



## G-E-T Middle School Curriculum

### Align, Explore, Empower

Scope and Sequence

Math - Grade 8

#### Unit 1 - The Real Number System

~3 weeks

In this unit, students will be able to identify and classify numbers in the following categories: real, rational/irrational, integer, whole, natural. They will also be able to convert between fractions, decimals, and percents and follow the order of operations with rational numbers.

#### Standards for Grade 8

The students will:

- Know that there are numbers that are not rational, and approximate them by rational numbers.
- Work with radicals and integer exponents.

#### Unit 2 - Algebraic Expressions

~4 weeks

In this unit, students will translate, simplify, and factor expressions. They will also work fluidly with exponent rules for monomials including: quotient rule, product rule, power rule, zero exponents, and negative exponents. Students will use that knowledge to complete operations in scientific notation. This unit also introduces work with adding and subtracting polynomials.

#### Standards for Grade 8

The students will:

- Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
- Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. They will also use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.

#### Unit 3 - Equations & Inequalities

~5 weeks

In this unit, students will fluently solve one, two, and multi-step equations. They will learn to identify if an equation has one solution, no solution, or infinitely many solutions. They will also practice translating and solving their own algebraic equations including word problems. Finally, students will solve and graph two-step and multi-step inequalities.

#### Standards for 8

The students will:

- Give examples of linear equations in one variable with one solution, infinitely many solutions, or no

solutions. 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).

- Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

#### Unit 4 - Ratios, Proportions, & Percents

~4 weeks

In this unit, students will be reminded how to calculate rates and unit rates. They will also solve proportions algebraically and in word problem format. They will also relate their knowledge to scale drawings and models, similar figures, and indirect measurement. Finally, students will solve percent proportions, percent equations (discount and markup), and calculate the percent of change.

#### Standards for 8

The students will:

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

#### Unit 5 - Functions & Linear Relationships

~5 weeks

In this unit, students will learn the format  $y=mx+b$  for linear equations and how the variables “ $m$ ” and “ $b$ ” affect the graph of the line. They will calculate the slope and  $y$ -intercept of a line from a table, graph, or equation, and be able to interpret them from word problems. Students will also explore vertical and horizontal lines and how their graphs, tables, and equations differ from others.

#### Standards for 8

The students will:

- Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
- Define, evaluate, and compare functions.
- Investigate patterns of association in bivariate data.

#### Unit 6 - Systems of Equations

~3 weeks

In this unit, students will learn that two or more equations is called a system of equations. They will identify if a system of equations has one solution, no solution, or infinitely many solutions by graphing. Students will also identify number of solutions by using substitution and elimination. Students will also interpret real-world situations involving two variables.

#### Standards for Grade 8

The students will:

- Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- Solve systems of two linear variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example,  $3x + 2y = 5$  and  $3x + 2y = 6$  have no solution because

$3x + 2y$  cannot simultaneously be 5 and 6.

- Solve real-world and mathematical problems leading to two linear equations in two variables.

Unit 7 - Geometry

~7 weeks

In this unit, students will learn a lot of vocabulary regarding angles and angle relationships. They will be able to identify various angles created when cutting parallel lines by a transversal and the relationships between those angles. Students will learn the Pythagorean Theorem and apply it to real world situations. This unit also includes transformations of rigid figures including: reflections, translations, rotations, and dilations.

### Standards for 8

The students will:

- Verify experimentally the properties of rotations, reflections, and translations:
  - Lines are taken to lines, and line segments to line segments of the same length.
  - Angles are taken to angles of the same measure.
  - Parallel lines are taken to parallel lines.
- Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
- Use informal arguments to establish facts about the angle sum and exterior angle of triangles, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and given an argument in terms of transversals why this is so.
- Explain a proof of the Pythagorean Theorem and its converse.
- Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in right triangles in real-world and mathematical problems in two and three dimensions.
- Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Unit 8 - Measurement (Area & Volume)

5 weeks

In this unit, students will be reminded of basic area and perimeter/circumference formulas. They will then move into volume of 3D figures and learn how their volumes change when dimensions are changed. Students will finally work with perimeter and area of similar figures and volume and surface area of similar solids.

### Standards for 8

The students will:

- Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.