

Mathematics in the Eighth Grade

Mathematics in the middle grades should be exciting, useful, and creative. Adolescent students are at a significant transition point in their development. They experience physical, emotional and intellectual changes that affect the remainder of their lives. Students are drawn to math if it is challenging and meaningful, and if they receive the necessary support in the classroom.

Students at this level begin to leave the world of arithmetic and number and begin to discover and immerse themselves into the world of algebra and geometry. These two topics are crucial in the eighth grade and provide the foundation for future math courses.

Students deepen their understanding of number and operations by becoming proficient with rational numbers. Rational numbers include positive and negative whole numbers as well as all of the fractions. They also become more proficient in computation and estimation with rational numbers. In addition, students are expected to become more flexible with the relationships among fractions, decimals and percents.

While exploring and learning about algebra, students focus on linear (straight line) relationships and all of the different ways in which we represent a linear relationship like tables, graphs,

and equations. Students will also be able to solve linear equations.

Geometry is also given a large amount of attention in eighth grade. It is important that students see the relationship and connections between algebra and geometry. Students will be able to recognize the algebraic representations of geometry and see geometric models that are represented by algebraic expressions.

Finally, the concept of proportions is crucial at this stage. Proportions can be taught throughout all of the various topics in math. Some of the ideas include ratio and proportion, percent, similarity, scaling, linear equations, slope, relative-frequency histograms, and probability.

For complete information on the Arizona Academic Standards go to www.ade.az.gov/standards/contentstandards.asp

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*Parents' Guide to
Grade Level
Learning Targets
for Mathematics*

Grade 8

Osborn School District

Grade 8 Mathematics

Targets

Number Sense

- Locate rational numbers on a number line, identify irrational numbers, and classify real numbers as rational or irrational.
- Apply the symbols “ $\sqrt{\quad}$ ” to represent square root, “ \pm ” to represent roots, and “ $\{\}$ ” as grouping symbols.
- Use appropriate mathematical terminology.
- Calculate the missing value in a percentage problem.
- Simplify numerical expressions using the order of operations on number sets.
- Solve problems using estimation.
- Use estimation to verify the reasonableness of a calculation.
- Express answers to the appropriate place or degree of precision.

Data Analysis and Probability

- Construct and interpret box-and-whisker plots, circle graphs and scatter plots.
- Solve problems in contextual situations using the mean, median, mode, and range of a given data set.
- Solve contextual problems using scatter plots, box-and-whiskers plots, and double line graphs of continuous data.
- Evaluate the effects of missing or incorrect data on the results of an investigation.
- Identify a line of best fit for a scatter plot.
- Determine the probability that a specific event will occur in a 2-stage probability experiment.
- Solve contextual situations using probability.
- Predict the outcome and record data from a probability experiment.
- Distinguish between independent and

- Compare the results of two repetitions of the same probability experiment.
- Determine all possible outcomes involving the combination of two or more sets of objects.
- Determine all possible arrangements given a set.

Patterns, Algebra and Functions

- Communicate, extend, and solve an iterative or recursive pattern, using symbols or numbers.
- Distinguish between linear and nonlinear functions, given graphic examples.
- Determine whether a graph or table is related to a given equation of the form $y=ax^2$ where ‘a’ is a natural number.
- Identify independent and dependent variables for a contextual situation.
- Evaluate algebraic expressions by substituting rational values for variables [e.g., $2(ab+ac+bc)$, when $a = 2$, $b = 3/5$, and $c = 4$].
- Translate a written sentence or phrase into an algebraic equation or expression, and vice versa.
- Translate a contextual situation into an algebraic inequality.
- Identify an equation or inequality that represents a contextual situation.
- Solve one-step equations with rational numbers as coefficients or as solutions.
- Solve one-step equations that model contextual situations.
- Solve two-step equations with rational coefficients and integer solutions (e.g., $3x + 5 = 11$, $4x - 20 = 8$).
- Solve a simple algebraic proportion.
- Solve applied problems using the Pythagorean theorem.
- Identify the slope of a line as the rate of change (the ratio of rise over run).

Geometry and Measurement

- Draw a model that demonstrates basic geometric relationships such as parallelism, perpendicularity, similarity/proportionality, and congruence.

- Recognize the 3-dimensional figure represented by a net.
- Identify the properties of angles created by a transversal intersecting two parallel lines.
- Recognize the relationship between inscribed angles and intercepted arcs.
- Identify tangents and secants of a circle.
- Determine whether three given lengths can form a triangle.
- Identify corresponding angles of similar polygons as congruent and sides as proportional.
- Identify the planar geometric figure that is the result of a given rigid transformation.
- Model a simple transformation on a coordinate grid.
- Use a table of values to graph a linear equation.
- Determine the midpoint given two points on a number line.
- Determine the distance between two points on a number line.
- Solve problems for the area of a trapezoid.
- Solve problems involving the volume of rectangular prisms and cylinders.
- Calculate the surface area of rectangular prisms or cylinders.
- Solve problems using ratios and proportions, given the scale factor.
- Calculate the length of a side, given two similar triangles.

Structure and Logic

- Describe how to use a proportion to solve a problem in context.
- Solve a logic problem given the necessary information.
- Identify simple valid arguments using *if...then* statements.
- Verify the Pythagorean theorem using an area dissection argument.