

8th Grade Mathematics

Key Instructional Activities

In grade eight, students take their understanding of unit rates and proportional relationships to a new level, connecting these concepts to points on a line and ultimately using them to solve linear equations that require them to apply algebraic reasoning as well as knowledge of the properties of operations. Students will also expand their understanding of numbers beyond rational numbers to include numbers that are irrational—meaning that they cannot be written as a simple fraction, such as the square root of 2 or $\sqrt{2}$.

Activities in these areas will include:

- Understanding that every *rational* number (such as $\frac{1}{2}$, 0.3, 2, or -2) can be written as a decimal, but that the decimal form of an *irrational* number (such as $\sqrt{2}$) is both non-repeating and infinite
- Applying the properties of exponents to generate equivalent numerical expressions
- Determining the value of square roots of small perfect squares (such as $\sqrt{49} = 7$) and cube roots of small perfect cubes (such as $\sqrt[3]{64} = 4$)
- Graphing proportional relationships and interpreting the unit rate as the *slope* (how steep or flat a line is)
- Solving and graphing one- and two-variable linear equations
- Understanding that a *function* is a rule that assigns to each value of x exactly one value of y , such as $y=2x$, a rule that would yield such ordered pairs as (-2,-4), (3,6), and (4,8)
- Comparing the properties of two functions represented in different ways (in a table, graph, equation, or description)
- Determining *congruence* (when shapes are of equal size and shape) and *similarity* (same shape but different sizes)
- Learning and applying the Pythagorean Theorem (an equation relating the lengths of the sides of a right triangle: $a^2 + b^2 = c^2$)
- Solving problems involving the volume of cylinders, cones, and spheres



What resources
are available for
students and
parents?

<https://hcbemath.weebly.com/>



- ✓ Online Math Textbook
- ✓ Parent Portal
- ✓ Overview of Units and Pacing
- ✓ The Learn Button!



What is the Learn Button on the Weebly Site? *Link to Georgia Virtual School Modules for instructional videos, examples, and practice by unit.*

8th Math Course Overview

Unit 1: Number System Fluency

Expected Dates: Beginning of School Year to Late August

In this unit, student will; find the greatest common factor of two whole numbers less than or equal to 100, find the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. Interpret and compute quotients of fractions. Solve word problems involving division of fractions by fractions using visual fraction models and equations to represent the problem. Fluently divide multi-digit numbers using the standard algorithm Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Unit 2: Expressions

Expected Dates: September to Early October

In this unit, students understand the use of variables in mathematical expressions. They become more fluent at viewing expressions as objects in their own right versus calculations. Students write expressions that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students will understand that expressions in different forms can be equivalent, and they will use the properties of operations to generate and rewrite expressions in equivalent forms. The Mathematical Practices should be evident throughout instruction of symbolic expressions and connected to the content. Students should engage in mathematical tasks that provide an opportunity to connect content and practices.

Unit 3: One-Step Equations and Inequalities

Expected Dates: Mid-October to Early November

In this unit, understand Solving and Equation or Inequality is based on understanding the important role equivalence plays in the number and operation strand of mathematics. Based on the equivalence understanding, students learn a process for solving equations (6.EE.5), and begin to see the usefulness of variables (6.EE.8). Students learn to use equations and inequalities to describe relationships in data or in patterns of numbers or shapes, and then make statements about these relationships based on the structure of mathematics. This includes processes such as: using substitution to make an equation true, and using variables to represent numbers and inequalities. Students practice using critical thinking to solve word problems using number lines and equations to model thinking.

Unit 4a: Rate, Ratio, and Proportional Reasoning Using Equivalent Fractions

Expected Dates: Early November to December

Students learn that a ratio expresses the comparison between two quantities. Special types of ratios are rates, unit rates, measurement conversions, and percentages are concepts that are applied to a variety of real world and mathematical situations. Students gain a deeper understanding of proportional reasoning through instruction and practice. They develop and use multiplicative thinking to develop a sense of proportional reasoning as they describe ratio relationships between two quantities.

Unit 4b: Analyzing Quantitative Relationships

Expected Dates: January

In this unit, Student will analyze the relationship between dependent and independent variables through the use of tables, equations and graphs. Ratios and rates can be used in ratio tables and graphs to solve problems. Previously, students have used additive reasoning in tables to solve problems. Graph data that occurs as a result of relationships between varying quantities in the coordinate plane. Analyze graphs and tables to determine the relationship between varying quantities. Describe how change in one variable

Unit 5: Area and Volume

Expected Dates: Late January to Late-February

In this unit students will:
Find areas of right, equilateral, isosceles, and scalene triangles, and special quadrilaterals, Find areas of composite figures and polygons by composing into rectangles and decomposing into triangles and other shapes, Solve real-world and mathematical problems involving area Decipher and draw views of rectangular and triangular prisms from a variety of perspectives, Recognize and construct nets for rectangular and triangular prism, Find the surface area of rectangular and triangular prisms by using manipulatives and by constructing nets, Determine the surface area of rectangular and triangular prisms by substituting given values for their dimensions into the correct formulas; Solve real-world that require determining the surface area of rectangular and triangular prisms

Unit 6: Rational Explorations: Numbers and Their Opposites

Expected Dates: Late February to Late March

In this unit students will: understand that positive and negative numbers are used together to describe quantities having opposite directions or values, understand a rational number as a point on the number line, Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates, recognize opposite signs of numbers as indicating locations on opposite recognize that the opposite of the opposite of a number is the number itself, understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane, recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes, find and position integers and other rational numbers on a horizontal or vertical number line diagram, find and position pairs of integers and other rational numbers on a coordinate plane, understand ordering and absolute value of rational numbers, interpret statements of inequality as statements about the relative write, interpret, and explain statements of order for rational numbers in real-world contexts, understand the absolute value of a rational number as its distance from 0 on the number line, interpret absolute value as magnitude for a positive or negative quantity in a real-world situation, distinguish comparisons of absolute value from statements about order, solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.

Unit 7: Statistics

Expected Dates: Late March to May

Students develop a sense of statistical variability, summarizing and describing distributions. Students gain experience doing investigations, especially statistical investigations, by starting with a question. The data gathered to answer the question is interpreted in light of the variability of the data relative to the situation where the data resides, the question being asked and how the data is distributed over the data set. Whether larger numbers such as those involving populations of states or small, such as the changes in plant height over a week, the variability of the data matters. Student learn to make histogram and box plot data displays, and further their expertise with dot plots (line plots) when working with measurements or quantities that are counted. The shape of displayed data, especially symmetry, is considered in analysis of data distributions, including the identification of clusters, peaks and gaps. Measures of central tendency and spread, including median, quartiles, the interquartile range, are used.

affects the other. Use written descriptions, tables, graphs and equations to represent relationships between varying quantities.

Helpful Tips for Parents and Guardians

Believe that every child can be successful in math. It takes good teaching, coaching, encouragement and practice.

Partnering with your child's teacher

- Get to know your child's math teacher! Your child will thank you (someday) for being involved in his or her learning. Also – know about the online resources that are available!

- Don't be afraid to reach out to your child's teacher—you are an important part of your child's education. Ask to see a sample of your child's work or bring a sample with you.

- Talk with your child's teacher about difficulties he/she may be experiencing. When teachers and parents work together, children benefit.

- Ask the teacher questions like:

- Where is my child excelling? How can I support this success?

- What do you think is giving my child the most trouble? How can I help my child improve in this area?

- What can I do to help my child with upcoming work?

Helping your child learn outside of school

- Talk about math in a positive way. A positive attitude about math is infectious. Encourage your child to stick with it whenever a problem seems difficult. This will help your child see that everyone can learn math.

- Encourage persistence. Some problems take time to solve. Praise your child when he or she makes an effort, and share in the excitement when he or she solves a problem or understands something for the first time

- Encourage your child to experiment with different approaches to mathematics. There is often more than one way to solve a math problem.

- Encourage your child to talk about and show a math problem in a way that makes sense

- When your child is solving math problems ask questions such as: Why did you...? What can you do next? Do you see any patterns? Does the answer make sense? How do you know? This helps to encourage thinking about mathematics.

- Connect math to everyday life and help your child understand how math influences them (i.e. shapes of traffic signs, walking distance to school, telling time).

- Play family math games together that add excitement such as checkers, junior monopoly, math bingo and uno.

- Computers + math = fun! There are great computer math games available on the internet that you can discover with your child.