8th Grade Math Syllabus

Chapter 1 Algebra: Integers and Algebraic Expressions Key Concepts
- The student will learn to compare and order integers.
- The student will use appropriate operations to solve problems involving integers.
- The student will learn and use the properties of numbers.
- The student will find solutions to application problems using equations.

Chapter 1 – Lesson Objectives
- The student will write algebraic expressions and evaluate them using the order of operations
  - MA 8.2.1.a, MA 8.2.1.b
- The student will find the absolute values of integers and use absolute value to compare integers.
  - MA 8.1.1.d, MA 8.1.2.c
- The student will add and subtract integers and solve problems involving integers.
  - MA 8.1.2.e
- The student will multiply and divide integers and solve problems involving integers.
  - MA 8.1.2.e
- The student will identify the properties of numbers and use the properties to solve problems.
  - MA 8.1.2.e
- The student will solve equations using addition and subtraction. (Review)
  - 3rd, 6th, and 7th grade concept at varying DOK
- The student will write and solve equations using multiplication and division. (Review)
  - 3rd, 6th, and 7th grade concept at varying DOK

Chapter 2 Rational Numbers – Key Concepts
- The student will compare and order rational numbers, including positive and negative fractions and decimals.
- The student will use addition, subtraction, multiplication and division to solve problems involving rational numbers.
- The student will write and use numbers with exponents, including numbers in scientific notation. The student will simplify numerical expressions involving roots.

Chapter 2 – Lesson Objectives
- The student will identify prime and composite numbers and find the greatest common factor. (Review)
  - 4th and 6th grade concept
- The student will write equivalent fractions and decimals.
  - MA 8.1.1.c
- The student will use least common denominators, decimals, and number lines to compare and order rational numbers.
  - MA 8.1.1.d
- The student will add and subtract fractions and mixed numbers and solve problems involving rational numbers. Understanding fractions allows you to make more accurate measurements as carpenters, electricians, plumbers, and tailors. (Review)
  - 4th, 5th, 6th, and 7th grade concept

- The student will multiply and divide fractions and mixed numbers and solve problems involving rational numbers. Sometimes objects need to be divided into smaller pieces. (Review)
  - 4th, 5th, 6th, and 7th grade concept
- The student will evaluate using formulas. When you solve a formula for a variable, you use inverse operations and the properties of equality. When you can substitute a value for all but one of the variables in a formula, you can then solve for the remaining unknown value.
  - MA 8.1.2.e
- The student will evaluate expressions using positive and negative exponents. An exponent applies only to its base so $(-3)^2$ is 9 but -3^2 is -9. (e.g. $4\wedge(-2) = 1/16$)
  - MA 8.1.1.b
- The student will write numbers in scientific notation and decimal notation. Scientific notation is a brief way to write very large or very small numbers.
  - MA 8.1.1.b
- The student will multiply and divide numbers using scientific notation.
  - MA 8.1.2.d

Chapter 3 Real Numbers and the Coordinate Plane – Key Concepts
- Approximate the value of irrational numbers and use the Pythagorean Theorem to solve real-world problems.
- Graph points and lines in the coordinate plane.
- Translate, reflect, and rotate figures.

Chapter 3 - Lesson Objectives
- The student will find and estimate square roots less than or equal to 400 and cube roots less than or equal to 125 and classify numbers as rational or irrational.
  - MA 8.1.1.a, MA 8.1.1.c, MA 8.1.2.a
- The student will use the Pythagorean Theorem to find the length of the hypotenuse of a right triangle.
  - MA 8.3.3.b
- The student will use the Pythagorean Theorem to find missing measurements of triangles.
  - MA 8.1.2.e, MA 8.3.3.b
- The student will graph points and use the Pythagorean Theorem to find distances in the coordinate plane.
  - MA 8.3.3.c
- The student will use tables, equations and graphs to solve problems.
  - MA 8.2.3.a, MA 8.2.3.b
- The student will graph and describe translations in the coordinate plane.
  - MA 8.3.2.a
- The student will graph reflections in the coordinate plane and will identify lines of symmetry.
  - MA 8.3.2.a
- The student will graph rotations and identify rotational symmetry.
  - MA 8.3.2.a
- Tessellations use rotations, translations, and/or reflections to make repeating designs. Students will know which figures can form tessellations and make their own tessellating diagrams.
  - local

Chapter 4 Applications of Proportions – Key Concepts
- Solve problems involving ratios, rates and proportions.
- Use proportions in real-world applications, including scale models and indirect measurement.
- Graph dilations in the coordinate plane.

Chapter 4 - Lesson Objectives
- The student will write ratios and unit rates and use rates to solve problems. (6th grade)
  - MA 8.1.2.e
- The student will convert units within and between the customary and metric systems.
  - 9th-11th grade concept
- The student will identify and solve proportions. (7th grade)
  - MA 8.1.2.e
- The student will identify similar figures and to use proportions to find missing measurements in similar figures.
  - 9th-11th grade
- Translations, reflections, and rotations change a figure's position but not its size or shape. A dilation transformation changes the size but not the shape. To define a dilation, you need to know the scale factor and the point that is the center of dilation.
  - MA 8.3.2.a, MA 8.3.2.c
- A scale model can be smaller or larger than the object that it represents. The student will use the scale of a map to find actual distance between locations. (Review)
  - 7th grade
- The student will use indirect measurement to determine the height of objects uses the properties of similar triangles.
  - MA 8.1.2.e

Chapter 5 Applications of Percent - Key Concepts
- Compare and order integers, percents, fractions, and decimals.
- Use estimation, proportions, and equations to solve problems involving percents.
- Use ratios to find probability.

Chapter 5 - Lesson Objectives
- A percent expresses parts per 100. The percent symbol, %, means "per 100". Percents can be between 1% and 100%, less than 1%, and greater than 100%. Percent is relative to the size of the whole.
  - 5th and 6th grade
- The student will estimate using decimals and fractions. In real-life situations, it is sometimes useful to estimate the percent of a number by multiplying by the percent in decimal form.
  - MA 8.1.1.a, MA 8.1.2.e
- The student will use proportions to find part of a whole, a whole amount, or a percent. Finding the percent of a number means finding a portion of the number that is proportional to the percent. (6th and 7th grade)
  - MA 8.1.2.e
- The student will use equations to solve problems involving percents. (6th grade)
  - MA 8.1.2.e, MA 8.2.1.a
- The student will find percent of change and solve problems involving percent of increase and percent of decrease.
  - MA 8.1.2.e
- The student will use percent of change to find markup, discount, and selling price.
  - local

- The student will find simple interest and account balances.
  - local
- The student will find probablility and the sample space of an event.
  - 7th and 9th-11th grade

Chapter 6 Equations and Inequalities – Key Concepts
- The student will simplify algebraic expressions.
- The student will solve problems by writing and solving multi-step equations.
- The student will write, solve, and graph inequalities.

Chapter 6 - Lesson Objectives
- The student will solve two-step equations and use two-step equations to solve problems. (Review)
  - 3rd and 7th grade
- The student will combine like terms and simplify algebraic expressions. (Review)
  - 6th and 7th grade
- The student will write and solve multi-step equations.
  - MA 8.2.2.a, MA 8.2.3.a, MA 8.2.3.b, MA 8.2.3.c
- The student will write and solve equations with variables on both sides.
  - MA 8.2.2.a, MA 8.2.3.a, MA 8.2.3.b, MA 8.2.3.c
- The student will write and solve inequalities. The solution set will contain infinitely many points.
  - MA 8.2.1.a, MA 8.2.2.b
- The student will write and solve inequalities using multiplication and division. Solving equations and inequalities involve isolating the variable on one side. There is one key difference: when you multiply or divide an inequality by a negative number, the direction of the inequality symbol reverses.
  - MA 8.1.2.e, MA 8.2.1.a, MA 8.2.2.b

Chapter 7 Geometry - Key Concepts
- The student will use the properties of pairs of angles and parallel lines to find angle measures.
- The student will find the areas of geometric figures, including parallelograms, triangles, trapezoids, and circles.
- The student will construct congruent angles and parallel lines using a compass and straightedge.

Chapter 7 - Lesson Objectives
- The student will identify types of angles and to find angle measures using the relationship between angles. (Review)
  - 4th grade (acute, obtuse, etc.) and 7th grade (adjacent, complementary, supplementary, etc.)
- The student will identify parallel lines and the angles formed by parallel lines and transversals.
  - MA 8.3.1.b
- The student will identify congruent figures and use them to solve problems.
  - MA 8.3.2.b
- The student will classify triangles and quadrilaterals. (Review)
  - 4th grade
- The student will find the angle measures of a polygon.
  - MA 8.3.1.a
- The student will find the areas of parallelograms, triangles, and trapezoids. (Review)

o 6th and 7th grade
▪ The student will find the circumference and area of a circle and the area of irregular figures. (Review)
o 7th grade

Chapter 8 Measurement - Key Concepts
▪ The student will classify and draw three-dimensional figures.
▪ The student will find the surface areas and volumes of prisms, cylinders, pyramids, cones, and spheres.
▪ The student will use proportions to find missing measurements in similar solids.

Chapter 8 - Lesson Objectives
▪ The student will identify solids, parts of solids, and skew line segments.
o Local
▪ The student will draw views of three-dimensional figures, including base plans and isometric views.
o Local
▪ The student will identify nets of solids. (Review)
o 6th grade
▪ The student will find surface areas of prisms and cylinders using nets and formulas. (Review)
o 6th and 7th grade
▪ The student will find surface areas of pyramids and cones using nets and formulas. (Review)
o 6th and 7th grade
▪ The student will find the volumes of prisms and cylinders.
o MA 8.3.3.d (prisms are in 6th grade)
▪ The student will find the volumes of pyramids and cones.
o MA 8.3.3.d
▪ The student will find the surface area and volume of a sphere.
o MA 8.3.3.d
▪ The student will use proportions to find missing measurements of similar solids including surface areas and volumes.
o 9th-11th grade

Chapter 9 Using Graphs to Analyze Data - Key Concepts
▪ The student will use different types of graphs to represent and analyze data.
▪ The student will make predictions using trends in scatter plots.
▪ The student will read graphs critically and choose an appropriate graph to display a set of data.

Chapter 9 - Lesson Objectives
▪ The student will describe data using mean, median, mode, and range and choose an appropriate measure of central tendency.
o 6th grade and 9th-11th grade
▪ The student will use line plots, frequency tables, and histograms to represent data.
o 6th grade, local
▪ The student will recognize misleading graphs and choose appropriate scales.
o 3rd and 4th grade, local
▪ The student will represent and interpret data using box-and-whisker plots.
o local
▪ The student will represent and interpret data using circle graphs. (Review)
o 7th grade

- The student will make scatter plots to use trends to make predictions.
  - MA 8.4.1.a
- The student will represent and interpret data using stem-and-leaf plots.
  - Local

Chapter 10 Probability - Key Concepts
- The student will use theoretical and experimental probabilities to make predictions and decisions.
- The student will use permutations and combinations to count outcomes.
- The student will evaluate methods of sampling and identify biased and unbiased survey questions.

Chapter 10 - Lesson Objectives
- The student will find theoretical probability, experimental probability, and odds.
  - 7th grade
- The student will make predictions based on theoretical and experimental probabilities.
  - 5th grade
- The student will identify random samples and biased questions and to judge conclusions based on survey results.
  - 7th and 9th-11th grade
- The student will find probabilities of independent and dependent events.
  - 7th grade
- The student will find the number of permutations of a set of objects.
  - 9th-11th grade (counting techniques)
- The student will find the number of combinations of a set of objects using lists and combination notation.
  - 9th-11th grade (counting techniques)

Chapter 11 Functions – Key Concepts
- The student will identify types of sequences and describe them using verbal descriptions and algebraic expressions.
- The student will calculate the slopes of lines and use slope to write equations and draw graphs.

Chapter 11 – Lesson Objectives
- The student will write rules for sequences and use rules to find terms in a sequence.
  - local
- The student will interpret and sketch graphs that represent real-world situations.
  - local
- The student will represent functions with equations, tables, and function notation.
  - 9th-11th grade
- The student will find the slope of a line from a graph or table.
  - MA 8.2.1.b, MA 8.2.1.d
- The student will use tables and equations to graph linear functions.
  - MA 8.2.1.a, MA 8.2.1.b
- The student will write function rules from words, tables, and graphs.
  - MA 8.2.1.a, MA 8.2.3.a