continually evaluate the reasonableness of their results. This informs and strengthens their understanding of the structure of mathematics which leads to fluency.</p>