Adair County Middle School

2019-2020

8th Grade MATH STANDARDS / PACING GUIDE

5 Key Skills

The Number System

Cluster: Know that there are numbers that are not rational and approximate them by rational numbers

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary
KY.8.NS.1 (MP.2, MP.6, MP.7) Understand informally that every number has a decimal expansion; the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational.	• **Convert repeating decimals into their fraction equivalents.** • **Identify rational numbers based on their decimal expansion. (repeating, and terminating)** • **Identify irrational numbers as numbers that are non-terminating and non-repeating.**	**Unit 1** Weeks 1-3	• **Terminate decimals** • **Repeating decimals** • **fractions** • **Rational** • **Irrational**
KY.8.EE.2 (MP.5, MP.6) Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that perfect squares and perfect cubes are rational.	• **Find square roots of small perfect squares and small perfect cubes. (with basic fractions).** • **Solve small non-linear equations of the form x^2=p and x^3=p and identify solutions a sqrt(x).** • **Estimate small non-perfect square roots using multiplication to the tenth. (sqrt(2) is between 1.4 and 1.5)**		• **Square/Cube (squaring a number)** • **Square/cube root** • **Non-perfect square/ cube root**
KY.8.NS.2 (MP.2, MP.7, MP.8) Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions.	• **Use rational approximations of irrational numbers to compare the sizes or irrational numbers, locate, and plot them approximately on a number line diagram, and then estimate the value of the expressions.** • **Use estimate values to compare two irrational numbers using <, >, =.**		• **Estimate** • **Number line (vertical/horizontal)** • **Greater than** • **Less than** • **Equal to** • **Compare**

Expressions and Equations

Cluster: Work with radicals and integer exponents

Standard	Learning Target We are learning to.....	Window of Instruction (weeks)	Essential Vocabulary

KY.8.EE.1 (MP.3, MP.7, MP.8)
Know and apply the properties of integers exponents to generate equivalent numerical expressions.
	• **Describe and apply the properties of integer exponents to simplify expressions.**
	  ○ **Multiplication**
	  ○ **Division**
	  ○ **Power to Power**
	  ○ **Negative**
	  ○ **Zero**
		Unit 2
		Weeks 4-8
			• **Exponent Rules**
			  ○ **Multiplication**
			  ○ **Division**
			  ○ **Power to Power**
			  ○ **Negative**
			  ○ **Zero**

KY.8.EE.3 (MP.3, MP.5, MP.6) Use numbers expressed in the form of a	• **Express very large and small numbers in scientific**		• **Scientific Notation** • **Standard Form**

single digit times an integer power of 10 (Scientific Notation) to estimate very large or very small quantities and express how many times larger or smaller one is than the other.	**notation.** • **Compare and order numbers in scientific notation.** • **Determine the proportional difference between scientific numbers. (How many times larger is…)**		
KY.8.EE.4 (MP.2, MP.5, MP.6) Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.	• **Add, subtract, multiply, and divide numbers in scientific notation.** • **Choose appropriate units for real-life situations.** • **Interpret scientific notation that is generated by technology.**		• **Units of measure** • **Technology notation** • **"1 E12"**

Expressions and Equations

Cluster: Understand the connections between proportional relationships, lines and linear equations

Standard	Learning Target We are learning to……	Windows of Instruction (weeks)	Essential Vocabulary
KY.8.EE.5 (MP.2, MP.3, MP.4) Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.	• **Graph proportional relationships interpreting the unit rate as the slope of the graph.** • **Use a table, an equation or graph to decide the unit rate of a proportional relationship.** • **Use the unit rate to compare, contrast, and interpret multiple representations of proportional relationships (graphs, tables, equations, and verbal models).**	**Unit 3**	• **Unit Rate** • **Proportional relationship**
KY.8.EE.6 (MP.3, MP.4, MP.7) Use similar triangles to explain why the slope, *m*, is the same between any two distinct points on a non-vertical line in the coordinate plane; know the equation *y=mx* for a line through the origin and the equation *y=mx + b* for a line intercepting the vertical axis at *b*.	• **Use similar triangles to explain why the slope m is the same between two points on a non-vertical line in a coordinate plane.** • **Explain that an equation in the form y=mx will represent the graph of a proportional relationship with a slope of m and y-intercept of 0.** • **Explain that an equation in the form of y=mx+b represents the graph of a linear relationship with a slope of m and a y-intercept of b.**		• **Similar Triangles** • **Slope (*constant of roportionality)*** • **Rate of change** • **Y intercept** • **y=mx (*y=kx)*** • **y=mx+b** • **Linear equation/relationship** • **Positive slope** • **Negative slope** • **No slope** • **Undefined slope**

Expressions and Equations

Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations

Standard	Learning Target We are learning to……	Window of Instruction (weeks)	Essential Vocabulary

KY.8.EE.7 Solve linear equations in one variable (MP.2, MP.3, MP.7)			

a. 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 in one variable.**
	  ○ **One-step.**
	  ○ **Two-step.**
	  ○ **Multi-step with variables on both sides.**
	• **Simplify a linear equation using the distributive property and combining like terms.**
	• **Give examples of linear equations with one solution, infinitely many solutions, or no solutions.**
		Unit 4
		3 Weeks
			• **Solve**
			• **Simplify**
			• **variable**
			• **Distributive property**
			• **Combining like terms**
			• **One solution**
			• **Infinitely many solutions**
			• **No solution**

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.	• **Solve linear equations with rational number coefficients, including equations when solutions require expanding expressions using the distributive property and combining like terms.**		• **Coefficients** • **Expanding expressions**
KY.8.EE.8 Analyze and solve a system of two linear equations. (MP.1, MP.3, MP.4)			
a. 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; understand that a system of two linear equations may have one solution, no solution, or infinitely many solutions.	• **Analyze and solve pairs of simultaneous linear equations.** • **Explain solutions to a system of two linear equations in two variables as the point of intersection of their graph.** • **Describe the point of intersection between two lines as the point that satisfies both equations at the same time.** • **Describe instances when a system of equations will yield one solution, no solutions, or infinitely many solutions.**	**Unit 5** 3 weeks	• **Systems of equations** • **Solution of Systems (x,y)** • **Point of intersection**

b. Solve systems of two linear equations in two variables algebraically by using substitution where at least one equation contains at least one variable whose coefficient is 1 and by inspection for simple cases.	• **Solve a system of two equations (linear) in two unknowns algebraically.**
	• **Solve simple cases of systems of two linear equations in two variables by inspection.**
			• **Solve systems of equations by:**
			  ○ **Substitution**
			  ○ **Graphically**

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

Functions

Cluster: Define, evaluate and compare functions

Standard	Learning Target We are learning to…..	Windows of Instruction	Essential Vocabulary

		(weeks)	
KY.8.F.1 (MP.7, MP.8) Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	• **Define a function as a rule, where for each input there is exactly one output. (vertical line test, repeated inputs, etc..)** • **Show the relationship between inputs and outputs of a function by graphing them as ordered pairs on a coordinate grid.**	**Unit 6** 4 weeks	• **Function** • **Function Rule** • **Function Table** • **Input** • **Output** • **Vertical line test**
KY.8.F.2 (MP.1, MP.2, MP.4) Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	• **Determine the properties of a function given the inputs and outputs in a table.** • **Compare the properties of two functions that are represented differently (as equations, tables, graphs or given verbally).**		
KY.8.F.3 Understand properties of linear functions. (MP.7)			
a. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line.	• **Explain why the equations y=mx+b represents a linear function and then find the slope and y-intercept in relation to the function.**		
b. Identify and give examples of functions that are not linear	• **Give examples of relationships (graphs and equations) and create a table of values that can be defined as a non-linear function.**		• **Non-linear function**

Functions

Cluster: Use functions to model relationships between quantities

Standard	Learning Target We are learning to.....	Windows of instruction (weeks)	Essential Vocabulary
KY.8.F.4 Construct a function to model a linear relationship between two quantities (MP.4, MP.5, MP.8)			
a. Determine the rate of change and initial value of the function from a description of a relationship or from two (*x,y*) values, including reading these from a table or from a graph.	• **Create a function to model a linear relationship between two quantities.** • **Determine the rate of change and initial value of the function from decryption of the relationship of two (x,y) values, including reading a table or graph.**		
b. Interpret the rate of change and initial value of a linear function in terms of the	• **Interpret the rate of change and initial value**		

situation it models and in terms of its graph or a table of values.	**of a linear function in relation to the situation it models (in a table or graph).**		
KY.8.F.5 Use graphs to represent functions. (MP.3, MP.7)			
a. Describe qualitatively the functional relationship between two quantities by analyzing a graph.	• **Match the graph of a function to a given situation.**		
b. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	• **Sketch a graph that exhibits the qualitative features of a function that has been described verbally.**		

Geometry

Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software

Standard	Learning Target We are learning to…….	Windows of Instruction (weeks)	Essential Vocabulary

KY.8.G.1 (MP.5, MP.6)
Verify experimentally the properties of rotations, reflections and translations:
• Lines are congruent to lines.
• Line segments are congruent to line segments of the same length.
• Angles are congruent to angles of the same measure
• Parallel lines are congruent to parallel lines.
	• **Verify by measuring and comparing the properties of rotated, reflected or translated geometric figures.**
	• **Verify that corresponding lines and line segments remain the same length.**
	• **Verify that corresponding angles have the same measure.**
	• **Verify that corresponding parallel lines remain parallel.**
		Unit 7
		4 weeks
			• **Transformations**
			  ○ **Rotation**
			  ○ **Reflection**
			  ○ **Translation**
			• **Prime**
			• **Angles**
			• **Angle measure**
			• **Parallel lines**
			• **Congruent**

KY.8.G.2 (MP.2, MP.7) Understand that a two-dimensional figures 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.	• **Explain that a two-dimensional figure is congruent to another if the second figure can be made from the first by rotations, reflections, and translations.** • **Describe a sequence of transformations that shows the congruence between two figures.**		• **Sequence of transformations** • **Composition of transformations (HS)**
KY.8.G.3 (MP.3, MP.5, MP.6) Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	• **Describe the changes to the x- and y- coordinates of a figure after either dilation, translation, rotation or reflection.**		• **Similar** • **Dilation**
KY.8.G.4 (MP.2, MP.5, MP.7) 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.	• **Explain how transformations can be used to show that two figures are similar.** • **Describe a sequence of transformations that either prove or disprove that two figures are**		

	similar.		
KY.8.G.5 (MP.3) Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal and the angle-angle criterion for similarity of triangles.	• **Informally prove that the sum of a triangle's interior angles will be the same measure as a straight angle (180 degrees).** • **Informally prove that the sum of the remote interior angles of a triangle are equal to their corresponding exterior angle.** • **Identify the relationship and measurements of angles that are formed when two parallel lines are cut by a transversal.**		• **Straight angle** • **Right angle** **Angle relationships** • **Alternate Interior angles** • **Alternate Exterior Angles** • **Corresponding angles** • **Vertical angles** • **Adjacent angles**

Geometry

Cluster: Understand and apply the Pythagorean Theorem

Standard	Learning Target We are learning to…..	Window of Instruction (weeks)	Essential Vocabulary
KY.8.G.6 (MP.3, MP.7) Explain a proof of the Pythagorean Theorem and its converse.	• **Use the Pythagorean Theorem to determine if a given triangle is a right triangle.** • **Use algebraic reasoning to relate a visual model to the Pythagorean Theorem.**	**Unit 8** 2 weeks	• **Pythagorean Theorem** • **Legs** • **Hypotenuse**
KY.8.G.7 (MP.1, MP.2, MP.4) Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	• **Draw a diagram and use the Pythagorean Theorem to solve real-world problems involving right triangles.** • **Draw a diagram to find right triangles in a three-dimensional figure and use the Pythagorean Theorem to calculate various dimensions.** • **Apply the Pythagorean Theorem to find an unknown side length of a right triangle.**		
KY.8.G.8 (MP.5, MP.6) Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	• **Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.**		• **Distance between two points**

Geometry

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

Standard	Learning Target We are learning to…..	Window of Instruction (weeks)	Essential Vocabulary
KY.8.G.9 (MP.1, MP.7, MP.8) Apply the formulas for the volumes and surface areas of cones, cylinders and spheres and use them to solve real-world	• **State and apply the formulas for the volumes of cones, cylinders and spheres.**	**Unit 9** 2 weeks	• **Cone** • **Cylinder** • **Sphere**

and mathematical problems.	• **State and apply the formulas for the surface area of cones, cylinders and spheres.** • **Apply the formulas for volume to solve real-world problems.** • **Apply the formulas for surface area to solve real-world problems.**		

Statistics and Probability

Cluster: Investigate patterns of association in bivariate data

Standard	Learning Target We are learning to…..	Window of Instruction (weeks)	Essential Vocabulary
KY.8.SP.1 (MP.2, MP.7) Construct and interpret scatter plots for bivariate numerical data to investigate patterns of association between two quantities. Describe patterns such as clustering, outlier, positive or negative association, linear association and nonlinear association.	• **Plot ordered pairs on a coordinate grid representing the relationship between two data sets.** • **Describe patterns such as clustering, outliers, positive or negative association, linear association and nonlinear association.**	**Unit 10** 3 weeks	• **Scatter plot** • **Cluster** • **Outliers** • **Positive association** • **Negative association** • **Linear association** • **Nonlinear association**
KY.8.SP.2 (MP.2) Know that lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a line and informally assess the model fit by judging the closeness of the data points to the line.	• **Recognize if the data plotted on a scatter plot has a linear association.** • **Draw a straight line to approximate the linear relationship between the plotted points of two data sets.**		• **Line of best fit** • **Trend line**
KY.8.SP.3 (MP.2, MP.4) Use the equation of a linear model to solve problems in the context of bivariate numerical data, interpreting the slope and intercept.	• **Determine the equation of a trend line that approximates the linear relationships between the plotted points of two data sets.** • **Interpret the y-intercept and slope of an equation based on collected data.** • **Use the equation of a trend line to summarize the given data and make predictions about additional data points.**		