SCHOOL DISTRICT OF MANAWA
CURRICULUM COMMITTEE MEETING
AGENDA

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Date: May 5, 2021 **Time: 6:00 p.m.**

Hybrid Meeting Format (In-person Meeting for Board of Education at MES Board Room, 800 Beech Street & Virtual Components)

Board Committee Members: Hollman (C), Jepson, J. Johnson

In Attendance:

Timer: _____ Recorder: _____

1. Consider Endorsement of Secondary Math Curriculum as Presented (Information / Action)
    a. Seventh Grade Math
    b. Eighth Grade Math
    c. AP Calculus AB
    d. Precalculus & Trigonometry
2. Consider Endorsement of Recommendation to Change from the Adopted Lucy Calkins's Phonics Units of Study for Grades 4K-2 to Really Great Reading as Presented (Information / Action)
3. Consider Endorsement of Pre-ACT (SY2021-22) and Mosaic Adaptive Academic Learning (SY2022 and beyond) to Replace the ACT Periodic as the Grades 9 & 10 Universal Screener as Presented (Information / Action)
4. Receive Presentation on 2021 ACT Results (Information)
5. Future Academic Goals Planning (Information)
6. Curriculum Committee Planning Guide (Information / Action)
7. Next Meeting Date:_____
8. Next Meeting Items:
    a. Begin Annual Handbook Review (spread across June, July, & August)
    b. Consider Endorsement of the International Society for Technology in Education (ISTE) Scope & Sequence as Presented (Information / Action)
    c.
9. Adjourn

Course Name:	7th Grade Math		
Credits:	1		
Prerequisites:	n/a		
Description:	The idea behind the 7th grade Math class is to introduced topics and build on the students' prior knowledge by investigating new number sets and adding new skills and malleability within those number sets. Topics in this course include: The Number System, Expressions and Equations, Ratios and Proportional Relationships, and Geometry.		
Academic Standards:	Wisconsin State Standards in Mathematics (2011)		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Integers	25 days	7.NS.1A-D, 7.NS.2A-D, 7.NS.3	Use and justify rules of addition, subtraction, multiplication, and division of integers. Find the absolute values of integers. Add, subtract, multiply, and divide integers.
Rational Numbers	20 days	7.NS.1A-D, 7.NS.2A-D, 7.NS.3	Add, subtract, multiply and divide rational numbers. Apply properties of operations as strategies to perform operations with rational numbers. Convert a rational number to a decimal using division.
Expressions and Equations	25 days	7.EE.1, 7.EE.2, 7.EE.4A	Add, subtract, factor, and expand linear expressions with rational coefficients. Understand that rewriting expressions in different forms can show how the quantities are related. Write, graph, and solve one-step equations (including negative numbers). Solve two-step equations. Compare algebraic solutions to arithmetic solutions.
Inequalities	20 days	7.EE.4B	Solve one-step inequalities involving integers and rational numbers. Solve two-step inequalities. Graph one- and two-step inequalities.
Ratios and Proportions	20 days	7.RP.1, 7.RP.2A-D, 7.RP.3	Find unit rates associated with ratios of fractions, areas, and other quantities in like or different units. Decide whether two quantities are proportional using ratio tables. Identify the constant of proportionality (unit rate) in tables, equations, diagrams, and verbal descriptions. Represent proportional relationships with equations. Use proportionality to solve ratio problems.
Constructions	20 days	7.G.2, 7.G.5	Use supplementary, complementary, vertical, and adjacent angles. Draw geometric shapes with given conditions, focusing on triangles and quadrilaterals. Represent proportional relationships with equations. use proportionality to solve ratio problems.
Circles and Areas	16 days	7.G.4, 7.G.6	Understand pi and its estimates. Use values of pi to estimate and calculate the circumference and area of circles. Find perimeters and areas of composite two-dimensional figures, including semi-circles.
Surface Area	4 days	7.G.6	Solve problems involving surface areas of objects, including prisms.
Percents	16 days	7.EE.3, 7.RP3	Compare fractions, decimals, and percents. Use proportionality to solve percent problems. Use the percent equation.
Probability and Statistics	9 days	7.SP.5, 7.SP.7A, 7.SP.8A-B	Understand that probability is the likelihood of an event occuring, expressed as a number from zero to one.Develop probability models and use them to find probabilities. Find the probabilities of compound events.

Unit Name: Integers	Length: 25 days
Standards: 7.NS.1A-D, 7.NS.2A-D, 7.NS.3	Outcomes: Use and justify rules of addition, subtraction, multiplication, and division of integers. Find the absolute values of integers. Add, subtract, multiply, and divide integers.
Essential Questions: How can you use integers to represent the velocity and speed of an object? Is the sum of two integers positive, negative, or zero? How are adding integers and subtracting integers related? Is the product of two integers positive, negative, or zero? Is the quotient of two integers positive, negative, or zero?	Learning Targets: Define the absolute value of a number. Find the absolute values of numbers. Apply real-life situations. Add integers. Show that the sum of a number and its opposite is zero. Subtract integers. Multiply integers. Divide integers.
Topic 1: Integers and Absolute Value	Length: 5 days
Standard(s): 7.NS.1, 7.NS. 2, 7.NS.3	Academic Vocabulary: integer, absolute value
Lesson Frame:	We will: Explore absolute value on a number line.
	I will: Find absolute values of given integers.
Lesson Frame:	We will: Investigate integers and absolute values.
	I will: Compare values.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Adding Integers	Length: 5 days
Standard(s): 7.NS.1A, 7.NS.1B, 7.NS.1D, 7.NS.3	Academic Vocabulary: opposites, additive inverse
Lesson Frame:	We will: Demonstrate addition on a number line and with integer tiles.
	I will: Add integers with the same sign.
Lesson Frame:	We will: Practice addition on integers on a number line.
	I will: Add integers with different signs.
Lesson Frame:	We will: Discuss and review order of operations and properties of addition.
	I will: Add more than two integers with varying signs.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Subtracting Integers	Length: 5 days
Standard(s): 7.NS.1C, 7.NS.1D, 7.NS.3	Academic Vocabulary: n/a
Lesson Frame:	We will: Explore what happens when subtracting integers using a number line and with integer tiles.
	I will: Subtract integers.
Lesson Frame:	We will: Evaluate expressions with subtraction.
	I will: Subtract integers.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Multiplying Integers	Length: 5 days
Standard(s): 7.NS.2A, 7.NS.2C, 7.NS.3	Academic Vocabulary: n/a
Lesson Frame:	We will: Review multiplication as an expression of repeated addition.
	I will: Apply rules of integer addition.
Lesson Frame:	We will: Investigate the signs of products using positive and negative numbers.
	I will: Multiply integers with the same signs and with different signs.
Lesson Frame:	We will: Explore the application of exponents to multiplication of integers.
	I will: Evaluate expressions with exponents.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 5: Dividing Integers	Length: 5 days
Standard(s): 7.NS.2B, 7.NS.3	Academic Vocabulary: n/a
Lesson Frame:	We will: Review the results of multiplying integers, with regard to product signs.
	I will: Apply the same rules to quotient signs.
Lesson Frame:	We will: Investigate the signs of quotients using positive and negative numbers.
	I will: Divide integers with the same signs and with different signs.
Lesson Frame:	We will: Review given values and substitution.
	I will: Evaluate expressions with positive and negative integers.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Rational Numbers	Length: 20 days
Standards: 7.NS.1A-D, 7.NS.2A-D, 7.NS.3	Outcomes: Add, subtract, multiply and divide rational numbers. Apply properties of operations as strategies to perform operations with rational numbers. Convert a rational number to a decimal using division.
Essential Questions: How can you use a number line to order rational numbers? How can you use what you know about adding integers to add rational numbers? How can you use what you know about subtracting integers to subtract rational numbers? Why is the product of two negative rational numbers positive?	Learning Targets: Understand that a rational number is an integer divided by an integer. Convert rational numbers to decimals. Add rational numbers. Apply real-life situations. Subtract rational numbers. Multiply and divide rational numbers.
Topic 1: Rational Numbers	Length: 5 days
Standard(s): 7.NS.2B, 7.NS.2D	Academic Vocabulary: rational number, terminating decimal, repeating decimal
Lesson Frame:	We will: Review converting fractions to decimals using division.
	I will: Write rational numbers as decimals.
Lesson Frame:	We will: Review place value and simplifying fractions.
	I will: Write decimals as fractions.
Lesson Frame:	We will: Explore using a number line to show number order.
	I will: Order rational numbers on a number line.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Adding Rational Numbers	Length: 5 days
Standard(s): 7.NS.1A, 7.NS.1B, 7.NS.1D, 7.NS.3	Academic Vocabulary: n/a
Lesson Frame:	We will: Review the sign rules for addition of integers.
	I will: Add rational numbers.
Lesson Frame:	We will: Review substitution, order of operations, and simplifying fractions.
	I will: Evaluate expression with rational numbers.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Subtracting Rational Numbers	Length: 5 days
Standard(s): 7.NS.1C, 7.NS.1D, 7.NS.3	Academic Vocabulary: n/a
Lesson Frame:	We will: Review the sign rules for subtraction of integers.
	I will: Subtract rational numbers.
Lesson Frame:	We will: Investigate using a number line to find distance.
	I will: Find the distance between two numbers on a number line, and apply to real-life situations.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Multiplying and Dividing Rational Numbers	Length: 5 days
Standard(s): 7.NS.2A, 7.NS.2B, 7.NS.2C, 7.NS.3	Academic Vocabulary: n/a
Lesson Frame:	We will: Review the sign rules for multiplication and division of integers.
	I will: Divide rational numbers and Multiply rational numbers.
Lesson Frame:	We will: Review properties of multiplication.
	I will: Multiply more than two rational numbers, and apply to real-life situations.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Expressions and Equations	Length: 25 days
Standards: 7.EE.1, 7.EE.2, 7.EE.4A	Outcomes: Add, subtract, factor, and expand linear expressions with rational coefficients. Understand that rewriting expressions in different forms can show how the quantities are related. Write, graph, and solve one-step equations (including negative numbers). Solve two-step equations. Compare algebraic solutions to arithmetic solutions.
Essential Questions: How can you simplify an algebraic expression? How can you use algebra tiles to add or subtract algebraic expressions? How can you use algebra tiles to solve addition or subtraction equations? How can you use multiplication or division to solve equations? How can you use algebra tiles to solve a two-step equation?	Learning Targets: Apply properties of operations to simplify algebraic expressions. Apply properties of operations to add and subtract linear expressions. Write simple equations. Solve equations using addition or subtraction. Solve equations using multiplication or division. Apply real-life situations. Solve two-step equations.
Topic 1: Algebraic Expressions	Length: 5 days
Standard(s): 7.EE.1, 7.EE.2	Academic Vocabulary: like terms, simplest form, coefficient, variable, constant
Lesson Frame:	We will: Discuss the parts that make up expressions and equations.
	I will: Identify terms and like terms.
Lesson Frame:	We will: Review order of operations and mathematical properties.
	I will: Simplify an algebraic expression.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Adding and Subtracting Linear Expressions	Length: 5 days
Standard(s): 7.EE.1, 7.EE.2	Academic Vocabulary: linear expression
Lesson Frame:	We will: Explore the vertical and horizontal methods for finding the sum of expressions.
	I will: Add linear expressions.
Lesson Frame:	We will: Explore the vertical and horizontal methods for finding the difference of expressions.
	I will: Subtract linear expressions.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Solving Equations Using Addition or Subtraction	Length: 5 days
Standard(s): 7.EE.4A	Academic Vocabulary: equivalent equations
Lesson Frame:	We will: Investigate the addition and subtraction properties of equality.
	I will: Solve equations using properties of equality.
Lesson Frame:	We will: Practice finding key words/phrases and numerical information in word sentences and word problems.
	I will: Write an equation from a word sentence or word problem.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Solving Equations Using Multiplication or Division	Length: 5 days
Standard(s): 7.EE.4A	Academic Vocabulary: reciprocal
Lesson Frame:	We will: Investigate the multiplication and division properties of equality.
	I will: Solve equations using properties of equality.
Lesson Frame:	We will: Review using the multiplicative inverse property.
	I will: Solve an equation using a reciprocal.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 5: Solving Two-Step Equations	Length: 5 days
Standard(s): 7.EE.4A	Academic Vocabulary: n/a
Lesson Frame:	We will: Discuss the steps needed to solve a two-step equation.
	I will: Solve a two-step equation.
Lesson Frame:	We will: Review like terms.
	I will: Combine like terms before solving an equation.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Inequalities	Length: 20 days
Standards: 7.EE.4B	Outcomes: Solve one-step inequalities involving integers and rational numbers. Solve two-step inequalities. Graph one- and two-step inequalities.
Essential Questions: How can you use a number line to represent solutions of an inequality? How can you use addition or subtraction to solve an inequality? How can you use multiplication or division to solve an inequality?	Learning Targets: Write and graph inequalities. Use substitution to check whether a number is a solution of an inequality. Solve inequalities using addition or subtractions. Apply real-life situations. Solve inequalities using multiplication or division. Solve multi-step inequalities.
Topic 1: Writing and Graphing Inequalities	Length: 5 days
Standard(s): 7.EE.4B	Academic Vocabulary: inequality, solution of an inequality, solution set, graph of an inequality
Lesson Frame:	We will: Review the inequality symbols and practice finding key words/phrases and numerical values in word sentences.
	I will: Write an inequality.
Lesson Frame:	We will: Explore using substitution to check possible answers.
	I will: Check solutions to inequalities.
Lesson Frame:	We will: Explore using a number line graph to visually show the possible solutions of an inequality.
	I will: Graph an inequality.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Solving Inequalities Using Addition or Subtraction	Length: 5 days
Standard(s): 7.EE.4B	Academic Vocabulary: properties of inequality
Lesson Frame:	We will: Investigate using the addition property of inequality.
	I will: Solve an inequality using addition.
Lesson Frame:	We will: Practice using the subtraction property of inequality.
	I will: Solve an inequality using subtraction.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Solving Inequalities Using Multiplication or Division	Length: 5 days
Standard(s): 7.EE.4B	Academic Vocabulary: n/a
Lesson Frame:	We will: Explore using multiplication and division properties of inequality with positive numbers.
	I will: Solve an inequality using multiplication or division with positive numbers.
Lesson Frame:	We will: Explore using multiplication and division properties of inequality with negative numbers.
	I will: Solve an inequality using multiplication or division with negative numbers.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Solving Two-Step Inequalities	Length: 5 days
Standard(s): 7.EE.4B	Academic Vocabulary: n/a
Lesson Frame:	We will: Review steps and rules for solving two-step equations, and realize they are the same for two-step inequalities.
	I will: Solve two-step inequalities.
Lesson Frame:	We will: Interpret inequality graphs to decide the solutions.
	I will: Graph an inequality.
Lesson Frame:	We will: Explore situations in which inequalities are used and solved for solutions.
	I will: Apply inequalities to real-life situations.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Course Name:	8th Grade Math		
Credits:	1		
Prerequisites:	n/a		
Description:	The idea behind the 8th grade Math class is to revisit previously introduced topics and build on the students' understanding by adding new skills and look for deeper comprehension of the concept. Topics in this course include: The Number System, Expressions and Equations, Functions, Geometry, and Statistics and Probability.		
Academic Standards:	Wisconsin State Standards in Mathematics (2011)		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Equations	15 days	8.EE.7A-B	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. Show that a linear equations in one variable has one solution, infinitely many solutions, or no solution by transforming the equation into simpler forms.
Transformations	26 days	8.G.1A-C, 8.G.2, 8.G.3, 8.G.4	Verify the properties of translations, reflections, and rotations. Describe translations, reflections, and rotations using coordinates. Identify dilations. Understand that figures are congruent (or similar) when they can be related by a sequence of translations, reflections, and rotations (and dilatations). Describe a sequence that exhibits congruence or similarity between two figures.
Angles and Triangles	20 days	8.G.5	Classify and determine the measure of angles created when parallel lines are cut by a transversal. Demonstrate that the sum of the interior angle measures of a triangle is 180 degrees and apply this fact to find the unknown measures of angles and the sum of the angles of polygons. Use similar triangles to solve problems that include height and distance.
Graphing and Writing Linear Equations	24 days	8.EE.5, 8.EE.6, 8.F.4	Use similar triangles to explain why the slope is the same between any two points on a line. Graph proportional relationships, interpreting the unit rate as the slope. Compare proportional relationships represented in different ways. Derive y = mx and y = mx +b.
Systems of Linear Equations	20 days	8.EE.7A-B, 8.EE.8A-C	Show that a linear equation in one variable has one solution, infinitely many solutions, or no solution by transforming the equation into simpler forms. Solve multi-step equations. Understanding that the solution of a system of two linear equations in two variables corresponds to the point of intersection of their graphs. Solve systems of two linear equations in two variables graphically and algebraically.
Functions	18 days	8.F,1, 8.F.2, 8.F.3, 8.F.4	Understand the definition of a function. Compare and write functions represented in different ways (words, tables, graphs). Understand that y = mx +b is a linear function and recognize nonlinear functions.
Real Numbers and the Pythagorean Theorem	21 days	8.NS.1, 8.NS.2, 8.EE.2, 8.G.6, 8.G.7, 8.G.8	Understand that every rational number has a decimal expansion that terminates or repeats. Understand that numbers that are not rational are irrational. Compare irrational numbers using rational approximations. Evaluate square roots and cube roots, including those resulting from solving equations. Use the Pythagorean Theorem to find missing measures of right triangles and distances between points in the coordinate plane.
Data Analysis and Displays	7 days	8.SP.1, 8.SP.2, 8.SP.3	Construct and interpret scatter plots. Find and assess lines of fit for scatter plots.
Exponents	15 days	8.EE.1	Use the properties of integer exponents to generate equivalent expressions.

Unit Name: Exponents	Length: 15 days
Standards: 8.EE.1	Outcomes: Use the properties of integer exponents to generate equivalent expressions.
Essential Questions: How can you use exponents to write numbers? How can you use inductive reasoning to observe patterns and write general rules involving properties of exponents? How can you divide two powers that have the same base? How can you evaluate a nonzero number with an exponent of zero? How can you evaluate a nonzero number with a negative integer exponent?	Learning Targets: Write expressions using integer exponents. Evaluate expressions involving integer exponents. Multiply powers with the same base. Find a power of a power. Find a power of a product. Divide powers with the same base. Simplify expressions involving the quotient of powers. Evaluate expressions involving numbers with zero as an exponent. Evaluate expressions involving negative integer exponents.
Topic 1: Exponents	Length: 3 days
Standard(s): 8.EE.1	Academic Vocabulary: power, base, exponent
Lesson Frame:	We will: define exponents and display visual meaning
	I will: write expressions using exponents
Lesson Frame:	We will: discuss positive and negative expressions with exponents
	I will: evaluate expressions
Lesson Frame:	We will: review order of operations
	I will: use order of operations to evaluate expressions involving exponents
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Product of Powers Property	Length: 4 days
Standard(s): 8.EE.1	Academic Vocabulary: product of powers property, power of a power property, power of a product property
Lesson Frame:	We will: explore the product of powers property
	I will: multiply powers with the same base
Lesson Frame:	We will: explore power of a power property
	I will: find a power of a power
Lesson Frame:	We will: explore power of a product property
	I will: find a power of a product
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Quotient of Powers Property	Length: 4 days
Standard(s): 8.EE.1	Academic Vocabulary: quotient of powers property
Lesson Frame:	We will: explore quotient of powers property

Unit Name: Exponents	Length: 15 days
Standards: 8.EE.1	Outcomes: Use the properties of integer exponents to generate equivalent expressions.
Essential Questions: How can you use exponents to write numbers? How can you use inductive reasoning to observe patterns and write general rules involving properties of exponents? How can you divide two powers that have the same base? How can you evaluate a nonzero number with an exponent of zero? How can you evaluate a nonzero number with a negative integer exponent?	Learning Targets: Write expressions using integer exponents. Evaluate expressions involving integer exponents. Multiply powers with the same base. Find a power of a power. Find a power of a product. Divide powers with the same base. Simplify expressions involving the quotient of powers. Evaluate expressions involving numbers with zero as an exponent. Evaluate expressions involving negative integer exponents.
	I will: divide powers with the same base
Lesson Frame:	We will: review order of operations and simplifying expressions with exponents
	I will: simplify an expression
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Zero and Negative Exponents	Length: 4 days
Standard(s): 8.EE.1	Academic Vocabulary: n/a
Lesson Frame:	We will: explore the use of zero and negative exponents
	I will: evaluate expressions using power properties and zero or negative exponents
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Equations	Length: 15 days
Standards: 8.EE.7a-b	Outcomes: Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. Show that a linear equation in one variable has one solution, infinitely many solutions, or no solution by transforming the equation into simpler forms.
Essential Questions: How can you solve multi-step equations and check the reasonableness of your solution? How can you solve an equation that has variables on both sides? How can you use a formula for one measurement to write a formula for a different measurement?	Learning Targets: Solve simple equations using addition, subtraction, multiplication, or division. Use inverse operations to solve multi-step equations. Use the Distributive Property to solve multi-step equations. Solve equations with variables on both sides. Determine whether equations have no solution or infinitely many solutions. Rewrite equations to solve for one variable in terms of the other variable(s).
Topic 1: Solving Simple and Multi-Step Equations	Length: 7 days
Standard(s): 8.EE.7a, 8.EE.7b	Academic Vocabulary: inverse operations, addition property of equality, subtractions property of equality, multiplication property of equality, division property of equality
Lesson Frame:	We will: review what an equation is/has and what it means to get a solution
	I will: solve simple equations using addition, subtraction, multiplication, or division.
Lesson Frame:	We will: identify what inverse means and which operations are inverses of each other
	I will: use inverse operations to solve multi-step equations.
Lesson Frame:	We will: review what distributive property is
	I will: use the distributive property to solve multi-step equations.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Solving Equations with Variables on Both Sides	Length: 5 days
Standard(s): 8.EE.7a, 8.EE.7b	Academic Vocabulary: variable term, constant term
Lesson Frame:	We will: review steps to solve complex equations
	I will: solve equations with variables on both sides.
Lesson Frame:	We will: investigate possible solution outcomes
	I will: determine whether equations have no solution or infinitely many solutions.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Rewriting Equations and Formulas	Length: 3 days
Standard(s): 8.EE.7b	Academic Vocabulary: literal equation, formula
Lesson Frame:	We will: discuss how to solve for certain variables when more than one is present.
	I will: rewrite equations to solve for one variable in terms of the other variable(s).
Lesson Frame:	We will: review what a formula is
	I will: recognize that a formula is a type of literal equation and be able to rewrite formulas to solve for one variable in terms of the other
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Transformations	Length: 26 days
Standards: 8.G.1A-C, 8.G.2, 8.G.3, 8.G.4	Outcomes: Verify the properties of translations, reflections, and rotations. Describe translations, reflections, and rotations using coordinates. Identify dilations. Understand that figures are congruent (or similar) when they can be related by a sequence of translations, reflections, and rotations (and dilatations). Describe a sequence that exhibits congruence or similarity between two figures.
Essential Questions: How can you identify congruent figures? How can you arrange tiles to make a tessellation? How can you reflect an image? What are the three basic ways to move an object in a plane? How can you use proportions to help make various multimedia products? How do changes in dimensions of similar geometric figures affect the perimeters and the areas of the figures? What does it mean to enlarge or reduce a figure in the coordinate plane?	Learning Targets: name corresponding angles and corresponding sides of congruent figures. Identify congruent figures. Identify translations. Translate figures in the coordinate plane. Identify reflections. Reflect figures in the x-axis or the y-axis of the coordinate plane. Identify rotations. Rotate figures in the coordinate plane. Use more than one transformation to find images of figures. Name corresponding angles and corresponding sides of similar figures. Identify similar figures. Find unknown measures of similar figures. Understand the relationship between perimeters of similar figures. Understand the relationship between areas of similar figures. Find ratios of perimeters and areas for similar figures. Identify dilations. Use more than one transformation to find images of figures.
Topic 1: Congruent Figures	Length: 3 days
Standard(s): 8.G.2	Academic Vocabulary: congruent, congruent figures, corresponding angles, corresponding sides
Lesson Frame:	We will: discuss congruency and corresponding angles and sides.
	I will: name corresponding angles and corresponding sides of congruent figures.
Lesson Frame:	We will: explore the criteria of congruent figures
	I will: identify congruent figures.
Lesson Frame:	We will: examine how we can use known information of congruent figures to find missing measures
	I will: practice using congruent figures to find unknown measures
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Translations	Length: 4 days
Standard(s): 8.G.1, 8.G.2, 8.G.3	Academic Vocabulary: transformation, image, translation
Lesson Frame:	We will: investigate what happens when a figure is translated
	I will: identify a translation
Lesson Frame:	We will: display a variety of ways to calculate a translation on a graph
	I will: translate figures in the coordinate plane.
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Reflections	Length: 4 days
Standard(s): 8.G.1, 8.G.2, 8.G.3	Academic Vocabulary: reflection, line of reflection
Lesson Frame:	We will: discuss the characteristics of a mirror image
	I will: identify a reflection
Lesson Frame:	We will: investigate direction and quadrants resulting in a reflection in the x-axis
	I will: demonstrate a reflection in the x-axis
Lesson Frame:	We will: investigate direction and quadrants resulting in a reflection in the y-axis
	I will: demonstrate a reflection in the y-axis
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Rotations	Length: 8 days
Standard(s): 8.G.1, 8.G.2, 8.G.3	Academic Vocabulary: rotation, center of rotation, angle of rotation
Lesson Frame:	We will: demonstrate the characteristics of a rotation
	I will: identify a rotation
Lesson Frame:	We will: practice different techniques to use in order to rotate a figure in the coordinate plane
	I will: be able to rotate a figure in two directions and at various degrees of rotation
Lesson Frame:	We will: discuss sequences of transformations that result in prime and double prime images
	I will: follow a sequence of transformations to end in the correct resulting image on the coordinate plane
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 5: Similar Figures	Length: 3 days
Standard(s): 8.G.4	Academic Vocabulary: similar figures
Lesson Frame:	We will: explore characteristics of similar figures
	I will: identify similar figures
Lesson Frame:	We will: discover how knowing some information of similar figures allows us to find missing information
	I will: use similar figures to find unknown measures
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 6: Perimeters and Areas of Similar Figures	Length: 3 days
Standard(s): 8.G.4	Academic Vocabulary: ratio, proportions
Lesson Frame:	We will: review the meaning and set-up of ratios in context of using perimeters and areas of similar figures
	I will: find the ratios of the perimeters and areas of similar figures
Lesson Frame:	We will: review what a proportion is and how it is written
	I will: use proportions to find perimeters and areas
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 7: Dilations	Length: 1 days
Standard(s): 8.G.3	Academic Vocabulary: dilation, center of dilation
Lesson Frame:	We will: discuss the concept of enlarging or reducing the size of a figure
	I will: identify a dilation
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Angles and Triangles	Length: 20 days
Standards: 8.G.5	Outcomes: Classify and determine the measure of angles created when parallel lines are cut by a transversal. Demonstrate that the sum of the interior angle measures of a triangle is 180 degrees and apply this fact to find the unknown measures of angles and the sum of the angles of polygons. Use similar triangles to solve problems that include height and distance.
Essential Questions: How can you describe angles formed by parallel lines and transversals? How can you describe the relationship among the angles of a triangle? How can you find the sum of the interior angle measures and the sum of the exterior angle measures of a polygon? How can you use angles to tell whether triangles are similar?	Learning Targets: identify the angles formed when parallel lines are cut by a transversal. Find the measures of angles formed when parallel lines are cut by a transversal. Understand that the sum of the interior angle measures of a triangle is 180 degrees. Find the measure s of interior and exterior angles of triangles. Find the sum of the interior angle measures of polygons. Understand that the sum of the exterior angle measures of a polygon is 360 degrees. Find the measures of interior and exterior angles of polygons. Understand the concept of similar triangles. Identify similar triangles. Use indirect measurement to find missing measures.
Topic 1: Parallel Lines and Transversals	Length: 5 days
Standard(s): 8.G.5	Academic Vocabulary: transversal, interior angles, exterior angles, alternate interior angles, alternate exterior angles
Lesson Frame:	We will: review and discuss properties of parallel lines. Explore what occurs when a transversal cuts parallel lines.
	I will: identify and find angle measures when two parallel lines are cut by a transversal
Lesson Frame:	We will: review the characteristics and appearance of corresponding angles
	I will: use corresponding angles to find missing measures
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Angles of Triangles	Length: 5 days
Standard(s): 8.G.5	Academic Vocabulary: interior angles of a polygon, exterior angles of a polygon
Lesson Frame:	We will: rediscover that all interior angle measure of a triangle must equal 180 degrees
	I will: use interior angle measures of a triangle to find the missing angle measure(s)
Lesson Frame:	We will: explore how the interior angle measures of a triangle are related to the exterior angle measure of a triangle
	I will: use the exterior angle measures of a triangle formula to determine the measure of the exterior angle
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Angles of Polygons	Length: 5 days
Standard(s): 8.G.5	Academic Vocabulary: polygon, convex, concave, regular polygon
Lesson Frame:	We will: use our knowledge of triangles to determine the formula for finding the sum of the interior angle measures of any polygon
	I will: find the sum of the interior angle measures of polygons
Lesson Frame:	We will: explore what happens when we know some of the pieces of information, but not all information about the sides and angles of polygons
	I will: use multiple steps in order to find a missing interior angle measure of a polygon
Lesson Frame:	We will: discuss what occurs on the exterior of a polygon and how all exterior angles of a polygon add up to 360 degrees
	I will: find the missing exterior angle measure(s) of a polygon
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Using Similar Triangles	Length: 5 days
Standard(s): 8.G.5	Academic Vocabulary: indirect measurement
Lesson Frame:	We will: explore what happens with the angles of two similar triangles
	I will: identify similar triangles
Lesson Frame:	We will: use real-world examples of when indirect measurement would be useful using similar triangles
	I will: calculate the missing measure using indirect measurement
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Graphing and Writing Linear Equations	Length: 24 days
Standards: 8.EE.5, 8.EE.6, 8.F.4	Outcomes: Use similar triangles to explain why the slope is the same between any two points on a line. Graph proportional relationships, interpreting the unit rate as the slope. Compare proportional relationships represented in different ways. Derive y = mx and y = mx +b.
Essential Questions: How can you recognize a linear equation? How can you draw a linear equation's graph? How can you use the slope of a line to describe the line? How can you describe the graph of the equation y = mx? How can you describe the graph of the equation y = mx + b? How can you describe the graph of the equation ax + by = c? How can you write an equation of a line when you are given the slope and the y-intercept of the line?	Learning Targets: Understand that lines represent solutions of linear equations. Graph linear equations. Find slopes of lines by using two points. Find slopes of lines from tables. Identify parallel and perpendicular lines in the same plane. Write and graph proportional relationships. Find slopes and y-intercepts of graphs of linear equations. Graph linear equations written in slope-intercept form. Graph linear equations written in standard form. Write equations of lines in slope-intercept form.
Topic 1: Graphing Linear Equations	Length: 4 days
Standard(s): 8.EE.5	Academic Vocabulary: linear equation, solution
Lesson Frame:	We will: investigate equations written in y = mx + b form and apply substitution
	I will: graph a linear equation
Lesson Frame:	We will: discuss the circumstances that occur when given the equations y = a and x = b
	I will: graph a horizontal and a vertical line
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Slope of a Line	Length: 4 days
Standard(s): 8.EE.6	Academic Vocabulary: slope, rise, run
Lesson Frame:	We will: explore different methods to determine the slope of a line
	I will: find the slope of a line
Lesson Frame:	We will: examine situations that involve horizontal lines and vertical lines
	I will: find the slope of a horizontal line and of a vertical line
Lesson Frame:	We will: practice using a table to investigate the data provided
	I will: find the slope from a table
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Graphing Proportional Relationships	Length: 4 days
Standard(s): 8.EE.5, 8.EE.6	Academic Vocabulary: direct variation equation
Lesson Frame:	We will: discuss how proportional relationships can be displayed using an equation and its graph
	I will: graph a proportional relationship
Lesson Frame:	We will: practice how to use direct variation equations
	I will: write and use a direct variation equation
Lesson Frame:	We will: examine proportional relationships and use linear equations and graphs to compare
	I will: compare proportional relationships
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Graphing Linear Equations in Slope-Intercept Form	Length: 4 days
Standard(s): 8.EE.6	Academic Vocabulary: x-intercept, y-intercept, slope-intercept form
Lesson Frame:	We will: explore what intercepts are and where they are located in slope-intercept form
	I will: identify slopes and y-intercepts
Lesson Frame:	We will: discuss how knowing slope-intercept form can result in graphing a line
	I will: graph a linear equation in slope-intercept form
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 5: Graphing Linear Equations in Standard Form	Length: 4 days
Standard(s): 8.EE.6	Academic Vocabulary: standard form
Lesson Frame:	We will: investigate the process of rewriting equations written in one form into another form to graph it
	I will: graph a linear equation in standard form
Lesson Frame:	We will: explore other methods for rewriting equations in order to graph them
	I will: graph a linear equation in standard form
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 6: Writing Equations in Slope-Intercept Form	Length: 4 days
Standard(s): 8.F.4	Academic Vocabulary: n/a
Lesson Frame:	We will: compile previous lessons to formulate an equation
	I will: write equations in slope-intercept form
Lesson Frame:	We will: practice reading the graph of a line and determine its equation
	I will: write an equation
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Systems of Linear Equations	Length: 20 days
Standards: 8.EE.7A-B, 8.EE.8A-C	Outcomes: Show that a linear equation in one variable has one solution, infinitely many solutions, or no solution by transforming the equation into simpler forms. Solve multi-step equations. Understanding that the solution of a system of two linear equations in two variables corresponds to the point of intersection of their graphs. Solve systems of two linear equations in two variables graphically and algebraically.
Essential Questions: How can you solve a system of linear equations? How can you use substitution to solve a system of linear equations? How can you use elimination to solve a system of linear equations? Can a system of linear equations have no solution? Can a system of linear equations have many solutions?	Learning Targets: Write and solve systems of linear equations by graphing. Write and solve systems of linear equations by substitution. Write and solve systems of linear equations by elimination. Solve systems of linear equations with no solution or infinitely many solutions. Solve real-life problems.
Topic 1: Solving Systems of Linear Equations by Graphing	Length: 5 days
Standard(s): 8.EE.8a-c	Academic Vocabulary: system of linear equations, solution of a system of linear equations
Lesson Frame:	We will: explore what happens when we graph two linear equations in the same plane
	I will: solve a system of linear equations by graphing
Lesson Frame:	We will: review how to turn words and contextual clues into mathematical sentences (equations)
	I will: practice writing real-world situations as equations and graphing the solution of the system of linear equations
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Solving Systems of Linear Equations by Substitution	Length: 5 days
Standard(s): 8.EE.b-c	Academic Vocabulary: n/a
Lesson Frame:	We will: revisit the concept of substitution and create a process for using in within a system of linear equations
	I will: solve a system of linear equations by substitution
Lesson Frame:	We will: explore how systems of linear equations can be used in everyday situations
	I will: solve real-life problems by solving a system of linear equations by substitution
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Solving Systems of Linear Equations by Elimination	Length: 5 days
Standard(s): 8.EE.8b-c	Academic Vocabulary: n/a
Lesson Frame:	We will: investigate what elimination means and how we can use it when noticing similarities in a system of linear equations
	I will: solve a system of linear equations by elimination
Lesson Frame:	We will: explore when additional steps in the process of using elimination might be needed
	I will: solve a system of linear equations by elimination
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Solving Special Systems of Linear Equations	Length: 5 days
Standard(s): 8.EE.8a-c	Academic Vocabulary: infinite
Lesson Frame:	We will: investigate systems of linear equations forming parallel lines on the graph or false algebraic statements
	I will: solve a system of linear equations using two methods to show there is no solution
Lesson Frame:	We will: investigate systems of linear equations forming only one line on the graph or true algebraic statements w/o a variable
	I will: solve a system of linear equations using two methods to show there is infinitely many solutions
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Functions	Length: 18 days
Standards: 8.F,1, 8.F.2, 8.F.3, 8.F.4	Outcomes: Understand the definition of a function. Compare and write functions represented in different ways (words, tables, graphs). Understand that y = mx +b is a linear function and recognize nonlinear functions.
Essential Questions: How can you use a mapping diagram to show the relationship between two data sets? How can you represent a function in different ways? How can you use a function to describe a linear pattern? How can you recognize when a pattern in real life is linear or nonlinear?	Learning Targets: Define relations and functions. Determine whether relations are functions. Describe patterns in mapping diagrams. Write function rules. Use input-output tables to represent functions. Use graphs to represent functions. Understand that the equation y = mx + b defines a linear function. Write linear functions using graphs or tables. Compare linear functions. Identify linear or nonlinear functions from tables or graphs. Compare linear and nonlinear functions.
Topic 1: Relations and Functions	Length: 4 days
Standard(s): 8.F.1	Academic Vocabulary: inputs, outputs, relation, mapping diagram, function
Lesson Frame:	We will: examine mapping diagrams and decipher information from them
	I will: list the ordered pairs of a relation
Lesson Frame:	We will: investigate mapping diagrams further for more specific results
	I will: determine whether relations are functions
Lesson Frame:	We will: practice reading mapping diagrams
	I will: describe a mapping diagram
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Representations of Functions	Length: 5 days
Standard(s): 8.F.1	Academic Vocabulary: function rule
Lesson Frame:	We will: explore what function rules are
	I will: write function rules
Lesson Frame:	We will: practice using algebraic and mathematical properties
	I will: evaluate a function
Lesson Frame:	We will: explore data representations of functions
	I will: graph a function
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: Linear Functions	Length: 4 days
Standard(s): 8.F.2, 8.F.3, 8.F.4	Academic Vocabulary: linear function
Lesson Frame:	We will: review how to find the slope of a line by its graphed points and y-intercept
	I will: write a linear function using a graph
Lesson Frame:	We will: review how to find the slope of a line by its ordered pairs and y-intercept
	I will: write a linear function using a table
Lesson Frame:	We will: explore functions in various forms to make determinations about them
	I will: compare linear functions to one another
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Comparing Linear and Nonlinear Functions	Length: 5 days
Standard(s): 8.F.3	Academic Vocabulary: nonlinear function
Lesson Frame:	We will: investigate x and y tables
	I will: identify functions from tables
Lesson Frame:	We will: interpret graphs
	I will: identify functions from graphs
Lesson Frame:	We will: examine various equations
	I will: identify a nonlinear function
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Real Numbers and the Pythagorean Theorem	Length: 21 days
Standards: 8.NS.1, 8.NS.2, 8.EE.2, 8.G.6, 8.G.7, 8.G.8	Outcomes: Understand that every rational number has a decimal expansion that terminates or repeats. Understand that numbers that are not rational are irrational. Compare irrational numbers using rational approximations. Evaluate square roots and cube roots, including those resulting from solving equations. Use the Pythagorean Theorem to find missing measures of right triangles and distances between points in the coordinate plane.
Essential Questions: How can you find the dimensions of a square or circle when you are given its area? How is the cube root of a number different from the square root of a number? How are the lengths of the sides of a right triangle related? How can you find decimal approximations of square roots that are not rational?	Learning Targets: Find square roots of perfect squares. Evaluate expressions involving square roots. Use square roots to solve equations. Find cube roots of perfect cubes. Evaluate expressions involving cube roots. Use cube roots to solve equations. Provide geometric proof of the Pythagorean Theorem. Use the Pythagorean Theorem to find missing sides lengths of right triangles. Define irrational numbers. Approximate square roots.
Topic 1: Finding Square Roots	Length: 5 days
Standard(s): 8.EE.2	Academic Vocabulary: square root, perfect square, radical sign, radicand
Lesson Frame:	We will: discuss what square roots and perfect squares are
	I will: find the square roots of a perfect square
Lesson Frame:	We will: examine non-perfect squares
	I will: find square roots
Lesson Frame:	We will: practice and review simplifying expressions
	I will: evaluate expressions involving square roots
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Finding Cube Roots	Length: 5 days
Standard(s): 8.EE.2	Academic Vocabulary: cube root, perfect cube
Lesson Frame:	We will: discuss what cube roots are
	I will: find cube roots
Lesson Frame:	We will: practice and review simplifying expressions
	I will: evaluate expressions involving cube roots
Lesson Frame:	We will: review evaluating expressions with given values
	I will: evaluate an algebraic expression
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 3: The Pythagorean Theorem	Length: 5 days
Standard(s): 8.EE.2, 8.G.6, 8.G.7, 8.G.8	Academic Vocabulary: theorem, legs, hypotenuse, Pythagorean Theorem
Lesson Frame:	We will: explore right triangles
	I will: find the length of a hypotenuse
Lesson Frame:	We will: practice using the Pythagorean Theorem
	I will: find the length of a leg
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 4: Approximating Square Roots	Length: 6 days
Standard(s): 8.NS.1, 8.NS.2, 8.EE.2	Academic Vocabulary: irrational number, real number
Lesson Frame:	We will: explore the set of real numbers
	I will: classify real numbers
Lesson Frame:	We will: investigate square root values
	I will: approximate a square root
Lesson Frame:	We will: discuss and review number values on a number line
	I will: compare real numbers
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Unit Name: Data Analysis and Displays	Length: 7 days
Standards: 8.SP.1, 8.SP.2, 8.SP.3	Outcomes: Construct and interpret scatter plots. Find and assess lines of fit for scatter plots.
Essential Questions: How can you construct and interpret a scatter plot?	Learning Targets: Construct and interpret scatter plots. Describe patterns in scatter plots.
Topic 1: Scatter Plots	Length: 4 days
Standard(s): 8.SP.1	Academic Vocabulary: scatter plot, outliers, clusters
Lesson Frame:	We will: explore what scatter plots are and what they show
	I will: interpret a scatter plot
Lesson Frame:	We will: investigate date on a scatter plot
	I will: identify relationships
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:
Topic 2: Lines of Fit	Length: 3 days
Standard(s): 8.SP.1, 8.SP.2, 8.SP.3	Academic Vocabulary: line of fit, line of best fit
Lesson Frame:	We will: revisit concepts of slope, y-intercepts, and linear equations
	I will: find a line of fit
Performance Tasks: any or all- exit tickets, assignments (various forms), quiz, test	Notes:

Course Name:	A.P. Calculus AB		
Credits:	1		
Prerequisites:	Pre-Calculus & Trigonometry (Recommended grade of B or better or by teacher approval)		
Description:	Equivalent to a first semester college calculus course. The basis of study includes limits and continuity, derivatives, integrals, and the applications. A TI-83 or TI-84 calculator is required. A TI-89 is not allowed.		
Academic Standards:	College Board Mathematical Practices for AP Calculus AB		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Limits and Continuity	16 days	CHA 1-2B, Lim 1-2B, Lim 1-1E, Lim 1-1C, Lim 1-3C, Lim 1-2C, Lim 2-3D, Lim 2-2D, Lim 2-3B, Lim 2-3C, Lim 2-1E, Fun 1-3E, Cha 2-2B	Students will learn the concept of the limit in this unit. They will learn how to evaluate, notate and apply limits to real world applications. This unit will also explore rates of change and how to connect the limit to the following concept of the derivative.
Derivatives	35 days	Cha 2-1D, Cha 2-4C, Cha 2-1E, Fun 2-3E, Fun 3-1E, Cha 3-1E, Fun 3-1D, Fun 3-1C, Cha 3-2A	Students will learn how to take the derivative of various functions in this unit. They will also learn notation and begin investigating some uses of the derivative in real world applications.
Applications of Derivatives	24 days	Fun 1-3E, Fun 4-1E, Fun 4-2E, Fun 4-3D, Fun 4-2D, Fun 4-2A, Fun 4-3F, Cha 3-1F, Fun 4-1E, Fun 4-3E, Cha 3-1E, Cha 3-3F	Students will apply their knowledge of derivatives in this unit to solve real worlds problems. They will learn how derivatives relate to the graphs of functions and how tests can be used to picture important features of graphs.
The Definite Integral	19 days	Cha 4-4B, Lim 5-1F, Lim 5-2C, Fun 5-2D, Fun 5-1D, Fun 5-3D, Fun 5-3D, Fun 6-4C, Fun 6-1C	Students wil explore and learn about the definite integral. They will learn notation and properties of integrals and how the fundamental theorem of calculus makes a connection between derivative calculus and integral calculus.
Differential Equations and Mathematical Modeling	10 days	Fun 7-2C, Fun 7-3G, Fun 7-4D, Fun 6-1E, Fun 7-1E, Fun 7-3G	Students will get an introduction to differential equations in this unit. They will learn how antiderivatives can be used with various strategies to solve differential equations problems.
Applications of Definite Integrals	20 days	Cha 4-4B, Cha 4-3D, Cha 5-4C, Cha 5-1E, Cha 5-2B, Cha 5-3D, Cha 5-2D, Cha 5-4E, Cha 6-3D	Students will explore various applications of the definite integral in this unit. They will solve real world problems with rates of change and learn how the integral can be used to calculate geometric values such as area and volume.

Unit Name: Limits and Continuity	**Length:** 16 days
Standards: CHA 1-2B, Lim 1-2B, Lim 1-1E, Lim 1-1C, Lim 1-3C, Lim 1-2C, Lim 2-3D, Lim 2-2D, Lim 2-3B, Lim 2-3C, Lim 2-1E, Fun 1-3E, Cha 2-2B	**Outcomes:** Students will learn the concept of the limit in this unit. They will learn how to evaluate, notate and apply limits to real world applications. This unit will also explore rates of change and how to connect the limit to the following concept of the derivative.
Essential Questions: How do limits describe the behavior of a function? What are the strategies used to determine the limit of a function? What determines continuity and how can you find and describe discontinuities?	**Learning Targets:** Students will be able to: -Calculate average and intantaneous rates of change. -Calculate limits as x approaches positive or negative infinity. -Identify intervals on which a function is continuous. -Find the equation of a tangent and a normal line to a curve.
Topic 1: Rates of Change and Limits	Length: 4 days
Standard(s): CHA 1-2B, Lim 1-2B, Lim 1-1E, Lim 1-1C, Lim 1-3C, Lim 1-2C	Academic Vocabulary: Average Speed, Instantaneous Speed, Limit, One-Sided Limit, Two-Sided Limit, Sandwich Theorem
Lesson Frame:	We will explore the definition of a limit and how it can be used to find rates of change.
	I will calculate average and intantaneous rates of change.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Limits Involving Infinity	Length: 3 days
Standard(s): Lim 1-2B, Lim 1-1E, Lim 2-3D, Lim 2-2D	Academic Vocabulary: Infinite Limits, End Behavior Model
Lesson Frame:	We will investigate what happens at the end of a function.
	I will calculate limits as x approaches positive or negative infinity.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Continuity	Length: 3 days
Standard(s): Lim 2-3B, Lim 2-3C, Lim 2-1E, Fun 1-3E	Academic Vocabulary: Continuity, Continuous Function, Intermediate Value Theorem
Lesson Frame:	We will define continuity and the properties of continuous functions.
	I will identify intervals on which a function is continuous.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Rates of Change and Tangent Lines	Length: 4 days
Standard(s): Cha 2-2B	Academic Vocabulary: Average Rate of Change, Tangent, Normal Line
Lesson Frame:	We will define a tangent line and discuss its relation to slope.
	I will find the equation of a tangent and a normal line to a curve.

Unit Name: Limits and Continuity	**Length:** 16 days
Standards: CHA 1-2B, Lim 1-2B, Lim 1-1E, Lim 1-1C, Lim 1-3C, Lim 1-2C, Lim 2-3D, Lim 2-2D, Lim 2-3B, Lim 2-3C, Lim 2-1E, Fun 1-3E, Cha 2-2B	**Outcomes:** Students will learn the concept of the limit in this unit. They will learn how to evaluate, notate and apply limits to real world applications. This unit will also explore rates of change and how to connect the limit to the following concept of the derivative.
Essential Questions: How do limits describe the behavior of a function? What are the strategies used to determine the limit of a function? What determines continuity and how can you find and describe discontinuities?	**Learning Targets:** Students will be able to: -Calculate average and intantaneous rates of change. -Calculate limits as x approaches positive or negative infinity. -Identify intervals on which a function is continuous. -Find the equation of a tangent and a normal line to a curve.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Derivatives	**Length:** 35 days
Standards: Cha 2-1D, Cha 2-4C, Cha 2-1E, Fun 2-3E, Fun 3-1E, Cha 3-1E, Fun 3-1D, Fun 3-1C, Cha 3-2A	**Outcomes:** Students will learn how to take the derivative of various functions in this unit. They will also learn notation and begin investigating some uses of the derivative in real world applications.
Essential Questions: How do you find the slope of a curve at an instantaneous point? How can you find the derivative of a function using the limit process? What rules allow you to find the derivative of a function without using the entire limit process?	**Learning Targets:** Students will be able to: - Calculate the slope of a function using the definition of a derivative. - Tell where a function is not differentiable. - Use the rules of differentiation to calculate a derivative. - Use derivatives to analyze straight line motion. - Use the rules of differentiation to calculate derivatives for the six basic trigonometric functions. - Differentiate a composite function. - Find the derivative of an implicitly defined function. - Calculate the derivative of an inverse trigonometric function. - Calculate the derivative of an exponential and a logarithmic function.
Topic 1: Derviative of a Function	Length: 3 days
Standard(s): Cha 2-1D, Cha 2-4C, Cha 2-1E, Fun 4-2D	Academic Vocabulary: Derivative, Derivative Notation
Lesson Frame:	We will define a derivative and practice writing notations for derivatives.
	I will calculate the slope of a function using the definition of a derivative.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Differentiability	Length: 2 days
Standard(s): Fun 2-3E	Academic Vocabulary: Differentiable, Intermediate Value Theorem for Derivatives
Lesson Frame:	We will explore where functions fail to have derivatives.
	I will tell where a function is not differentiable.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Rules for Differentiation	Length: 4 days
Standard(s): Fun 3-1E	Academic Vocabulary: Power Rule, Product Rule, Quotient Rule, Second Derivative
Lesson Frame:	We will define the basic shortcut rules for taking derivatives.
	I will use the rules of differentiation to calculate a derivative.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Velocity and Other Rates of Change	Length: 4 days
Standard(s): Cha 3-1E, Cha 3-2A	Academic Vocabulary: Instantaneous Rate of Change, Velocity, Speed, Acceleration
Lesson Frame:	We will explore how derivatives tie into real worl applications of velocity and acceleration.
	I will use derivatives to analyze straight line motion.

Unit Name: Derivatives	**Length:** 35 days
Standards: Cha 2-1D, Cha 2-4C, Cha 2-1E, Fun 2-3E, Fun 3-1E, Cha 3-1E, Fun 3-1D, Fun 3-1C, Cha 3-2A	**Outcomes:** Students will learn how to take the derivative of various functions in this unit. They will also learn notation and begin investigating some uses of the derivative in real world applications.
Essential Questions: How do you find the slope of a curve at an instantaneous point? How can you find the derivative of a function using the limit process? What rules allow you to find the derivative of a function without using the entire limit process?	**Learning Targets:** Students will be able to: - Calculate the slope of a function using the definition of a derivative. - Tell where a function is not differentiable. - Use the rules of differentiation to calculate a derivative. - Use derivatives to analyze straight line motion. - Use the rules of differentiation to calculate derivatives for the six basic trigonometric functions. - Differentiate a composite function. - Find the derivative of an implicitly defined function. - Calculate the derivative of an inverse trigonometric function. - Calculate the derivative of an exponential and a logarithmic function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 5: Derivatives of Trigonometric Functions	Length: 3 days
Standard(s): Fun 3-1D	Academic Vocabulary: Harmonic Motion, Jerk
Lesson Frame:	We will define the rules for taking the derivative of basic trigonometric functions.
	I will use the rules of differentiation to calculate derivatives for the six basic trigonometric functions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 6: Chain Rule	Length: 3 days
Standard(s): Fun 3-1C	Academic Vocabulary: Chain Rule, Power Chain Rule
Lesson Frame:	We will investigate composite functions and how to use the chain rule to take the derivative.
	I will differentiate a composite function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 7: Implicit Differentiation	Length: 3 days
Standard(s): Fun 3-1E	Academic Vocabulary: Implicit Differentiation,
Lesson Frame:	We will investigate implicitly defined functions and learn to take derivatives of them.
	I will find the derivative of an implicitly defined function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 8: Derivatives of Inverse Trigonometric Functions	Length: 3 days
Standard(s): Fun 3-1E	Academic Vocabulary: Inverse Trigonometric Function

Unit Name: Derivatives	**Length:** 35 days
Standards: Cha 2-1D, Cha 2-4C, Cha 2-1E, Fun 2-3E, Fun 3-1E, Cha 3-1E, Fun 3-1D, Fun 3-1C, Cha 3-2A	**Outcomes:** Students will learn how to take the derivative of various functions in this unit. They will also learn notation and begin investigating some uses of the derivative in real world applications.
Essential Questions: How do you find the slope of a curve at an instantaneous point? How can you find the derivative of a function using the limit process? What rules allow you to find the derivative of a function without using the entire limit process?	**Learning Targets:** Students will be able to: - Calculate the slope of a function using the definition of a derivative. - Tell where a function is not differentiable. - Use the rules of differentiation to calculate a derivative. - Use derivatives to analyze straight line motion. - Use the rules of differentiation to calculate derivatives for the six basic trigonometric functions. - Differentiate a composite function. - Find the derivative of an implicitly defined function. - Calculate the derivative of an inverse trigonometric function. - Calculate the derivative of an exponential and a logarithmic function.
Lesson Frame:	We will derive a formula for taking the derivative of inverse trigonometric functions.
	I will calculate the derivative of an inverse trigonometric function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 9: Derivatives of Exponential and Logarithmic Functions	Length: 4 days
Standard(s): Fun 3-1E	Academic Vocabulary: Exponential Function, Logarithmic Function
Lesson Frame:	We will explore how derivatives can be used on logarithmic and exponential functions.
	I will calculate the derivative of an exponential and a logarithmic function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Applications of Derivatives	**Length:** 24 days
Standards: Fun 1-3E, Fun 4-1E, Fun 4-2E, Fun 4-3D, Fun 4-2D, Fun 4-2A, Fun 4-3F, Cha 3-1F, Fun 4-1E, Fun 4-3E, Cha 3-1E, Cha 3-3F	**Outcomes:** Students will apply their knowledge of derivatives in this unit to solve real worlds problems. They will learn how derivatives relate to the graphs of functions and how tests can be used to picture important features of graphs.
Essential Questions: How can the derivative be used to find key information on a graph of a function? How do you use the derivative to optimize a function? How do you use linearization and differentials to estimate values of a function?	**Learning Targets:** Students will be able to: -Determine the local and absolute extrema of a function. -Find the open intervals in which a function is increasing and decreasing. -Use the first derivative test to find local extrema of a function. -Solve an application problem that asks to find a minimum or maximum value. -Use a linearization to approximate the value of a square root value. -Solve a real world problem that involves multiple rates of change.
Topic 1: Extreme Values of Functions	Length: 4 days
Standard(s): Fun 1-3E, Fun 4-1E	Academic Vocabulary: Extreme Value, Extreme Value Theorem, Absolute Extreme, Local Extreme
Lesson Frame:	We will define basic vocabulary for finding the highest and lowest points of a function.
	I will determine the local and absolute extrema of a function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Mean Value Theorem	Length: 3 days
Standard(s): Fun 1-3E, Fun 4-2E	Academic Vocabulary: Mean Value Theorem, Increasing Functions, Decreasing Functions
Lesson Frame:	We will explore how derivatives can be used to find where functions are increasing or decreasing.
	I will find the open intervals in which a function is increasing and decreasing.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Connecting f' and f'' with the Graph of f	Length: 4 days
Standard(s): Fun 4-3D, Fun 4-2E, Fun 4-2D	Academic Vocabulary: First Derivative Test, Concavity, Points of Inflection, Second Derivative
Lesson Frame:	We will learn how to use tests to make finding maximums and minimums easier.
	I will use the first derivative test to find local extrema of a function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Optimization	Length: 4 days
Standard(s): Fun 4-2A, Fun 4-3F	Academic Vocabulary: Optimization, Constraint, Objective Equation
Lesson Frame:	We will learn the optimization process and how it can be used to find minimums and maximums.
	I will solve an application problem that asks to find a minimum or maximum value.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 5: Linearizations and Differentials	Length: 3 days
Standard(s): Cha 3-1F	Academic Vocabulary: Linear Approximation, Differential, Absolute Change, Relative Change, Percentage Change
Lesson Frame:	We will explore how tangent lines and derivatives can be used in conjunction with estimation.
	I will use a linearization to approximate the value of a square root value.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 6: Related Rates	Length: 4 days
Standard(s): Fun 4-1E, Fun 4-3E, Cha 3-1E, Cha 3-3F	Academic Vocabulary: Related Rate Equation
Lesson Frame:	We will explore problems that relate multiple rates of change and how derivatives can be used to solve them.
	I will solve a real world problem that involves multiple rates of change.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: The Definite Integral	**Length:** 19 days
Standards: Cha 4-4B, Lim 5-1F, Lim 5-2C, Fun 5-2D, Fun 5-1D, Fun 5-3D, Fun 5-3D, Fun 6-4C, Fun 6-1C	**Outcomes:** Students wil explore and learn about the definite integral. They will learn notation and properties of integrals and how the fundamental theorem of calculus makes a connection between derivative calculus and integral calculus.
Essential Questions: How does the definite integral connect to the concept of derivatives? How can you find the area under the curve of a function?	**Learning Targets:** Students will be able to: -Approximate the area under a curve using rectangles. -Use definite integral notation to expess the area under the curve. -Apply rules for definite integrals to find the average value of a function. -Apply the fundamental theorem of calculus to evaluate a definite integral. -Use trapezoids to estimate the area under the curve.
Topic 1: Estimiting With Finite Sums	Length: 3 days
Standard(s): Cha 4-4B, Lim 5-1F, Lim 5-2C	Academic Vocabulary: Distance, Rectangular Approximation Method
Lesson Frame:	We will connect rates of change back to function values with area under the curve.
	I will approximate the area under a curve using rectangles.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Definite Integrals	Length: 3 days
Standard(s): Fun 5-2D	Academic Vocabulary: Riemann Sums, Definite Integral
Lesson Frame:	We will define a definite integral and learn the notation used to write them.
	I will use definite integral notation to expess the area under the curve.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Definite Integrals and Antiderivatives	Length: 4 days
Standard(s): Fun 5-1D, Fun 5-3D	Academic Vocabulary: Average Value, Mean Value Theorem for Definite Integrals
Lesson Frame:	We will learn the basic properties of definite integrals and how to apply them together.
	I will apply rules for definite integrals to find the average value of a function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Fundamental Theorem of Calculus	Length: 4 days
Standard(s): Fun 5-3D, Fun 6-4C, Fun 6-1C	Academic Vocabulary: Fundamental Theorem Part 1, Fundamental Theorem Part 2
Lesson Frame:	We will connect derivatives to the antiderivative and learn how the processes can work together.
	I will apply the fundamental theorem of calculus to evaluate a definite integral.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 5: Trapezoidal Rule	Length: 3 days
Standard(s): Lim 5-1F	Academic Vocabulary: Trapezoidal Approximations
Lesson Frame:	We will learn how to improve rectangular approximation methods using trapezoids.
	I will use trapezoids to estimate the area under the curve.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Differential Equations and Mathematical Modeling	**Length:** 10 days
Standards: Fun 7-2C, Fun 7-3G, Fun 7-4D, Fun 6-1E, Fun 7-1E, Fun 7-3G	**Outcomes:** Students will get an introduction to differential equations in this unit. They will learn how antiderivatives can be used with various strategies to solve differential equations problems.
Essential Questions: How can antiderivatives be used to solve equations with derivatives in them? What techniques can be uesd to solve initial value problems?	**Learning Targets:** Students will be able to: -Solve an initial value problem using antiderivatives. -Compute an indefinite integral using u-substitution methods. -Use separation of variables to solve a differential equation.
Topic 1: Slope Fields and Differential Equations	Length: 3 days
Standard(s): Fun 7-2C, Fun 7-3G, Fun 7-4D	Academic Vocabulary: Differential Equations, Slope Fields
Lesson Frame:	We will define a differential equation and explore strategies to solve them.
	I will solve an initial value problem using antiderivatives.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Antidifferentiation by Substititution	Length: 3 days
Standard(s): Fun 6-1E	Academic Vocabulary: Indefinite Integrals, U-Substitution
Lesson Frame:	We will create a method for finding the antiderivative of a function that needs to use substitution.
	I will compute an indefinite integral using u-substitution methods.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Separable Differential Equations	Length: 2 days
Standard(s): Fun 7-1E, Fun 7-3G	Academic Vocabulary: Separable Differential Equation, Law of Exponential Change
Lesson Frame:	We will explore differential equations with both x and y on the same size and formalize a way to solve them.
	I will use separation of variables to solve a differential equation.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Applications of Definite Integrals	**Length:** 20 days
Standards: Cha 4-4B, Cha 4-3D, Cha 5-4C, Cha 5-1E, Cha 5-2B, Cha 5-3D, Cha 5-2D, Cha 5-4E, Cha 6-3D	**Outcomes:** Students will explore various applications of the definite integral in this unit. They will solve real world problems with rates of change and learn how the integral can be used to calculate geometric values such as area and volume.
Essential Questions: How can you use integrals to solve real world problems involving rates of change? How can you find the area between two curves in the plane? How can integrals be used to find volumes of solid objects?	**Learning Targets:** Students will be able to: -Integrate a rate of change function to find net change. -Use integration to find the area between two curves. -Use integration to calculate volumes of solids. -Use integration to calculate the length of a curve.
Topic 1: Integral as Net Change	Length: 3 days
Standard(s): Cha 4-4B, Cha 4-3D	Academic Vocabulary: Net Change, Consumption, Work
Lesson Frame:	We will investigate the connection of integrals and rates of change in real world problems.
	I will integrate a rate of change function to find net change.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Areas in the Plane	Length: 4 days
Standard(s): Cha 5-4C, Cha 5-1E, Cha 5-2B	Academic Vocabulary: Area Between Curves
Lesson Frame:	We will formalize techniques for finding the areas of shapes in the x-y plane.
	I will use integration to find the area between two curves.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Volumes of Solids	Length: 4 days
Standard(s): Cha 5-3D, Cha 5-2D, Cha 5-4E	Academic Vocabulary: Cross Section, Volume of Revolution, Disk Method, Shell Method
Lesson Frame:	We will explore how integrals can be used to find the volume of 3 dimensional objects.
	I will use integration to calculate volumes of solids.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Lengths of Curves	Length: 3 days
Standard(s): Cha 6-3D	Academic Vocabulary: Sine Wave, Arc Length
Lesson Frame:	We will explore how integrals can be used to find the length of curves.
	I will use integration to calculate the length of a curve.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Course Name:	Pre-Calculus & Trigonometry		
Credits:	1		
Prerequisites:	Advanced Algebra (Recommended grade of C or better or by teacher approval)		
Description:	Prepares students for college mathematics. The basic structure of this course is built around the study of functions, their properties, graphs and applications in society. Functions included in this course: linear, polynomial, rational, trigonometric, exponential and logarithmic. Also included in this course is the study of polar coordinates and complex numbers, sequences and series, and probability. The purchase of a graphing calculator is highly recommended for this course. A TI-83 or TI-84 calculator is required.		
Academic Standards:	Wisconsin State Standards in Mathematics (2011)		
Units:	Unit Length:	Unit Standards:	Unit Outcomes:
Functions and Graphs	26 days	HSFBFB3, HSF.IF.A.2, HSF.IF.A.1, HSF.IF.C.8.A,HSF.BF.B.3, HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2, HSF.IF.C.7.B, HSF.IF.C.7.B, HSF.BF.A.1.C, HSF.BF.B.4	Students will use the information in this unit to be able to graph and analyze various types of functions. Students will learn how to describe key aspects of a function and rewrite equations of functions.
Polynomial and Rational Functions	24 days	HSA-SSE.A.2, HSA-SSE.B.3a, HSA.APR.D.6, HSA.APR.A.1, HSA.REI.B.4, HSA.APR.B.2, HSA.REI.A.2, HSF.IF.C.7.D	Students will understand how to factor algebraic expressions and use factoring and division techniques to solve equations. Students will also learn how to simplify and solve expressions and equations with rational terms.
Exponential and Logarithmic Functions	24 days	8.EE.A.1, HSF.LE.A.3, 8.NS.A.1, HSN.RN.A.1, HSN.RN.B.3, HSF.BF.B.5, HSF.LE.A.4	Students will utilize algebraic properties to rewrite exponential and logarithmic expressions. Students will extend their knowledge of logarithms and exponents to solve equations and real world problems.
Basic Triangle Trigonometry	16 days	HSF.TF.A.1, HSG.SRT.C.6, HSG.SRT.C.8, HSG.SRT.D.11	Students will be able to solve right triangles using geometric principles and basic trigonometry. Students will also be able to solve problems involving triangles without right angles using the law of sines and the law of cosines.
Graphs of Trigonometric Functions	15 days	HSF.TF.A.2, HSF.TF.A.3, HSF.TF.B.5, HSF.TF.B.7	Students will memorize the unit circle and use it to find values of trigonometric functions. Students will extend their knowledge of the unit circle to graph both sinusoidal curves as well as other trigonometric functions. Students will also understand how inverse trigonometric functions can be used in trigonometry.
Analytic Trigonometry	17 days	HSF.TF.C.8, HSF.TF.C.9, HSF.TF.B.7	Students will use information learned in this unit about how the interrelationships among the six basic trigonometric functions make it possible to write trigonometric expressions in various equivalent forms.

Unit Name: Functions and Graphs	**Length:** 26 days
Standards: HSFBFB3, HSF.IF.A.2, HSF.IF.A.1, HSF.IF.C.8.A,HSF.BF.B.3, HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2, HSF.IF.C.7.B, HSF.IF.C.7.B, HSF.BF.A.1.C, HSF.BF.B.4	**Outcomes:** Students will use the information in this unit to be able to graph and analyze various types of functions. Students will learn how to describe key aspects of a function and rewrite equations of functions.
Essential Questions: How can you determine which family a function belongs to? How can you write the domain and range of a function? How can you draw the graph of a given function? How can you perform operations within a function	**Learning Targets:** Students will be able to: -Graph a function using transformations. -Use interval notation to write a set of real numbers. -Calculate the domain and range of a function both graphically and analytically. -Find and label extrema for a given function. -Determine whether a function is even, odd, or neither both graphically and analytically. -Write an equation in slope-intercept form given enough information. -Graph a piecewise function. -Graph a transformed version of the greatest integer function. -Write a single function defined as the composition of two functions. -Find the inverse of a function and prove that it is the inverse of the original function.
Topic 1: Parent Functions & Transformations	Length: 3 days
Standard(s): HSFBFB3	Academic Vocabulary: Stretch, Shrink, Transformation, Translation, Reflection
Lesson Frame:	We will classify families of functions and identify transformations of parent functions.
	I will graph a function using transformations.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Interval Notation	Length: 2 days
Standard(s): HSF.IF.A.2	Academic Vocabulary: Interval
Lesson Frame:	We will define interval notation.
	I will use interval notation to write a set of real numbers.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Domain and Range	Length: 3 days
Standard(s): HSF.IF.A.1	Academic Vocabulary: Function, Domain, Range, Vertical Line Test
Lesson Frame:	We will review domain and range as well as how to determine if a graph represents a function.
	I will calculate the domain and range of a function both graphically and analytically.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Extreme Values	Length: 2 days
Standard(s): HSF.IF.C.8.A	Academic Vocabulary: Extreme Value, Maximum, Minimum, Local/Relative, Absolute, Increasing, Decreasing
Lesson Frame:	We will define and classify various forms of extrema on a function.
	I will find and label extrema for a given function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Functions and Graphs	**Length:** 26 days
Standards: HSFBFB3, HSF.IF.A.2, HSF.IF.A.1, HSF.IF.C.8.A,HSF.BF.B.3, HSA-CED. A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2, HSF.IF.C.7.B, HSF.IF.C.7.B, HSF.BF.A. 1.C, HSF.BF.B.4	**Outcomes:** Students will use the information in this unit to be able to graph and analyze various types of functions. Students will learn how to describe key aspects of a function and rewrite equations of functions.
Essential Questions: How can you determine which family a function belongs to? How can you write the domain and range of a function? How can you draw the graph of a given function? How can you perform operations within a function	**Learning Targets:** Students will be able to: -Graph a function using transformations. -Use interval notation to write a set of real numbers. -Calculate the domain and range of a function both graphically and analytically. -Find and label extrema for a given function. -Determine whether a function is even, odd, or neither both graphically and analytically. -Write an equation in slope-intercept form given enough information. -Graph a piecewise function. -Graph a transformed version of the greatest integer function. -Write a single function defined as the composition of two functions. -Find the inverse of a function and prove that it is the inverse of the original function.
Topic 5: Even and Odd Functions	Length: 2 days
Standard(s): HSF.BF.B.3	Academic Vocabulary: Symmetry, Even Function, Odd Function
Lesson Frame:	We will explore even and odd functions and symmetry within a function.
	I will determine whether a function is even, odd, or neither both graphically and analytically.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	
Topic 6: Linear Functions	Length: 3 days
Standard(s): HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2	Academic Vocabulary: Slope, Intercept, Slope-Intercept Form, Point-Slope Form, Parallel, Perpendicular
Lesson Frame:	We will review linear functions in slope-intercept form.
	I will write an equation in slope-intercept form given enough information.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 7: Piecewise Functions	Length: 3 days
Standard(s): HSF.IF.C.7.B	Academic Vocabulary: Piecewise Function
Lesson Frame:	We will explore how to read and graph piecewise-defined functions.
	I will graph a piecewise function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 8: Greatest Integer Function	Length: 2 days
Standard(s): HSF.IF.C.7.B	Academic Vocabulary: Integer, Greatest Integer Function, Step Function
Lesson Frame:	We will practice graphing step functions and define the greatest integer operation.
	I will graph a transformed version of the greatest integer function.

Unit Name: Functions and Graphs	**Length:** 26 days
Standards: HSFBFB3, HSF.IF.A.2, HSF.IF.A.1, HSF.IF.C.8.A,HSF.BF.B.3, HSA-CED.A.2, HSF-BF.A.1a, HSF-LE.A.1b, HSF-LE.A.2, HSF.IF.C.7.B, HSF.IF.C.7.B, HSF.BF.A.1.C, HSF.BF.B.4	**Outcomes:** Students will use the information in this unit to be able to graph and analyze various types of functions. Students will learn how to describe key aspects of a function and rewrite equations of functions.
Essential Questions: How can you determine which family a function belongs to? How can you write the domain and range of a function? How can you draw the graph of a given function? How can you perform operations within a function	**Learning Targets:** Students will be able to: -Graph a function using transformations. -Use interval notation to write a set of real numbers. -Calculate the domain and range of a function both graphically and analytically. -Find and label extrema for a given function. -Determine whether a function is even, odd, or neither both graphically and analytically. -Write an equation in slope-intercept form given enough information. -Graph a piecewise function. -Graph a transformed version of the greatest integer function. -Write a single function defined as the composition of two functions. -Find the inverse of a function and prove that it is the inverse of the original function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 9: Composite Functions	Length: 2 days
Standard(s): HSF.BF.A.1.C	Academic Vocabulary: Function Composition
Lesson Frame:	We will explore operations that can be used between operations including function compostion.
	I will write a single function defined as the composition of two functions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 10: Inverse Functions	Length: 2 days
Standard(s): HSF.BF.B.4	Academic Vocabulary: Inverse
Lesson Frame:	We will define the inverse of a function and investigate inverse operations.
	I will find the inverse of a function and prove that it is the inverse of the original function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Polynomial and Rational Functions	**Length:** 24 days
Standards: HSA-SSE.A.2, HSA-SSE.B.3a, HSA.APR.D.6, HSA.APR.A.1, HSA.REI.B.4, HSA.APR.B.2, HSA.REI.A.2, HSF.IF.C.7.D	**Outcomes:** Students will understand how to factor algebraic expressions and use factoring and division techniques to solve equations. Students will also learn how to simplify and solve expressions and equations with rational terms.
Essential Questions: How can you choose the best factoring technique for a given polynomial? How can you manipulate and analyze functions with rational expressions? How can you find the roots of any given polynomial equation?	**Learning Targets:** Students will be able to: -Factor a trinomial with a leading coefficient that is not 1 into to binomials. -Use grouping to factor a third degree polynomial. -Simplify a rational expression and state its excluded values -Use synthetic division to find the quotient of two polynomials and inclued the remainder. -Pick the simplest method necessary and use it to solve a quadratic equation. -Find the rational zeros of a cubic polynomial. -Solve a rational equation and check to make sure I don't have extraneous solutions. -Analytically find the asymptotes of a rational function and use them to draw a graph.
Topic 1: Factoring Trinomials	Length: 2 days
Standard(s): HSA-SSE.A.2, HSA-SSE.B.3a	Academic Vocabulary: Monomial, Trinomial, Factor, FOIL
Lesson Frame:	We will review factoring trinomials by both removing common factors and using th FOIL pattern.
	I will factor a trinomial with a leading coefficient that is not 1 into to binomials.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Advanced Factoring Methods	Length: 3 days
Standard(s): HSA-SSE.A.2	Academic Vocabulary: Factor, Grouping, Difference/Sum of Cubes
Lesson Frame:	We will explore advanced factoring methods and use them to factor polynomials with a degree greater than 2.
	I will use grouping to factor a third degree polynomial.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Rational Expressions	Length: 3 days
Standard(s): HSA.APR.D.6	Academic Vocabulary: Rational Expression, Excluded Values
Lesson Frame:	We will investigate rules for simplifying rational expressions.
	I will simplify a rational expression and state its excluded values
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Synthetic and Long Division	Length: 2 days
Standard(s): HSA.APR.A.1	Academic Vocabulary: Quotient, Remainder, Synthetic Division
Lesson Frame:	We will explore the processes used for dividing one polynomial by another.
	I will use synthetic division to find the quotient of two polynomials and inclued the remainder.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Polynomial and Rational Functions	**Length:** 24 days
Standards: HSA-SSE.A.2, HSA-SSE.B.3a, HSA.APR.D.6, HSA.APR.A.1, HSA.REI.B.4, HSA.APR.B.2, HSA.REI.A.2, HSF.IF.C.7.D	**Outcomes:** Students will understand how to factor algebraic expressions and use factoring and division techniques to solve equations. Students will also learn how to simplify and solve expressions and equations with rational terms.
Essential Questions: How can you choose the best factoring technique for a given polynomial? How can you manipulate and analyze functions with rational expressions? How can you find the roots of any given polynomial equation?	**Learning Targets:** Students will be able to: -Factor a trinomial with a leading coefficient that is not 1 into to binomials. -Use grouping to factor a third degree polynomial. -Simplify a rational expression and state its excluded values -Use synthetic division to find the quotient of two polynomials and inclued the remainder. -Pick the simplest method necessary and use it to solve a quadratic equation. -Find the rational zeros of a cubic polynomial. -Solve a rational equation and check to make sure I don't have extraneous solutions. -Analytically find the asymptotes of a rational function and use them to draw a graph.
Topic 5: Solving Quadratic Equations	Length: 3 days
Standard(s): HSA.REI.B.4	Academic Vocabulary: Root, Zeros, Quadratic Formula
Lesson Frame:	We will review three processes for solving a quadratic equation.
	I will pick the simplest method necessary and use it to solve a quadratic equation.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 6: Rational Root Theorem	Length: 3 days
Standard(s): HSA.APR.B.2	Academic Vocabulary: Rational Root, Zeros
Lesson Frame:	We will explore how to use the rational root theorem to find possible solutions zeros of a polynomial.
	I will find the rational zeros of a cubic polynomial.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 7: Solving Rational Equations	Length: 3 days
Standard(s): HSA.REI.A.2	Academic Vocabulary: Rational Equation, Extraneous Solution
Lesson Frame:	We will investigate processes for solving rational equations.
	I will solve a rational equation and check to make sure I don't have extraneous solutions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 8: Graphing Rational Functions	Length: 3 days
Standard(s): HSF.IF.C.7.D	Academic Vocabulary: Asymptote, End Behavior, Discontinuity,
Lesson Frame:	We will explore asymptotic behavior on rational functions.
	I will analytically find the asymptotes of a rational function and use them to draw a graph.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Exponential and Logarithmic Functions	**Length:** 24 days
Standards: 8.EE.A.1, HSF.LE.A.3, 8.NS.A.1, HSN.RN.A.1, HSN.RN.B.3, HSF.BF.B.5, HSF.LE.A.4	**Outcomes:** Students will utilize algebraic properties to rewrite exponential and logarithmic expressions. Students will extend their knowledge of logarithms and exponents to solve equations and real world problems.
Essential Questions: How can you use an exponential groth or decay model to solve a real world problem? How can you rewrite exponential and logarithmic expressions using algebraic properties? How can you solve equations containing exponents and logarithms?	**Learning Targets:** Students will be able to: -Simplify expression using the rules of exponents. -Graph an exponential growth and an exponential decay model. -Simplify expressions that include the number e. -Rewrite expressions from radical form into exponent form and vice versa. -Rewrite expressions in logarithmic form into exponential form and vice versa. -Utilize the properties of logarithms to condense and expand logarithmic expressions. -Evaluate logarithms using the change of base formula. -Use logarithms to solve exponential equations. -Use exponents to solve logarithmic equations.
Topic 1: Rules of Exponents	Length: 3 days
Standard(s): 8.EE.A.1	Academic Vocabulary: Exponent, Base, Zero Power Rule
Lesson Frame:	We will review the rules of exponents.
	I will simplify expression using the rules of exponents.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Graphing Exponential Functions	Length: 2 days
Standard(s): HSF.LE.A.3	Academic Vocabulary: Exponential Growth, Exponential Decay
Lesson Frame:	We will investigate graphs of exponential equations and use them in mathematical models.
	I will graph an exponential growth and an exponential decay model.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Euler's Number	Length: 2 days
Standard(s): 8.NS.A.1	Academic Vocabulary: The Number e
Lesson Frame:	We will analyze Euler's number and it's importantance in real-world situations.
	I will simplify expressions that include the number e.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Radicals and Rational Exponents	Length: 3 days
Standard(s): HSN.RN.A.1, HSN.RN.B.3	Academic Vocabulary: Index, Radical Expression, Radicand, Rational Exponent
Lesson Frame:	We will explore the connection between rational exponents and radicals.
	I will rewrite expressions from radical form into exponent form and vice versa.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 5: Basic of Logarithms	Length: 2 days
Standard(s): HSF.BF.B.5	Academic Vocabulary: Exponential Form, Logarithmic Form
Lesson Frame:	We will define the operation of logarithm and explore its meaning.
	I will rewrite expressions in logarithmic form into exponential form and vice versa.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 6: Properties of Logarithms	Length: 2 days
Standard(s): HSF.BF.B.5	Academic Vocabulary: Power Rule, Product Rule, Quotient Rule
Lesson Frame:	We will define the basic properties of logarithms.
	I will utilize the properties of logarithms to condense and expand logarithmic expressions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 7: Change of Base Formula	Length: 2 days
Standard(s): HSF.BF.B.5	Academic Vocabulary: Change of Base Formula
Lesson Frame:	We will learn the change of base formula and how it can be used to evaluate logarithms
	I will evaluate logarithms using the change of base formula.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 8: Solving Exponential Equations	Length: 3 days

Unit Name: Exponential and Logarithmic Functions	**Length:** 24 days		
Standards: 8.EE.A.1, HSF.LE.A.3, 8.NS.A.1, HSN.RN.A.1, HSN.RN.B.3, HSF.BF.B.5, HSF.LE.A.4	**Outcomes:** Students will utilize algebraic properties to rewrite exponential and logarithmic expressions. Students will extend their knowledge of logarithms and exponents to solve equations and real world problems.		
Essential Questions: How can you use an exponential groth or decay model to solve a real world problem? How can you rewrite exponential and logarithmic expressions using algebraic properties? How can you solve equations containing exponents and logarithms?	**Learning Targets:** Students will be able to: -Simplify expression using the rules of exponents. -Graph an exponential growth and an exponential decay model. -Simplify expressions that include the number e. -Rewrite expressions from radical form into exponent form and vice versa. -Rewrite expressions in logarithmic form into exponential form and vice versa. -Utilize the properties of logarithms to condense and expand logarithmic expressions. -Evaluate logarithms using the change of base formula. -Use logarithms to solve exponential equations. -Use exponents to solve logarithmic equations.		
Standard(s): HSF.LE.A.4	Academic Vocabulary: Exponential Equation		
Lesson Frame:	We will explore strategies for solving exponential equations.		
	I will use logarithms to solve exponential equations.		
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:		
Topic 9: Solving Logarthmic Equations	Length: 3 days		
Standard(s): HSF.BF.B.5	Academic Vocabulary: Logarithmic Equation		
Lesson Frame:	We will explore strategies for solving logarithmic equations.		
	I will use exponents to solve logarithmic equations.		
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:		

Unit Name: Basic Triangle Trigonometry	**Length:** 16 days
Standards: HSF.TF.A.1, HSG.SRT.C.6, HSG.SRT.C.8, HSG.SRT.D.11	**Outcomes:** Students will be able to solve right triangles using geometric principles and basic trigonometry. Students will also be able to solve problems involving triangles without right angles using the law of sines and the law of cosines.
Essential Questions: How can you solve real world problems involving right triangle? What trigonometric properties can be used to solve problems involving triangles without right angles?	**Learning Targets:** Students will be able to: -Convert back and forth between radian and degree measurements for angles. -Calculate the sides of a 45-45-90 and a 30-60-90 right triangle. -Use sohcahtoa to solve for the angles and sides of a right triangle. -Use the law of cosines to solve a real world story problem. -Use the law of sines to solve a real world story problem. -Solve a real life problem using a trigonometric property.
Topic 1: Angles in Radians and Degree	Length: 2 days
Standard(s): HSF.TF.A.1	Academic Vocabulary: Degree, Radian, Coterminal Angle, Quadrantal Angle, Standard Position
Lesson Frame:	We will define what a radian is and how it can be used to measure angles.
	I will convert back and forth between radian and degree measurements for angles.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Special Right Triangles	Length: 2 days
Standard(s): HSG.SRT.C.6	Academic Vocabulary: Special Right Triangle (30-60-90, 45-45-90)
Lesson Frame:	We will review finding legths of sides of special right triangles.
	I will calculate the sides of a 45-45-90 and a 30-60-90 right triangle.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Right Triangle Trigonometry	Length: 3 days
Standard(s): HSG.SRT.C.8	Academic Vocabulary: Trigonometric Function, Hypotenuse, Sine, Cosine, Tangent, Sohcahtoa
Lesson Frame:	We will define the basic trigonometric functions and understand how the can be used to solve right triangles.
	I will use sohcahtoa to solve for the angles and sides of a right triangle.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Law of Cosines	Length: 2 days
Standard(s): HSG.SRT.D.11	Academic Vocabulary: Law of Cosines
Lesson Frame:	We will define the law of cosines and explore how to use it to solve for the angles and sides of a triangle.
	I will use the law of cosines to solve a real world story problem.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 5: Law of Sines	Length: 2 days
Standard(s): HSG.SRT.D.11	Academic Vocabulary: Law of Sines
Lesson Frame:	We will define the law of sines and explore how to use it to solve for the angles and sides of a triangle.
	I will use the law of sines to solve a real world story problem.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 6: Applications of Basic Triangle Trigonometry	Length: 3 days
Standard(s): HSG.SRT.C.8	Academic Vocabulary: Angle of Depression, Angle of Elevation
Lesson Frame:	We will practice modeling real life situations that can be solved with trigonometric properties.
	I will solve a real life problem using a trigonometric property.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Graphs of Trigonometric Functions	**Length:** 15 days
Standards: HSF.TF.A.2, HSF.TF.A.3, HSF.TF.B.5, HSF.TF.B.7	**Outcomes:** Students will memorize the unit circle and use it to find values of trigonometric functions. Students will extend their knowledge of the unit circle to graph both sinusoidal curves as well as other trigonometric functions. Students will also understand how inverse trigonometric functions can be used in trigonometry.
Essential Questions: How can the unit circle be used to find exact measurements of trigonometric functions? How can a sinusoidal curve be used to model a real world problem? How can inverse trigonometric functions be used find angles in triangles?	**Learning Targets:** Students will be able to: -Memorize the unit cirlcle and use it to find exact values of trigonometric functions. -Graph a sinusoidal function with multiple transformations. -Draw the graph of a tangent function. -Find the value of an inverse trigonmetric expression using the unit circle.
Topic 1: The Unit Circle	Length: 4 days
Standard(s): HSF.TF.A.2, HSF.TF.A.3	Academic Vocabulary: Cosecant, Cotangent, Secant
Lesson Frame:	We will define all the values on the unit circle and practice memorizing them.
	I will memorize the unit cirlcle and use it to find exact values of trigonometric functions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Sinusoidal Functions	Length: 4 days
Standard(s): HSF.TF.B.5	Academic Vocabulary: Sinusoidal Curve, Amplitude, Period, Phase Shift, Vertical Shift
Lesson Frame:	We will investigate graphs of sine and cosine functions and how they can be transformed.
	I will graph a sinusoidal function with multiple transformations.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Graphs of Other Trigonometric Functions	Length: 2 days
Standard(s): HSF.TF.A.3	Academic Vocabulary: Asymptotes
Lesson Frame:	We will explore graphs of tangent, cotangent, secant, and cosecant functions.
	I will draw the graph of a tangent function.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	We will:
Topic 4: Inverse Trigonometric Functions	Length: 3 days
Standard(s): HSF.TF.B.7	Academic Vocabulary: Inverse Trigonometric Function, Arc(sin,cos,...)
Lesson Frame:	We will define inverse trigonometric functions and connect them to the standard trigonometric operations.
	I will find the value of an inverse trigonmetric expression using the unit circle.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

Unit Name: Analytic Trigonometry	**Length:** 17 days
Standards: HSF.TF.C.8, HSF.TF.C.9, HSF.TF.B.7	**Outcomes:** Students will use information learned in this unit about how the interrelationships among the six basic trigonometric functions make it possible to write trigonometric expressions in various equivalent forms.
Essential Questions: How are algebraic properties related to trigonometric functions? How can you rewrite a trigonometric expression into a more useful form? How can you use trigonometric identities to solve equations?	**Learning Targets:** Students will be able to: -Use basic trigonometric identities to simplify expressions. -Use the pythagorean identities in conjunction with previous knowledge to simplify expressions. -Use the sum and difference identities in conjunction with previous knowledge to simplify expressions. -Use knowledge of all trigonometric identities to simplify expressions with trigonometric functions. -Solve a trigonometric equation using an identity and inverse trigonometry.
Topic 1: Basic Trigonometric Identities	Length: 3 days
Standard(s): HSF.TF.C.8	Academic Vocabulary: Reciprocal Identities, Cofunction Identities, Even/Odd Identities, Quotient Identities
Lesson Frame:	We will define four basic sets of trigonometric identies.
	I will use basic trigonometric identities to simplify expressions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 2: Pythagorean Identities	Length: 2 days
Standard(s): HSF.TF.C.8	Academic Vocabulary: Pythagorean Identities
Lesson Frame:	We will define and prove the pythagorean identities of trigonometry,
	I will use the pythagorean identities in conjunction with previous knowledge to simplify expressions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 3: Sum and Difference Identities	Length: 3 days
Standard(s): HSF.TF.C.9	Academic Vocabulary: Sum/Difference Identities
Lesson Frame:	We will define and prove the sum and difference identities of trigonometric functions.
	I will use the sum and difference identities in conjunction with previous knowledge to simplify expressions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 4: Double, Half, and Power Reducing Identities	Length: 3 days
Standard(s): HSF.TF.C.9	Academic Vocabulary: Double Angle Identity, Half Angle Identity, Power Reducing Identity
Lesson Frame:	We will define and prove the double angle, half angle, and power reducing identities of trigonometric functions.
	I will use my knowledge of all trigonometric identities to simplify expressions with trigonometric functions.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:
Topic 5: Trigonometric Equations	Length: 4 days

Unit Name: Analytic Trigonometry	**Length:** 17 days
Standards: HSF.TF.C.8, HSF.TF.C.9, HSF.TF.B.7	**Outcomes:** Students will use information learned in this unit about how the interrelationships among the six basic trigonometric functions make it possible to write trigonometric expressions in various equivalent forms.
Essential Questions: How are algebraic properties related to trigonometric functions? How can you rewrite a trigonometric expression into a more useful form? How can you use trigonometric identities to solve equations?	**Learning Targets:** Students will be able to: -Use basic trigonometric identities to simplify expressions. -Use the pythagorean identities in conjunction with previous knowledge to simplify expressions. -Use the sum and difference identities in conjunction with previous knowledge to simplify expressions. -Use knowledge of all trigonometric identities to simplify expressions with trigonometric functions. -Solve a trigonometric equation using an identity and inverse trigonometry.
Standard(s): HSF.TF.B.7	Academic Vocabulary: Trigonometric Equation, Inverse Operation
Lesson Frame:	We will explore techniques for solving trigonometric functions.
	I will solve a trigonometric equation using an identity and inverse trigonometry.
Performance Tasks: Warmup Problems, Exit Tickets, Challenge Problems, Application Examples	Notes:

MANAWA

Students choosing to excel; realizing their strengths

To: Board of Education

From: Jacquelyn Sernau- District Reading Specialist

Date: April 22, 2021

Re: Literacy Updates/Request for changing curriculum materials

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The purpose of this memo is to recommend to the Board a change from the adopted Lucy Calkins's Phonics Units of Study for grades 4K-2 to a different phonics curriculum through a company called Really Great Reading.

Per our comprehensive district literacy plan, phonics instruction is an identified focus area for the 2021-2022 school year. After extensive review of data and analyzing the types of skill gaps we are seeing in our students, it is apparent that making phonics instruction a top priority is imperative. Really Great Reading is a company that works to bring the science of reading alive in each classroom through explicit lessons and hands-on work for students using letter tiles and other manipulatives. They produce products that can be used within a whole group structure as well as for small groups of students. Manawa Elementary School is looking to use their phonics programs called: Launchpad (4K), Countdown (grade K), Blast (grade 1) and HD Word (grade 2).

In order for Phonics instruction to be effective, it must be systematic and explicit. We believe that following a series of programs from 4K through second grade will build a strong foundation for our students. Teachers are encouraged to take time over the summer to get familiar with the materials, and we will provide a day of in-house training and grade level planning over the summer as well. Teachers that have used these products with small groups of students have commented on students' growth, and teachers are showing excitement with the idea of being able to make a change to a program they truly believe in.

Please consider this recommendation to change from the Lucy Calkins's Phonics Units of Study to the Phonics programs through Really Great Reading as we work to close achievement gaps and build stronger readers at our elementary school.

School District of Manawa

To: Dr. Melanie Oppor, Curriculum Committee
Fr: Dan Wolfgram
Date: 4/26/2021
Re: Freshman and Sophomore Assessment Recommendation

The purpose of this memo is to recommend the following assessment changes for 9th and 10th grade students to replace the ACT Aspire Periodic Assessment:

- Use of the PreACT Assessment for one year (2021-2022 school year). The cost for the PreACT assessment is $14.00 per student. (The previous assessment was $12.000 per student and has been accounted for in the 2021-2022 school budget, pending approval.)

- Transition to the recommended Mosaic Platform for the 2022-23 school year and beyond.

Reasons for the Changes:

ACT Aspire Periodic is in the process of being phased out. The ACT Aspire Periodic tests are short-duration assessments, designed to produce snapshots of each learner's achievement at intervals throughout the academic year. They help to identify if a learner's progress is at pace for success with the state mandated test ACT Aspire at the conclusion of the year, and identify corrective strategies for re-teaching. The tests have been in use this year at Little Wolf High School.

ACT recommends replacing the ACT Periodic with the PreACT for use with freshman and sophomores. Much like the ACT Periodic, the test is a multiple-choice assessment that provides students an early measure of college, technical school, and career readiness while serving as a practice opportunity and predictor of performance on the state mandated ACT assessment given to all juniors. Students also receive a personalized view of college and career possibilities based on their answers to the ACT Interest Inventory which can help them start thinking about career paths.

ACT Aspire Periodic will be integrated into the new Mosaic Adaptive Academic Learning platform in Grades 3-8 in Math, Reading, and English, but are not yet available for high school grades. When Mosasic is available in the 2022-2023 school year, this is the most desirable choice because it is an accurate predictor of scoring on the ACT and can be administered multiple times a year.

- Monthly Disciplinary Literacy visits with teacher small groups.

3. **Math Professional Development for Teachers:**
   - College Preparatory Math (CPM) Teacher Professional Development - Summer 2021.
   - CPM Implementation Support Visits, Representatives - CPM matches each adopting school with an Implementation Partner. This person will be our liaison to CPM and will support teachers through implementation. The purpose is to model and observe lessons with teachers as well as be a resource for teacher questions.. Two visits in 2021-2022.
   - Principal classroom coaching and evaluation - Ongoing: commitment to be in each math classroom. Frequency = no less than 4 visits per teacher per quarter.

4. **Response to Intervention (RtI otherwise known as Wolftime):**
   - Focused identification of students for remediation based on classroom assessments, state mandated test results, STAR Universal Screener, and PreAct assessment results.
   - Focus on what has not been learned.

#

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ManawaSchools.org
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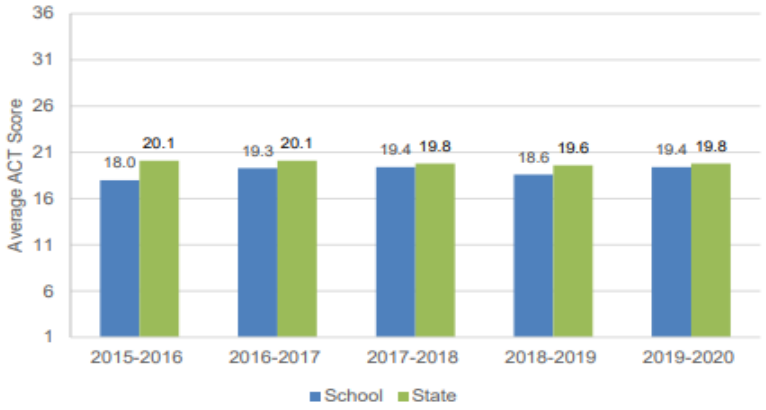
To: Dr. Melanie Oppor, Curriculum Committee
Fr: Dan Wolfgram
Date: 4/26/2021
Re: 2021 ACT Update

The purpose of this memo is to provide a preliminary overview of the LWHS 2021 ACT results.

ACT Composite 5-Year Trends: The following graphs were included in the 2019-2020 ACT Profile Report.

Figure 1.1. Average Composite Scores: 5 Years of Testing*

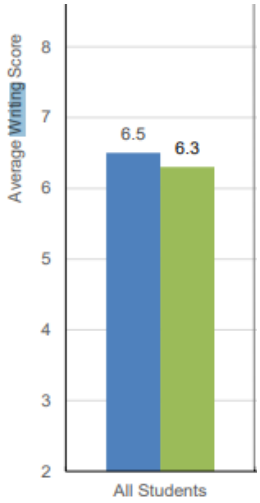


Content Area Breakdown 5-Year Trends:

Table 1.2. Five Year Trends—Average ACT Scores

	Number of Students Tested		Average ACT Scores									
			English		Mathematics		Reading		Science		Composite	
Year	School	State	School	State	School	State	School	State	School	State	School	State
2015-2016	48	62,647	16.9	19.1	17.4	20.1	17.5	20.1	19.6	20.6	18.0	20.1
2016-2017	58	64,475	18.5	19.2	19.2	20.0	18.9	20.1	20.1	20.4	19.3	20.1
2017-2018	55	63,877	18.0	18.8	19.5	19.9	19.8	19.9	20.2	20.2	19.4	19.8
2018-2019	53	62,946	17.5	18.5	18.1	19.5	19.3	20.1	19.0	19.9	18.6	19.6
2019-2020	**57**	**61,465**	**18.2**	**18.7**	**19.5**	**19.8**	**19.5**	**20.0**	**20.3**	**20.3**	**19.4**	**19.8**
2020- 2021	**47**		**16.3**		**18.9**		**17.9**		**18.4**		**18.0**	

2020 Writing Scores:



*Preliminary data for the average writing score of the **2021** ACT reports a writing score of **6.14.** (12 points possible) State scores not yet posted.

Analysis:

- Over a 5-year trend, student performance has plateaued. The Manawa scores are consistently below the state average.
- In 2021, average student scores dropped in all content areas with the largest decline in English and Reading.

The staff and I find this unacceptable and propose the following measures.

Strategies to Improve Learning:

1. **Teacher Wednesday Work -** This time provides the structure for ongoing discussions around student learning, expected outcomes, and methods for high student achievement across all content areas.
   - Formation of a dedicated leadership team of teachers and Mr. Wolfgram to study, and support the staff in maintaining the focus of the Wednesday work (essentially writing an adult learning lesson plan). The team will begin work during the summer of 2021 with Principal Wolfgram and Erin Loritz of CESA # 6.
   - Teachers will collaborate with colleagues in reviewing standards and student data (assessment, course grades, attendance, conduct, etc.) to identify areas of learning strength and areas that need remediation.

- Teachers will focus on teaching strategies that will incorporate Disciplinary Literacy in all classes.

2. **Balanced Approach to Content and Disciplinary Literacy** - Disciplinary Literacy Professional Development with Erin Loritz Literacy Center CESA 6.
   - Fall 2021 building inservice for all MMS/LWHS teachers.
   - Monthly Disciplinary Literacy visits by Ms. Loritz with teacher small groups to learn strategies that the teachers will use in their classes.
   - Principal classroom coaching and evaluation - Ongoing: commitment to be in each classroom. Frequency = Each classroom will be visited a minimum of 2 times per month.

3. **Math Professional Development for Teachers:**
   - College Preparatory Math (CPM) Teacher Professional Development - Summer 2021.
   - CPM Implementation Support Visits, Representatives - CPM matches each adopting school with an Implementation Partner. This person will be our liaison to CPM and will support teachers through implementation. The purpose is to model and observe lessons with teachers as well as be a resource for teacher questions. The Implementation Partner will conduct two math classroom visits in 2021-2022.
   - Principal classroom coaching and evaluation - Ongoing: commitment to be in each math classroom. Frequency = Each math classroom will be visited a minimum of 2 times per month.

4. **Response to Intervention (RtI otherwise known as Wolftime):**
   - Focused identification of students for remediation based on classroom assessments, state mandated test results, STAR Universal Screener, and PreAct assessment results.
   - Focus on what has not been learned.