Parent Guide to the Standards
8th Grade
Mathematics

This guide provides a summary of what your child will learn by the end of eighth grade in mathematics in the state of Kansas. This guide will also give some examples of the eighth grade mathematics so you can assist your child. To view the standards in their entirety, please go to:

http://community.ksde.org/Default.aspx?tabid=5276

The 2017 Kansas Mathematics Standards are divided into two sections. The first section is the same for every grade level from prekindergarten to 12th grade and is described below. The Standards for Mathematical Practice address *how* mathematics should be taught and *how* the students should engage with the mathematics. The second section outlines the content at each grade level.

Standards for Mathematical Practice — 8th

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.

Your child will be taught skills that will encourage critical thinking and problem solving. Some examples include:

- Students in the eighth grade solve real-world problems through the application of algebraic and geometric concepts.
- Students construct arguments using verbal or written explanations accompanied by expressions, equations, inequalities, models, graphs, tables, and other data displays.
- Students apply properties to generate equivalent expressions and examine patterns in tables and graphs to generate equations and describe relationships.
- Students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning.
- Students use repeated reasoning to understand algorithms and make generalizations about patterns.

Content Standards for Mathematics — 8th

The specific skills and content your child will be taught come from the content standards. The domains are listed with some examples of the mathematics at the 8th grade level.

The Number System:

- Understand that real numbers are either rational or irrational, distinguishing between rational and irrational numbers and estimating their locations on a number line.

Expressions and Equations:

- Identify the unit rate (or slope) in graphs, tables and equations to compare two proportional relationships represented in different ways.
- Solve one-variable equations including those with the variables on both sides of the equals sign.

Functions:

- Understand a rule that takes x as input and gives y as output is a function when there is exactly one y-value associated with any x-value.
- Identify the rate of change (slope) and initial value (y-intercept) from tables, graphs, equations, or verbal descriptions to write a function (linear equation).

Geometry:

- Measure angles and use facts about supplementary, complementary, vertical and adjacent angles to solve simple equations for an unknown angle.
- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems.

Statistics and Probability:

- Represent numerical data on a scatterplot to examine the relationships between variables.

Samples of Math Applications — 8th

8^{th} grade students recognize that squaring a number and taking the square root $(\sqrt{})$ of a number are inverse operations; likewise, cubing a number and taking the cube root $(\sqrt[3]{})$ of a number are inverse operations.

Example: Solve $x^2 = 64$

Solution: $\sqrt{x^2} = 64 \rightarrow x = \pm 8$. Note, there are two solutions because $8 \cdot 8$ and $-8 \cdot -8$ will both equal 64.

Real-Life Application

If the area of a square rug is 25 ft^2, what is the length of each side of the rug?

Solution: $\sqrt{25} = 5$ ft. The length of each side is 5 ft.
(Note: while $\sqrt{25} = 5\ and\ -5$, the only answer that makes sense in this situation is 5.)

Why Must I Learn Math?

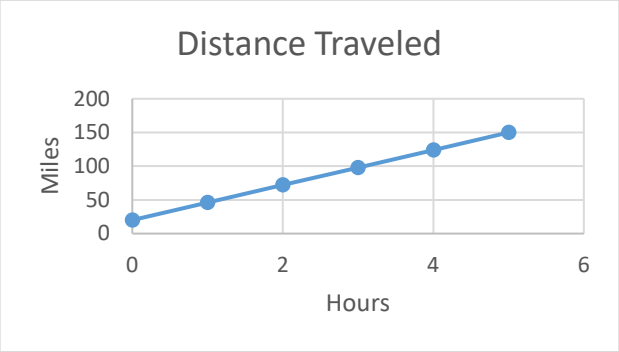
Here is a Math Guide!
http://www.mathguide.com/issues/whymath.html#6

Proportional Relationships, Lines, and Linear Equations

Eighth grade students build on their work with unit rates from 6th grade and proportional relationships in 7th grade to compare graphs, tables, and equations of proportional relationships.

Example: Compare the scenarios to determine which represents a greater speed. Explain your choice including a written description of each scenario.

Scenario 1:



Scenario 2:

$y = 45x$
x is time in hours
y is distance in miles

Solution: Scenario 2 has the greater speed since the unit rate is 45 miles per hour and the unit rate of Scenario 1 is only 26 miles per hour.

Career Applications

Health care professionals such as doctors and nurses often use linear equations to calculate medication dosages based on the weight of their patients.

Electrical engineers use linear equations to solve problems involving voltage, current, and resistance.

Financial planners use linear equations to calculate their client's stock value.

Modeling with Functions

Students identify the rate of change (slope) and initial value (y-intercept) from tables, graphs, equations, or verbal descriptions to write a function. (Note: Function notation is not required in eighth grade.)

Example: A canoe rental company charges a flat fee of $85 along with $45 per hour to rent a canoe. Write a function, C, that models the cost to rent a canoe for h hours.

Solution: Equation solution: $C = 45h + 85$
Table Solution:

Hours (h)	Cost (c) in dollars
1	85+45=130
2	85+45+45=175
3	85+45+45+45=220
4	85+45+45+45+45=265

Students may also write the solution using a graph or verbal description.

Real-Life Applications

Compound interest is a function of initial investment, interest rate, how often the interest is compounded, and time.

The circumference of a circle is a function of its diameter.

A monthly salary is a function of the number of hours worked and the hourly pay rate.

Why Study Math?

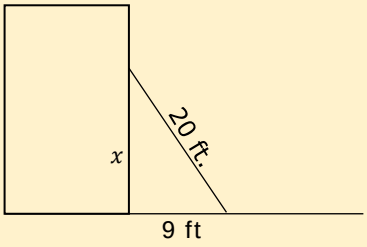
Ask Dr. Math!
http://mathforum.org/dr.math/faq/faq.why.math.html

Pythagorean Theorem

Eighth grade students apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.

Example: A fireman has a 20-foot ladder that is propped against a building. If the base of the ladder is 9 feet from the building, will it reach the bottom of a window that is 16 feet from the ground?

Solution:



$x^2 + 9^2 = 20^2$
$x^2 + 81 = 400$
$x^2 = 319$
$\sqrt{x^2} = \sqrt{319}$
$x \approx 17.86$

The ladder will reach approximately 17.86 feet up the side of the building, so it will reach the bottom of a window that is 16 feet from the ground.

Math Careers

http://www.careercornerstone.org/math/math.htm

Helpful Websites:

- ✓ Kansas Math Standards – http://community.ksde.org/Default.aspx?tabid=5276
- ✓ Parent Roadmaps from the Council of Great City Schools – https://www.cgcs.org/cms/lib/DC00001581/Centricity/Domain/36/ParentGuide_Math_8.pdf
- ✓ PTA's Parent Guides to Student Success – https://www.pta.org/docs/default-source/uploadedfiles/8th-grade-june20