News from the Mathematics 7/8 Course

Dear Parents,

In Unit 2, students continue with the study of Ratios and Proportional Reasoning initiated in Grade 6. Proportional reasoning has been referred to as the capstone of the elementary curriculum and the cornerstone of algebra and beyond. Proportional reasoning is the ability to think about and compare multiplicative relationships between quantities. Students represent proportional relationships with equations in the form of $y = kx$, where $k$ is the constant of proportionality that relates two proportional quantities. They graph proportional relationships using pegboards, and recognize that the graph of such relationships forms a straight line passing through the origin.

In Unit 2, students will...

- Recognize and represent proportional relationships with equations, tables and graphs.

In Unit 3, students use Cuisenaire rods and bar diagrams to visually represent unknowns and constants. Models help them understand the meaning of a solution and analyze how an inequality has an infinite number of solutions. Students learn how to use inverse operations to find solutions in equations and inequalities. This leads to an understanding of the Properties of Equality that can be used to keep an equation or inequality balanced. Students also work with perfect squares, perfect cubes, radicals, exponential expressions and scientific notation using tiles and cubes.

In Unit 3, students...

- Evaluate square roots and cube roots and extend their knowledge by solving equations using both.
- Appreciate that the square root of a non-perfect square is an irrational number.
- Multiply and divide exponential expressions with the same base and multiply expressions with different bases using the Properties of Integer Exponents.
- Compare and estimate very large and very small quantities using scientific notation.

We, in the Anne Arundel County middle school mathematics office, require effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of the mathematical ideas and reason mathematically. All students can learn mathematics at high levels, and with your support at home, we hope to achieve that with your child. Thank you for your continued support.

The Middle School Mathematics Office
**Important Concepts**

**Unit 2 Important Concepts**

- Ratios compare two quantities and have associated rates.
- Unit rate can be thought of as the constant of proportionality.
- Iterating and partitioning can be used to find equivalent ratios called a proportion.
- Graphed proportions form a straight line that passes through the origin.

**Unit 3 Important Concepts**

- Rational number includes whole numbers and integers, as well as numbers that can be written as the quotient of two integers, \( \frac{a}{b} \).
- Irrational numbers cannot be expressed as a quotient of two integers.
- Between any two rational numbers there are infinitely many rational and irrational numbers.
- There is an inverse relationship between perfect squares and square roots, and perfect cubes and cube roots. Most square roots are irrational numbers, which can be approximated using perfect squares.
- The Properties of Integer Exponents help with simplifying expressions.
- Writing very small and very large numbers in scientific notation makes it possible to add, subtract, multiply, and divide these numbers efficiently.

**Vocabulary**

**Unit 2 Vocabulary**

Proportional relationships form when two quantities vary directly with each other.

Constant of proportionality is the constant multiple that relates the proportional quantities \( x \) and \( y \). It's the value of the ratio \( \frac{y}{x} \) and represented by \( k \) such that \( y = kx \).

**Unit 3 Vocabulary**

Isolate the Variable is to get the variable by itself on one side of an equation.

Rational number is a number that can be written in the form of \( \frac{a}{b} \) while an irrational number cannot.

Square root of a number is a number that when multiplied by itself equals the original number. The radical symbol \( \sqrt{\ } \) is used to denote the nonnegative square root.

Cube root of a number is a number whose cube is equal to the number.

Properties of Integer Exponents follow below:

- **Product of Powers Property** states that when multiplying two powers with the same base, add the exponents.
- **Power of Products Property** states that when multiplying two exponential expressions with the same exponent and different bases, multiply the bases and keep the exponents the same.
- **Quotient of Powers Property** states that when dividing two exponential expressions with the same base, subtract the exponents.
- **Zero Exponent Property** states that \( a^0 = 1 \).
- **Negative Exponent Property** states that \( a^{-n} = \frac{1}{a^n} \).

Scientific notation is written as a product of two factors, one greater than or equal to one and less than ten, and the other a power of ten.
Real World Connections

Shopping –

The grocery store is a good source of ratios and proportions in real life. While looking at the prices of various groceries, you can easily illustrate ratios using two different boxes of cereal.

If a 10-ounce box of cereal costs $3 and a 20-ounce box of cereal costs $5, which is the better buy? How do you know?

Travel –

The universal travel question “Are we there yet?” is another example of ratios and proportions.

While taking a road trip from Annapolis to Boston, you must travel approximately 430 miles. Assuming the car travels at 65 miles per hour, how long will it take to drive to Boston?

Microbiology –

The work of scientists often involves the use of very large and very small numbers. Microbiologists, for example, work with very large quantities of very tiny organisms. Expressed numerically, microbiologists examine billions of cells (>10^9) under the microscope that can be as small as one millionth of a meter (10^-6) in diameter.

The length of plant cell A is 8 x 10^-5 meter. The length of plant cell B is 0.000004 meter. How many times greater is plant cell A’s length than plant cell B’s length?