# Anthony Wayne Local Schools

**Course of Study**

Sixth Grade Mathematics

**Anthony Wayne Local Schools Mathematics Belief Statements**

All Generals will experience an innovative and engaging curriculum with instruction that is personalized, promotes creativity and application, and provides real-world experiences that facilitate deeper learning.

***AWLS believes Mathematics instruction should:***

- identify skill gaps for individual students and work to close them
- include engaging learning activities where all learners can grow through productive struggle.
- develop strong number sense with the ability to manipulate numbers and perform mental math with an emphasis on subitizing
- provide scenarios where real world problems help to provide a path towards being future ready students.
- develop strong mathematical modeling and reasoning skills that continually build on prior knowledge.
- encourage students to be risk takers, demonstrate resilience and grit, while solving complex mathematical problems.
- encourage flexibility, creativity, and communication while working collaboratively with peers.
- include consistent and cohesive academic vocabulary through all grade-levels that is utilized by both teachers and students

**Sixth Grade Mathematics Course Description**

Sixth grade students will work toward mastery of the Ohio Learning Standards for mathematics. Students will investigate variables, expressions, equations, inequalities, working with decimals, working with fractions, integers, rational numbers, coordinate geometry, ratios, rates, percents, area, surface area, and volume. Instruction will promote teamwork, critical thinking, problem solving, mathematical reasoning, modeling of mathematical concepts, and will foster the development of number sense.

| Domain/ Conceptual Category | Standard | Standard Statement |
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| Ratios and Proportional Relationships | 6.RP.1 | **Understand ratio concepts and use ratio reasoning to solve problems.**<br>**6.RP.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."* |

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| Ratios and Proportional Relationships | 6.RP.2 | **Understand ratio concepts and use ratio reasoning to solve problems.**<br>**6.RP.2** Understand the concept of a unit rate *a/b* associated with a ratio *a:b* with $b \neq 0$, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."* |
| Ratios and Proportional Relationships | 6.RP.3 | **Understand ratio concepts and use ratio reasoning to solve problems.**<br>**6.RP.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagramsG, double number line diagramsG, or equations.<br>**a.** Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.<br>**b.** Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*<br>**c.** Find a percent of a quantity as a rate per 100, e.g., 30% of a quantity means 30/100 times the quantity; solve problems involving finding the whole, given a part and the percent.<br>**d.** Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities. |
| The Number System | 6.NS.1 | **Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**<br>**6.NS.1** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction modelsG and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 pound of chocolate equally? How many 3/4 cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?* |
| The Number System | 6.NS.2 | **Compute fluently with multi-digit numbers and find common factors and multiples.**<br>**6.NS.2** FluentlyG divide multi-digit numbers using a standard algorithmG. |
| The Number System | 6.NS.3 | **Compute fluently with multi-digit numbers and find common factors and multiples.**<br>**6.NS.3** Fluently add, subtract, multiply, and divide multi-digit decimals using a standard algorithm for each operation. |
| The Number System | 6.NS.4 | **Compute fluently with multi-digit numbers and find common factors and multiples.**<br>**6.NS.4** Find the greatest common factor of two whole numbers less than or equal to 100 and 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 |

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| | | numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).* |
| The Number System | 6.NS.5 | **Apply and extend previous understandings of numbers to the system of rational numbers.**<br>**6.NS.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values, e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. |
| The Number System | 6.NS.6 | **Apply and extend previous understandings of numbers to the system of rational numbers.**<br>**6.NS.6** 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.<br>**a.** Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., − (−3) = 3, and that 0 is its own opposite.<br>**b.** 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.<br>**c.** 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. |
| The Number System | 6.NS.7 | **Apply and extend previous understandings of numbers to the system of rational numbers.**<br>**6.NS.7** Understand ordering and absolute value of rational numbers.<br>**a.** Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret −3 > −7 as a statement that −3 is located to the right of −7 on a number line oriented from left to right.*<br>**b.** Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write −3°C > −7°C to express the fact that −3°C is warmer than −7 °C.*<br>**c.** 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. *For example, for an account balance of −30 dollars, write \|−30\| = 30 to describe the size of the debt in dollars.*<br>**d.** Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than −30 dollars represents a debt greater than 30 dollars.* |

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| The Number System | 6.NS.8 | **Apply and extend previous understandings of numbers to the system of rational numbers.**<br>**6.NS.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. |
| Expressions and Equations | 6.EE.1 | **Apply and extend previous understandings of arithmetic to algebraic expressions.**<br>**6.EE.1** Write and evaluate numerical expressions involving whole number exponents. |
| Expressions and Equations | 6.EE.2 | **Apply and extend previous understandings of arithmetic to algebraic expressions.**<br>**6.EE.2** Write, read, and evaluate expressions in which letters stand for numbers.<br>**a.** Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.*<br>**b.** Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*<br>**c.** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, using the algebraic order of operations when there are no parentheses to specify a particular order. *For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length s = 1/2.* |
| Expressions and Equations | 6.EE.3 | **Apply and extend previous understandings of arithmetic to algebraic expressions.**<br>**6.EE.3** Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.* |
| Expressions and Equations | 6.EE.4 | **Apply and extend previous understandings of arithmetic to algebraic expressions.**<br>**6.EE.4** Identify when two expressions are equivalent, i.e., when the two expressions name the same number regardless of which value is substituted into them. *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.* |
| Expressions and Equations | 6.EE.5 | **Reason about and solve one-variable equations and inequalities.**<br>**6.EE.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. |

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| Expressions and Equations | 6.EE.6 | **Reason about and solve one-variable equations and inequalities.**<br>**6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. |
| Expressions and Equations | 6.EE.7 | **Reason about and solve one-variable equations and inequalities.**<br>**6.EE.7** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$, $q$, and $x$ are all nonnegative rational numbers. |
| Expressions and Equations | 6.EE.8 | **Reason about and solve one-variable equations and inequalities.**<br>**6.EE.8** Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams. |
| Expressions and Equations | 6.EE.9 | **Represent and analyze quantitative relationships between dependent and independent variables.**<br>**6.EE.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.* |
| Geometry | 6.G.1 | **Solve real-world and mathematical problems involving area, surface area, and volume.**<br>**6.G.1** Through composition into rectangles or decomposition into triangles, find the area of right triangles, other triangles, special quadrilaterals, and polygons; apply these techniques in the context of solving real-world and mathematical problems. |
| Geometry | 6.G.2 | **Solve real-world and mathematical problems involving area, surface area, and volume.**<br>**6.G.2** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = \ell \times w \times h$ and $V = B \times h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. |
| Geometry | 6.G.3 | **Solve real-world and mathematical problems involving area, surface area, and volume.**<br>**6.G.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. |

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| Geometry | 6.G.4 | **Solve real-world and mathematical problems involving area, surface area, and volume.**<br>**6.G.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. |
| Statistics and Probability | 6.SP.1 | **Develop understanding of statistical problem solving.**<br>**6.SP.1** Develop statistical reasoning by using the GAISE model:<br>**a.** Formulate Questions: Recognize and formulate a statistical question as one that anticipates variability and can be answered with quantitative data. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because of the variability in students' ages.* (GAISE Model, step 1)<br>**b.** Collect Data: Design and use a plan to collect appropriate data to answer a statistical question. (GAISE Model, step 2)<br>**c.** Analyze Data: Select appropriate graphical methods and numerical measures to analyze data by displaying variability within a group, comparing individual to individual, and comparing individual to group. (GAISE Model, step 3)<br>**d.** Interpret Results: Draw logical conclusions from the data based on the original question. (GAISE Model, step 4) |
| Statistics and Probability | 6.SP.2 | **Develop understanding of statistical variability.**<br>**6.SP.2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. |
| Statistics and Probability | 6.SP.3 | **Develop understanding of statistical variability.**<br>**6.SP.3** Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. |
| Statistics and Probability | 6.SP.4 | **Summarize and describe distributions.**<br>**6.SP.4** Display numerical data in plots on a number line, including dot plotsG (line plots), histograms, and box plotsG. (GAISE Model, step 3) |

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| Statistics and Probability | 6.SP.5 | **Summarize and describe distributions.**<br>**6.SP.5** Summarize numerical data sets in relation to their context.<br>**a.** Report the number of observations.<br>**b.** Describe the nature of the attribute under investigation, including how it was measured and its units of measurement.<br>**c.** Find the quantitative measures of center (median and/or mean) for a numerical data set and recognize that this value summarizes the data set with a single number. Interpret mean as an equal or fair share. Find measures of variability (range and interquartile rangeG) as well as informally describe the shape and the presence of clusters, gaps, peaks, and outliers in a distribution.<br>**d.** Choose the measures of center and variability, based on the shape of the data distribution and the context in which the data were gathered. |