Anthony Wayne Local Schools

Course of Study

Modeling and Reasoning

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

Modeling and ReasoningCourse Description:

The Mathematical Modeling and Reasoning course is designed to promote reasoning, problem-solving and modeling through thematic units focused on mathematical practices, while reinforcing and extending content in Number and Quantity, Algebra, Functions, Statistics and Probability, and Geometry. This course satisfies the credit requirement for Algebra 2.

Domain/ Conceptual Category	Standard	
Number and Quantity	N.Q.2	**Reason quantitatively and use units to solve problems.** **N.Q.2** Define appropriate quantities for the purpose of descriptive modeling.★
Number and Quantity	N.Q.3	**Reason quantitatively and use units to solve problems.** **N.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.★
Algebra	A.CED.1	**Create equations that describe numbers or relationships.** **A.CED.1** Create equations and inequalities in one variable and use them to solve problems. *Include equations and inequalities arising from linear, quadratic, simple rational, and exponential functions.*★ **a.** Focus on applying linear and simple exponential expressions. (A1, M1) **b.** Focus on applying simple quadratic expressions. (A1, M2) **c.** Extend to include more complicated function situations with the option to solve with technology. (A2, M3)
Algebra	A.CED.2	**Create equations that describe numbers or relationships.** **A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★ **a.** Focus on applying linear and simple exponential expressions. (A1, M1) **b.** Focus on applying simple quadratic expressions. (A1, M2) **c.** Extend to include more complicated function situations with the option to graph with technology. (A2, M3)
Algebra	A.CED.3	**Create equations that describe numbers or relationships.** **A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*★ (A1, M1) **a.** While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations. (A2, M3)

Algebra	A.CED.4	**Create equations that describe numbers or relationships.** **A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.★ **a.** Focus on formulas in which the variable of interest is linear or square. *For example, rearrange Ohm's law V=IR to highlight resistance R, or rearrange the formula for the area of a circle A=(π)r2to highlight radius r.* (A1) **b.** Focus on formulas in which the variable of interest is linear. *For example, rearrange Ohm's law V=IR to highlight resistance R.* (M1) **c.** Focus on formulas in which the variable of interest is linear or square. *For example, rearrange the formula for the area of a circle A=(π)r2 to highlight radius r.* (M2) **d.** While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations. (A2, M3)
Algebra	A.REI.4	**Solve equations and inequalities in one variable.** **A.REI.4** Solve quadratic equations in one variable. **a.** Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x – p)^2 = q$ that has the same solutions. **b.** Solve quadratic equations as appropriate to the initial form of the equation by inspection, e.g., for $x^2 = 49$; taking square roots; completing the square; applying the quadratic formula; or utilizing the Zero-Product Property after factoring. (+) **c.** Derive the quadratic formula using the method of completing the square.
Functions	F.LE.5	**Interpret expressions for functions in terms of the situation they model.** **F.LE.5** Interpret the parameters in a linear or exponential function in terms of a context.★
Geometry	G.GMD.3	**Explain volume formulas, and use them to solve problems.** **G.GMD.3** Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.★
Geometry	G.MG.1	**Apply geometric concepts in modeling situations.** **G.MG.1** Use geometric shapes, their measures, and their properties to describe objects, e.g., modeling a tree trunk or a human torso as a cylinder.★