

Mathematics – PLANNED COURSE OUTLINE

Avon Grove School District

Grade 11 – Algebra 1

State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.1. Numbers, Number Systems and Number Relationships			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Numbers can be represented in multiple ways. • Being able to compute fluently means making smart choices about which tools to use and when to use them. • Classifying helps us build mathematical networks of mathematical ideas. • There is a need to represent and model numbers verbally, physically, and symbolically. 		Essential Questions: <ol style="list-style-type: none"> 1. What makes an answer exact? 2. What makes a solution optimal? 3. Why do we classify numbers? 4. How can numbers be used to compare quantities and describe relationships between them? 5. What numbers should be used to compare quantities and describe relationships between them? 	
<p>A. Use operations (e.g., opposite, reciprocal, absolute value, raising to a power, finding roots, finding logarithms).</p> <p>M11.A Numbers and Operations</p> <p>M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.</p> <p>M11.A.1.1 Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, per-cents, square roots, exponents and scientific notation).</p> <p>M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.</p> <p>M11.A.2.2 Use exponents, roots and/or absolute value to solve problems.</p>	<p>Find the square root of an integer to the nearest tenth using either a calculator or estimation. (2.1.8.A). M11.A.1.1.1</p> <p>Simplify square roots. (e.g., $\sqrt{24} = 2\sqrt{6}$) (2.1.11.A) M11.A.1.1.3</p> <p>Simplify/evaluate expressions involving positive and negative exponents, roots and/or absolute value (may contain all types of real numbers -exponents should not exceed power of 10). (2.1.11.A). M11.A.2.2.1</p> <p>Simplify/evaluate expressions involving multiplying with exponents. (e.g. $x^6 \cdot x^7 = x^{13}$), powers of powers (e.g., $(x^6)^7 = x^{42}$) and powers of products $(2x^3)^2 = 8x^6$ (positive exponents only). (2.1.11.A) M11.A.2.2.2</p>	<ul style="list-style-type: none"> • Simplify and evaluate expressions and formulas (1.2) • Evaluate expressions containing grouping symbols (1.2) • To add, subtract, multiply and divide rational numbers (2.2, 2.3) • To use the distributive property (2.4) • Simplify algebraic expressions (2.4) • To find percent of change (3.7) • To find percent error (3.7) • To estimate, find, and use square roots to the nearest hundredth (3.8) • To solve absolute value equations and inequalities (4.6) • To simplify expressions with zero and negative exponents (8.1) • To evaluate exponential expressions (8.1) • To write and use numbers in scientific notation (8.2) • Apply the properties of exponents: multiply and raise to a power (8.3, 8.4) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made

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Standard: 2.1. Numbers, Number Systems and Number Relationships			
A. (continued)		<ul style="list-style-type: none"> Apply the properties of exponents: to divide powers and raise a quotient to a power (8.5) To use the quadratic formula when solving quadratic equations (10.6) To simplify radicals involving products and quotients (11.1) (if time permits) To simplify sums, differences, products and quotients of radical expressions (11.2) (if time permits) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>B. Simplifying numerical expressions involving exponents, scientific notation and using order of operations. (Grade 8)</p> <p>M11.A Numbers and Operations</p> <p>M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.</p> <p>M11.A.1.1 Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, exponents and scientific notation).</p>	<p>Express numbers and/or simplify expressions using scientific notation (including numbers less than 1) (2.1.8.B). M11.A.1.1.2</p>	<ul style="list-style-type: none"> Simplify scientific expressions (8.3) 	

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<p>C. Simplify and expand algebraic expressions using exponential forms.</p> <p>(Grade 8)</p> <p>M11.A Numbers and Operations</p> <p>M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.</p> <p>M11.A.1.2 Apply number theory concepts to show relationships between real numbers in problem solving settings.</p>	<p>Find the greatest common factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials. (2.1.8.E)</p> <p>M11.A.1.2.1</p>	<ul style="list-style-type: none"> • Determine the GCF of monomials (9.2) • Determine the LCM of monomials (drop in) 	<p>Instructional Strategies:</p> <p>Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources:</p> <p>Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments:</p> <p>Publisher made Teacher made</p>

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.2. Computation and Estimation			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> Knowing the reasonableness of an answer comes from using good number sense and estimation strategies 		Essential Questions: 1. What makes an estimate reasonable?	
<p>A Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations.</p> <p>M11.A Numbers and Operations</p> <p>M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.</p> <p>M11.A.2.1 Apply ratio and/or proportion in problem-solving situations.</p> <p>M11.A.3 Compute accurately and fluently and make reasonable estimates.</p> <p>M11.A.3.1 Apply the order of operations in computation and in problem-solving situations.</p>	<p>Solve problems using operations with rational numbers including rates and percents (single and multi-step and multiple procedure operations) (e.g., distance, work and mixture problems, etc.). (2.2.11.A) M11.A.211</p> <p>Simplify/evaluate expressions using the order of operations to solve problems (any rational numbers may be used). (2.2.8.A). M11.A.3.1.1</p>	<ul style="list-style-type: none"> Model relationships with equations and formulas (1.2) Simplify/evaluate expressions using the order of operations (1.2) Classify and compare numbers (1.3) To add, subtract, multiply and divide rational numbers (2.2, 2.3) To use the distributive property (2.4) Simplify algebraic expressions (2.4) Identify properties (2.5) Use deductive reasoning (2.5) Simplify expressions with zero and negative exponents (8.1) Evaluate exponential expressions (8.1) Multiply powers and raise powers to powers (8.4) Divide powers and raise a quotient to a power (8.5) Solve a quadratic equation by completing the square (10.5) Use quadratic formula to solve an equation (10.6) Choose an appropriate method to solve a quadratic equation (10.6) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made

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Standard: 2.2. Computation and Estimation			
<p>B. Use estimation to solve problems for which an exact answer is not needed.</p> <p>M11A. Numbers and Operations</p> <p>M11.A.3 Compute accurately and fluently and make reasonable estimates.</p> <p>M11.A.3.1 Apply the order of operations in computation and in problem-solving situations.</p>	<p>Use estimates to solve problems. (2.2.11.B). M11.A.3.2.1</p>	<ul style="list-style-type: none"> • Use and estimate square roots (3.8) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>C. Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.</p> <p>M11.A Numbers and Operations</p> <p>M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.</p> <p>M11.A.1.3 Estimate the value of an irrational number.</p>	<p>Locate/identify irrational numbers at the approximate location on a number line. (2.2.8.C) M11.A.1.3.1</p> <p>Compare and/or order any real numbers (rational and irrational may be mixed). (2.2.8.C) M11.A.1.3.2</p>	<ul style="list-style-type: none"> • Analyze data using scatter plots (1.5) • To write an equation for a line of best fit and use it to make predications (6.7) • Locate/identify irrational numbers on number lines (drop in 3.8) • Order rational numbers (1.3) • Order rational and irrational numbers (3.8) 	

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Standard: 2.2. Computation and Estimation			
D. Describe and explain the amount of error that may exist in a computation using estimates.	Not assessed at grade 11.	<ul style="list-style-type: none"> To find percent change and percent error (3.7) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made
E. Recognize that the degree of precision needed in calculating a number depends on how the results will be used and the instruments used to generate the measure.		<ul style="list-style-type: none"> To find percent change and percent error (3.7) 	
F. Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.		<ul style="list-style-type: none"> Find, use and estimate square roots (3.8) To model exponential growth and decay (8.8) Solve equations involving radical equations and identify extraneous roots (11.3) (if time permits) Find sin, cos, and tan trig ratios (11.5) (if time permits) Use the Fundamental Counting Principle and find permutations (12.7) (if time permits) Find combinations and probability with counting techniques (12.8) (if time permits) 	

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Standard: 2.4. Mathematical Reasoning and Connections			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Reasoning allows us to make conjectures and prove conjectures. • Precise language helps us express mathematical ideas and receive them. • Connections can be made to various strands of mathematics as well as other subject areas. • Understand how mathematical ideas interconnect and build on one another to produce a coherent whole. 		Essential Questions: <ol style="list-style-type: none"> 1. How are solving and proving different? 2. How are showing and explaining different? 3. How do you know when you have proven something? 4. How do you develop a convincing argument? 5. What previous learning helps us to learn new materials? 6. What makes a strategy both effective and efficient? 7. Need to add ?s on Connections _____ 	
A. Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.		<ul style="list-style-type: none"> • Use deductive reasoning (2.5) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made
B. Construct valid arguments from stated facts.		<ul style="list-style-type: none"> • Interpret, sketch and analyze graphs from situations (5.1) 	
C. Determine the validity of an argument.		<ul style="list-style-type: none"> • Interpret, sketch and analyze graphs from situations (5.1) 	

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Standard: 2.4. Mathematical Reasoning and Connections			
D. Demonstrate mathematical solutions to problems (e.g., in the physical sciences).		<ul style="list-style-type: none"> • Find missing measures of similar figures (3.5) • Use similar figures when measuring indirectly (3.5) • Define a variable in terms of another variable (3.6) • Model distance, rate and time problems (3.6) • Solve problems using the Pythagorean theorem (3.9) • Solve and graph inequalities involving “and” and “or” (4.5) • Write an equations direct variations (5.5) • Use ratios and proportions using direct variations (5.5) • Solve inverse variations (5.6) • Compare direct and inverse variation (5.5, 5.6) • Write systems of linear equations (7.4) • Model exponential growth and decay (8.8) • Find the square of a binomial (9.4) • Find the difference of two squares (9.4) • Solve quadratic equations by graphing and by using square roots (10.3) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.5. Mathematical Problem Solving and Communication			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Mathematics can be used to solve problems outside of the mathematics classroom. • Mathematics is built on reasoning. • To demonstrate understanding of a given mathematical problem, it is essential to effectively represent and communicate our thinking using pictures, numbers, and words. • Use the language of mathematics to express mathematical ideas precisely. 		Essential Questions: <ol style="list-style-type: none"> 1. How do you make sense of different strategies? 2. How do you determine their strengths and weaknesses? 3. How do you determine similarities and differences? 4. What information in the problem is relevant to solve the problem? 5. How do we determine the appropriate strategy to solve a problem? 6. What should be included in the work shown to affectively represent our thinking and understanding? 7. What should be included in our writing to effectively communicate our thinking and understanding? 8. Why is it important to use mathematical words in our writing? 	
A. Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.		<ul style="list-style-type: none"> • Identify properties (2.5) • Use deductive reasoning (2.5) • Use the distributive property (3.4) • Define a variable in terms of another variable (3.6) • Model distance, rate and time problems (3.6) • Solve problems using the Pythagorean Theorem (3.9) • Identify right triangles (3.9) • Solve multi-step inequalities (4.4) • Write systems of linear equations (7.4) • Model exponential growth and decay (8.8) • Solve rational equation (12.6) (if time permits) • Solve proportions (12.6) (if time permits). 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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Standard: 2.5. Mathematical Problem Solving and Communication			
<p>B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p>		<ul style="list-style-type: none"> • Model relationships with variables, equations, and formulas (1.1) • Simplify and evaluate expressions and formulas (1.1) • Evaluate expressions containing grouping symbols (1.2) • Use mean, median, mode and range (1.6) • Use and make stem and leaf plots (1.6) • Use the distributive property (2.4) • Simplify algebraic expressions (2.4) • Find theoretical and experimental probability (2.6) • Find the probability of independent and independent events (2.7) • Find percent of change and percent of error (3.7) • Identify solutions of inequalities (4.1) • Graph and write inequalities (4.1) • Solve and graph inequalities (4.5) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.5. Mathematical Problem Solving and Communication			
B. (Continued)		<ul style="list-style-type: none"> • Interpret, sketch, and analyze graphs from situations (5.1) • Use inductive reasoning in continuing number patterns (5.7) • Write rules for arithmetic sequences (5.7) • Graph linear inequalities and apply to the real world (7.5) • Write numbers in scientific and standard notation (8.2) • Use scientific notation (8.2) • Choose a linear, quadratic or exponential model for data (10.8) • Use the Counting Principle and find permutations (12.7) (if time permits) • Find combinations and find probability with counting techniques (12.8) (if time permits) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.5. Mathematical Problem Solving and Communication			
<p>C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p>		<ul style="list-style-type: none"> • Evaluate expressions containing grouping symbols (1.2) • Identify properties (2.5) • Use deductive reasoning (2.5, 3.1) • Solve 2-step equations (3.1) • Use the distributive property to combine like terms and solve equations (3.2) • Solve equations with variables on both sides (3.3) • Identify equations that are identities or have no solutions (3.3) • Find ratios and rates (3.4) • Solve proportions (3.4) • Solve multi-step inequalities (4.4) • Solve systems of equations using substitution (7.2) • Graph quadratic functions in the form $y = ax^2 + bx + c$ (10.2) • Graph quadratic inequalities (10.2) • Choose a linear, quadratic, or exponential model for data (10.8) • Graph rational functions and identify their types (12.1) (If time allows) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.5. Mathematical Problem Solving and Communication			
<p>D. Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p>		<ul style="list-style-type: none"> • Add, subtract, multiply and divide rational numbers (2.1, 2.3) • Find the probability of independent or dependent events (2.7) • Solve 2-step equations (3.1) • Use deductive reasoning (3.1) • Solve equations with variables on both sides (3.3) • Identify equations that are identities or have no solutions (3.3) • Define a variable in terms of another variable (3.6) • Model distance, rate and time problems (3.6) • Solve problems using the Pythagorean theorem (3.9) • Use multiplication and division to solve inequalities (4.3) • Solve inverse variations (5.6) • Compare direct and inverse variations (5.6) • Solve systems by elimination (7.3) • Simplify expressions with negative and zero exponents (8.1) • Evaluate exponential expressions (8.1) • Raise a power to a power and a product to a power (8.4) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.5. Mathematical Problem Solving and Communication			
D. (Continued)		<ul style="list-style-type: none"> • Find the square of a binomial (9.4) • Find the difference of 2 squares (9.4) • Graph quadratic functions in the form $y = ax^2$ and $y = ax^2 + c$ (10.1) • Solve quadratic equations by factoring (10.4) • Solve rational equations (12.6) (if time permits) • Solve proportions (12.6) (if time permits) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.6. Statistics and Data Analysis			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • The question to be answered determines the data to be collected and how best to collect it. • Basic statistical techniques can be used to analyze data in the work place. • The probability of an event can be used to predict the probability of future events. • The study of statistics allows us to interpret and analyze data in order to make informed decisions. • The type of data determines how data sets can be organized, displayed, and analyzed. • Calculating the mean, median, mode, and range creates a numerical picture of data. 		Essential Questions: <ol style="list-style-type: none"> 1. What is average? 2. What makes a data representation useful? 3. How does my sample affect confidence in my prediction? 4. What is random? 5. How can we use data to make informed decisions? 6. How does the type of data influence the type of graph? 7. How can mean, median, mode, and range be used to describe the shape of data? 8. In what ways can data and data displays be misleading? 	
A. Design and conduct an experiment using random sampling. Describe the data as an example of a distributional measures of center and spread. Organize and represent the results with graphs. (Use standard deviation, variance and t-tests.) M11.E.1 Data Analysis and Probability Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data. M11.E.1.1 Appropriately display and/or use data in problem-solving settings. Select and/or use appropriate statistical methods to analyze data. M11.E.2 Use measures of central tendency to describe a set of data.	Create and/or use appropriate graphical representations of data, including box-and-whisker plots, stem-and-leaf plots or scatter plots. (2.6.11.A). M11.E.1.1.1 Calculate or select the appropriate measure of central tendency (mean, mode or median) of a set of data given or represented on a table, line plot or stem-and-leaf plot. (2.6.8.A). M11.E.2.1.1 Calculate and/or interpret the range, quartiles and interquartile range of data. (2.6.8.A). M11.E.2.1.2 Describe how outliers affect measures of central tendency. (2.6.11.A). M11.E.2.1.3	<ul style="list-style-type: none"> • Use mean, median, mode and range (1.6) • Create and use stem and leaf plots (1.6) • Create and analyze box-and-whisker plots (Chapter 1 activity lab) • Determine quartiles (Chapter 1 activity lab) • Calculate range, interquartile range, outliers (drop in Chapter 1) • Create and interpret scatter plots (6.7) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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Standard: 2.6. Statistics and Data Analysis			
<p>B. Determine the regression equation of best fit (e.g., linear, quadratic, exponential).</p> <p>M11.E Data Analysis and Probability</p> <p>M11.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.</p> <p>M11.E.4.2 Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions.</p>	<p>Draw, find and/or write an equation for a line of best fit for a scatter plot. (2.6.11.C). M11.E.4.2.1</p>	<ul style="list-style-type: none"> Write an equation of best fit and use it to make a predication (6.7) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>C. Make predictions using interpolation, extrapolation, regression and estimation using technology to verify them.</p> <p>M11.E Data Analysis and Probability</p> <p>M11.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.</p> <p>M11.E.4.1 Make predictions using data displays or probability.</p> <p>M11.E.4.2 Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions.</p>	<p>Use probability to predict outcomes. (References 2.6.11.D). M11.E.4.1.2</p> <p>Make predictions using the equations or graphs of best-fit lines of scatter plots. (References 2.6.11D). M11.E.4.2.2</p>	<ul style="list-style-type: none"> Write an equation of best fit and use it to make a predication (6.7) 	

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Standard: 2.6. Statistics and Data Analysis			
<p>D. Determine the validity of the sampling method described in a given study.</p> <p>M11.E Data Analysis and Probability</p> <p>M11.E.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.</p> <p>M11.E.1.1 Appropriately display and/or use data in problem-solving settings.</p>	<p>Analyze data and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf plots or scatter plots). (Reference 2.6.8.E).</p> <p>M11.E.1.1.2</p>	<ul style="list-style-type: none"> • Analyze data on a stem-and-leaf plot (1.6) • Create and analyze box-and-whisker plots (Chapter 1 activity lab) • Create and interpret scatter plots (6.7) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>E. Determine the degree of dependence of two quantities specified by a two-way table.</p>		<ul style="list-style-type: none"> • Write an equation of best fit and use it to make a predication (6.7) 	
<p>F. Describe questions of experimental design, control groups, treatment groups, cluster sampling and reliability.</p>		<ul style="list-style-type: none"> • Find theoretical and experimental probabilities (2.6) 	

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.7. Probability and Predictions			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> The probability of an event can be used to predict the probability of future events. Probability is the mathematics of chance. The predicted outcome of an event is a prediction of what might actually happen in the long run. 		Essential Questions: <ol style="list-style-type: none"> What is a fair outcome? How do you count outcomes? Why is probability used? How is the likelihood of an event determined and communicated? 	
A. Compare odds and probability. M11.E Data Analysis and Probability M11.E.3 Understand and/or apply basic concepts of probability or outcomes. M11.E.3.1 Apply probability and/or odds to practical situations. M11.E.3.2 Apply counting techniques in problem-solving settings.	Find, convert and/or compare the probability and/or odds of a simple event. (Reference 2.7.11.A). M11.E.3.1.2 Determine the number of permutations and/or combinations or apply the fundamental counting principle. (Formula provided on the reference sheet). (References 2.7.8.A). M11.E.3.2.1	<ul style="list-style-type: none"> Find theoretical and experimental probabilities (2.6) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials
B. Apply probability and statistics to perform an experiment involving a sample and generalize its results to the entire population.		<ul style="list-style-type: none"> Find theoretical and experimental probabilities (2.6) Find probabilities of independent and dependent events (2.7) 	Assessments: Publisher made Teacher made

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.7. Probability and Predictions			
C. Draw and justify a conclusion regarding the validity of a probability or statistical argument.		<ul style="list-style-type: none"> Find theoretical and experimental probabilities (2.6) Find probabilities of independent and dependent events (2.7) Write an equation of best fit and use it to make predictions (6.7) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made
D. Solve problems involving independent simple and compound events.		<ul style="list-style-type: none"> Find theoretical and experimental probabilities (2.6) Find probabilities of independent and dependent events (2.7) 	
E. Solve problems involving independent, simple and compound events. Make valid inferences, predications and arguments based on probability. (Grade 8). M11.E Data Analysis and Probability M11.E.3 Understand and/or apply basic concepts of probability or outcomes. M11.E.3.1 Apply probability and/or odds to practical situations. M11.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays. M11.E.4.1 Make predictions using data displays and probability.	Find probabilities for independent, dependent or compound events and represent as a fraction, decimal or percent). (Reference 2.7.11.E) M11.E.3.1.1 Estimate or calculate to make predictions based on a circle, line, bar graph or given situation. (2.7.8.E). M11.E.4.1.1	<ul style="list-style-type: none"> Find probabilities of independent and dependent events (2.7) Make predications based on circle, line, and bar graphs (Activity Lab 1.5 p. 38 & 39) 	

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.8. Algebra and Functions			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Change is fundamental to understanding functions. • Numbers or objects that repeat in predictable ways can be described or generalized. • An operation can be undone by its inverse. • Rules of arithmetic and algebra can be used together with notions of equivalents to transform equations and inequalities so solutions can be found. • Mathematical situations can be represented using patterns, symbols, and rules to describe relationships. • Algebra solves real life problems when numbers are unknown. 		Essential Questions: <ol style="list-style-type: none"> 1. How can change be described mathematically? 2. How are patterns of change related to the behavior of functions? 3. How do mathematical models/representations shape our understanding of mathematics? 4. How can we use patterns, symbols, and rules to represent and describe mathematical relationships? 	
A. Analyze a given set of data for the existence of a pattern and represent the pattern algebraically and graphically. M11.D Algebraic Concepts M11.D.1 Demonstrate an understanding of patterns, relations and functions. M11.D.1.1 Analyze and/or use patterns or relations.		<ul style="list-style-type: none"> • Write a function rule (1.4) • Recognize relationships in functions (1.4) • Identify relations and functions (5.2) • Evaluate functions (5.2) • Model functions using rules, tables and graphs (5.3) • Write a function rule given a table or real world situation (5.4) • Write an equation of a direct variation (5.5) • Use ratios and proportions with direct variations (5.5) • Use indirect reasoning in continuing number patterns (5.7) • Write rules for arithmetic sequences (5.7) • Use geometric sequences (8.6) • Use formulas when describing geometric sequences (8.6) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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Standard: 2.8. Algebra and Functions			
<p>B. Give examples of patterns that occur in data from other disciplines.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.3 Analyze change in various contexts.</p> <p>M11.D.3.1 Describe and/or determine change.</p>	<p>Determine how a change in one variable relates to a change in a second variable (e.g., $y=4/x$, if x doubles, what happens to y?). (2.11.8.B). M11.D.3.1.2</p>	<ul style="list-style-type: none"> • Use geometric sequences (8.6) • Use formulas when describing geometric sequences (8.6) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>C. Use patterns, sequences and series to solve routine and non-routine problems.</p>		<ul style="list-style-type: none"> • Use indirect reasoning in continuing number patterns (5.7) • Write rules for arithmetic sequences (5.7) • Use geometric sequences (8.6) • Use formulas when describing geometric sequences (8.6) 	
<p>D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities and matrices to model routine and non-routine problem situations.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods.</p>	<p>Identify or graph functions, linear equations or linear inequalities on a coordinate plane. (2.8.11.D). M11.D.2.1.2</p>	<ul style="list-style-type: none"> • Model relationships with variables, equations and formulas (1.1) • Write a function rule (1.4) • Recognize relationships in functions (1.4) • Solve 2-step equations (3.1) • Use deductive reasoning (3.1) • Use the distributive property when combining like terms and solving equations (3.2) • Solve equations with variables on both sides (3.3) 	

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Standard: 2.8. Algebra and Functions			
D. (Continued)		<ul style="list-style-type: none"> • Identify equations that are identities or have no solutions (3.3) • Define a variable in terms of another (3.6) • Model distance, rate and time problems (3.6) • Identify solutions of inequalities (4.1) • Graph and write inequalities (4.1) • Use addition, subtraction, multiplication and addition to solve inequalities (4.2, 4.3) • Solve multi-step inequalities (4.4) • Solve and graph inequalities containing “and” and “or” (4.5) • Solve absolute value equations and inequalities (4.6) • Interpret linear graphs (6.3) • Graph equations using intercepts (6.4) • Write equations in standard form (6.4) • Solve systems of equations by graphing (7.1) • Analyze special types of systems (7.1) • Solve systems using substitution (7.2) • Solve systems by elimination (7.3) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.8. Algebra and Functions			
D. (Continued)		<ul style="list-style-type: none"> • Write systems of linear equations (7.4) • Graph linear inequalities (7.5) • Use linear inequalities to model real world situations (7.5) • Solve systems of linear inequalities by graphing (7.6) • Use systems of linear inequalities to model real world situations (7.6) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
E. Use equations to represent curves (e.g., lines, circles, ellipses, parabolas, hyperbolas).		<ul style="list-style-type: none"> • Graph quadratic functions and inequalities in standard form (10.1, 10.2) • Choose a linear, quadratic, or exponential model for data (10.8) 	
<p>F. Identify whether systems of equations and inequalities are consistent or inconsistent.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods. (References Grade 8).</p>	Solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). (2.8.8.F). M11.D.2.1.1	<ul style="list-style-type: none"> • Solve systems of equations by graphing (7.1) • Analyze special types of systems (7.1) • Solve systems of linear inequalities by graphing (7.6) • Model real world situations using systems of linear inequalities (7.6) 	

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Standard: 2.8. Algebra and Functions			
<p>G. Analyze and explain systems of equations, systems of inequalities and matrices.</p>		<ul style="list-style-type: none"> • Solve systems of equations by graphing (7.1) • Analyze special types of systems (7.1) • Solve systems by substitution (7.2) • Solve systems by elimination (7.3) • Solve systems of linear inequalities by graphing (7.6) • Model real world situations using systems of linear inequalities (7.6) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p>
<p>H. Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods.</p>	<p>Write and/or solve systems of equations using graphing, substitution and/or elimination (limit systems to 2 equations). (2.8.11.H). M11.D.2.1.4</p>	<ul style="list-style-type: none"> • Solve systems of equations by graphing (7.1) • Analyze special types of systems (7.1) • Solve systems by elimination (7.3) • Write systems of linear equations (7.4) • Solve systems of linear inequalities by graphing (7.6) • Model real world situations using systems of linear inequalities (7.6) 	<p>Assessments: Publisher made Teacher made</p>

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State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.8. Algebra and Functions			
<p>I. Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p>		<ul style="list-style-type: none"> Add, subtract, multiply and divide rational numbers (2.1, 2.2, 2.3) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>J. Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods.</p> <p>M11.D.3 Analyze change in various contexts.</p> <p>M11.D.3.1 Describe and/or determine change.</p> <p>M11.D.3.2 Compute and/or use the slope of a line.</p>	<p>Identify or graph functions, linear equations or linear inequalities on a coordinate plane. (2.8.11.J). M11.D.2.1.2</p> <p>Write and/or solve systems of equations using graphing, substitution and/or elimination (limit systems to 2 equations). (2.8.11.J). M11.D.2.1.4</p> <p>Identify, describe and/or use constant or varying rates of change. (2.8.8.J). M11.D.3.1.1</p> <p>Apply the formula for the slope of a line to solve problems (formula given on reference sheet). (2.8.11.J). M11.D.3.2.1</p>	<ul style="list-style-type: none"> Solve inverse variations (5.6) Compare direct and inverse variations (5.6) Determine slope (6.1) Write linear equations in slope-intercept form (6.2) Graph linear equations (6.2) Translate the graph of an absolute value equation (6.8) Graph linear inequalities (7.5) Use linear inequalities when modeling real world situations (7.5) Graph square root functions (11.4) (if time allows) Translate graphs of square root functions (11.4) (if time allows) Solve problems using trig ratios (11.6) (if time allows) 	

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Standard: 2.8. Algebra and Functions			
<p>K. Select, justify and apply an appropriate technique to graph a linear function in two variables, including slope-intercept, x- and y-intercepts, graphing by transformations and the use of a graphing calculator.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods.</p> <p>M11.D.4 Describe or use models to represent quantitative relationships.</p> <p>M11.D.4.1 Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.</p>	<p>Write, solve and/or apply a linear equation (including problem situations). (2.8.11.K). M11.D.2.1.3</p> <p>Match the graph of a given function to its table or equation. (2.8.11.K, 2.8.11.Q). M11.D.4.1.1</p>	<ul style="list-style-type: none"> • Write linear equations in slope-intercept form (6.2) • Graph linear equations (6.2) • Graph equations using intercepts (6.4) • Write equations in standard form (6.4) • Graph and write linear equations using point-slope form (6.5) • Write a linear equation using data (6.5) • Match the graph of a given function to its table or equation (drop in) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made

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Standard: 2.8. Algebra and Functions			
<p>L. Write the equation of a line when given the graph of the line, two points on the line, or the slope of the line and a point on the line.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods.</p> <p>M11.D.3 Analyze change in various contexts.</p> <p>M11.D.3.2 Compute and/or use the slope of a line.</p>	<p>Write, solve and/or apply a linear equation (including problem situations). (2.8.11.L). M11.D.2.1.3</p> <p>Given the graph of the line, 2 points on the line, or the slope and a point on a line, write or identify the linear equation in point-slope, standard and/or slope-intercept form. (2.8.11.L). M11.D.3.2.2</p> <p>Compute the slope and/or y-intercept represented by a linear equation or graph. (2.8.11.L) M11.D.3.2</p>	<ul style="list-style-type: none"> • Write linear equations in slope-intercept form (6.2) • Graph linear equations (6.2) • Graph equations using intercepts (6.4) • Write equations in standard form (6.4) • Graph and write linear equations using point-slope form (6.5) • Write a linear equation using data (6.5) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made

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Standard: 2.8. Algebra and Functions			
<p>M. Given a set of data points, write an equation for a line of best fit.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.1 Write, solve and/or graph linear equations and inequalities using various methods.</p>	<p>Solve quadratic equations using factoring (integers only – not including completing the square or the Quadratic Formula). (2.8.11.M).</p> <p>M11.D.2.1.5</p>	<ul style="list-style-type: none"> • Write the equation for the line of best fit and use it to make predications (6.7) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials
<p>N. Solve linear, quadratic and exponential equations both symbolically and graphically.</p>		<ul style="list-style-type: none"> • Solve 2-step equations (3.1) • Use deductive reasoning (3.1) • Use the distributive property to combine like terms and solve equations (3.2) • Solve equations with variables on both sides (3.3) • Identify equations that are identities or have no solutions (3.3) • Define a variable in terms of another variable (3.6) • Model distance, time and rate problems (3.6) • Write equations in slope-intercept form (6.3) 	<p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made

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Standard: 2.8. Algebra and Functions			
N. (Continued)		<ul style="list-style-type: none"> • Graph linear equations and interpret their graphs (6.3) • Graph equations using intercepts (6.4) • Write equations in standard form (6.4) • Graph and write linear equations using point-slope (6.5) • Write a linear equation using data (6.5) • Evaluate and graph exponential functions (8.7) • Model exponential growth and decay (8.8) • Solve quadratic equations by graphing or using square roots (10.3) • Solve equations by factoring (10.4) • Solve quadratic equations by completing the square (10.5) • Use the quadratic formula to solve quadratic equations (10.6) • Choose an appropriate method for solving a quadratic equation (10.6) • Find the number of solutions of a quadratic equation (10.7) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.8. Algebra and Functions			
<p>O. Determine the domain and range of a relation, given a graph or set of ordered pairs.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.1 Demonstrate an understanding of patterns, relations and functions.</p> <p>M11.D.1.1 Analyze and/or use patterns or relations.</p>	<p>Identify the domain, range or inverse of a relation (may be presented as ordered pairs or a table). (2.8.11.O). M11.D.1.1.3</p>	<ul style="list-style-type: none"> • Write a function rule (1.4) • Recognize relationships in functions (1.4) • Identify, graph and write solutions of inequalities (4.1) • Use addition or subtraction to solve inequalities (4.2) • Identify relations and functions (5.2) • Evaluate functions (5.2) • Model functions using rules, tables and graphs (5.3) • Write a function rule given a table or real world situation (5.3) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made
<p>P. Analyze a relation to determine whether a direct or inverse variation exists and represent it algebraically and graphically.</p> <p>M11.A Numbers and Operations</p> <p>M11.A.2 Understand the meanings of operations use operations and understand how they relate to each other.</p> <p>M11.A.2.1 Apply ration and/or proportion in problem-solving situations.</p>	<p>Solve problems using direct and inverse proportions. (2.8.11.P). M11.A.2.1.2</p> <p>Identify and/or use proportional relationships in problem solving settings. (2.8.11.P). M11.A.2.1.3</p>	<ul style="list-style-type: none"> • Find ratios and rates (3.4) • Solve proportions (3.4) • Write an equation of direct variation (5.5) • Use ratios and proportions with direct variations (5.5) • Solve inverse variations (5.6) • Compare direct and inverse variations (5.6) • Graph rational functions (12.1) (if time allows) • Identify types of functions (12.1) (if time allows) 	

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Standard: 2.8. Algebra and Functions			
<p>Q. Represent functional relationships in tables, charts and graphs.</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.1 Demonstrate an understanding of patterns, relations and functions.</p> <p>M11.D.1.1 Analyze and/or use patterns or relations.</p> <p>M11.D.4 Describe or use models to represent quantitative relationships.</p> <p>M11.D.4.1 Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.</p>	<p>Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. (2.8.11.Q). M11.D.1.1.1</p> <p>Match the graph of a given function to its table or equation. (2.8.11.K, 2.8.11.Q). M11.D.4.1.1</p>	<ul style="list-style-type: none"> • Interpret, sketch and analyze graphs of situations (5.1) • Identify relations and functions (5.2) • Evaluate functions (5.2) • Model functions using rules, tables, and graphs (5.3) • Write a function rule given a table or real world situation (5.4) • Write an equation of a direct variation (5.5) • Use ratios and proportions with direct variations (5.5) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made
<p>R. Create and interpret functional models.</p>		<ul style="list-style-type: none"> • Interpret, sketch and analyze graphs of situations (5.1) • Find rates of change from tables and graphs (6.1) • Find slope (6.1) • Graph equations using intercepts (6.4) • Write equations in standard form (6.4) • Graph and write linear equations using point-slope (6.5) • Write a linear equation using data (6.5) 	

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Mathematics – PLANNED COURSE OUTLINE

Avon Grove School District

Grade 11 – Algebra 1

State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.8. Algebra and Functions			
R. (Continued)		<ul style="list-style-type: none"> • Determine whether lines are parallel or perpendicular (6.6) • Translate the graph of an absolute value equation (6.8) • Evaluate and graph exponential functions (8.7) • Graph quadratic functions and inequalities in standard form (10.2) • Find the number of solutions of a quadratic equation (10.7) • Choose a linear, quadratic, or exponential model (10.8) • Graph square root function (11.4) (if time allows) • Translate square root function (11.4) (if time allows) • Solve problems using trig ratios (11.6) (if time allows) • Graph rational functions (12.1) (if time allows) • Identify types of functions (12.1) (if time allows) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>

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Standard: 2.8. Algebra and Functions			
<p>S. Analyze properties and relationships of functions (e.g. linear, polynomial, rational, trigonometric, exponential, logarithmic)</p> <p>M11.D Algebraic Concepts</p> <p>M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.</p> <p>M11.D.2.2 Simplify expressions involving polynomials.</p>	<p>Add, subtract and/or multiply polynomial expressions (express answers in simplest form – nothing larger than a binomial multiplied by a trinomial). (2.8.11.S).</p> <p>M11.D.2. Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax^2+bx+c where a is not equal to 0). (2.8.11.S).</p> <p>M11.D.2.2.2</p> <p>Simplify algebraic fractions. (2.8.11.S). M11.D.2.2.3</p>	<ul style="list-style-type: none"> • Find slope (6.1) • Graph equations using intercepts (6.4) • Write equations in standard form (6.4) • Determine whether lines are parallel or perpendicular (6.6) • Translate the graph of an absolute value equation (6.8) • Evaluate and graph exponential functions (8.7) • Graph quadratic functions and inequalities in standard form (10.2) • Find the number of solutions of a quadratic equation (10.7) • Choose a linear, quadratic, or exponential model (10.8) • Graph square root function (11.4) (if time allows) • Translate square root function (11.4) (if time allows) • Solve problems using trig ratios (11.6) (if time allows) • Graph rational functions (12.1) (if time allows) • Identify types of functions (12.1) (if time allows) • Simplify algebraic fractions (12.2) (if time allows) 	<p>Instructional Strategies:</p> <ul style="list-style-type: none"> Guided Practice Lecture Projects Group Work Discussion Independent Practice <p>Resources:</p> <ul style="list-style-type: none"> Textbook Publisher made supplemental materials Teacher made supplemental materials <p>Assessments:</p> <ul style="list-style-type: none"> Publisher made Teacher made

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Grade 11 – Algebra 1

State Benchmarks (K,3,5,8,11) & Grade Specific Benchmark	Eligible Content	The Learner will be able to;	Instructional Strategies, Resources and Assessments
Standard: 2.9. Geometry			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Two- and three-dimensional objects can be described, classified, and analyzed by their attributes. • An object in a plane or in space can be oriented in an infinite number of ways while maintaining its size or shape. • An object’s location on a plane or in space can be described quantitatively. • Linear measure, area, and volume are fundamentally different but may be related to one another in ways that permit calculation of one given the other. • Reasoning allows us to make conjectures and prove conjectures. • Trigonometry is using the relationships between the sides and the angles of triangles to solve problems. 		Essential Questions: <ol style="list-style-type: none"> 1. How measurement and counting are related? 2. How does what we measure affect how we measure? 3. How can space be defined through numbers/measurement? 4. Why do we compare, contrast, and classify objects? 5. How do decomposing and recomposing shapes help us build our understanding of mathematics? 6. How can transformations be described mathematically? 7. How are solving and proving different? 8. How are showing and explaining different? 9. How do you know when you have proven something? 10. What is trigonometry? How does it help us? 	
A. Construct geometric figures using dynamic geometry tools (e.g., Geometer’s Sketchpad, Cabri Geometre).		<ul style="list-style-type: none"> • Write linear equations in slope-intercept form (6.2) • Graph linear equations (6.2) • Determine whether lines are parallel or perpendicular (6.6) • Translate the graphs of absolute value equations (6.8) • Evaluate and graph exponential functions (8.7) • Graph quadratic functions and inequalities in standard form (10.2) • Find the number of solutions to a quadratic equation (10.7) • Choose a linear, quadratic or exponential model (10.8) • Graph the square root function (11.4) (if time allows) • Translate the graph of square root functions (11.4) (if time allows) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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Standard: 2.9. Geometry			
A. (Continued)		<ul style="list-style-type: none"> • Solve problems using trig ratios (11.6) (if time allows) • Graph rational functions (12.1) (if time allows) • Identify types of functions (12.1) (if times allows) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice
B. Prove that two triangles or two polygons are congruent or similar using algebraic, coordinate and deductive proofs. M11.C Geometry M11.C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships. M11.C.1.3 Use properties of congruence, correspondence and similarity in problem solving settings involving two- and three-dimensional figures.	Identify and/or use properties of congruent and similar polygons or solids. (2.9.11.B). M11.C.1.3.1	Taught in Geometry	Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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Standard: 2.9. Geometry			
<p>C. Identify and prove the properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles and diagonals using deductive proofs.</p> <p>M11.C Geometry</p> <p>M11.C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships.</p> <p>M11.C.1.2 Recognize and/or apply properties of angles, triangles and quadrilaterals.</p>	<p>Identify and/or use properties of quadrilaterals (e.g., parallel sides, diagonals, bisectors, congruent sides/angles and supplementary angles). (2.9.11.C) M11.C.1.2.2</p> <p>Identify and/or use properties of isosceles and equilateral triangles. (2.9.11.C) M11.C.1.2.3</p>	<p>Taught in Geometry</p>	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>D. Identify corresponding parts in congruent triangles to solve problems.</p> <p>M11.C Geometry</p> <p>M11.C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships.</p> <p>M11.C.1.2 Recognize and/or apply properties of angles, triangles and quadrilaterals.</p>	<p>Identify and/or use properties of triangles (e.g., medians, altitudes, angle bisectors, side/angle relationships, Triangle Inequality Theorem). (2.9.8.D) M11.C.1.2.1</p>	<ul style="list-style-type: none"> • Find the missing measures of similar figures (3.5) • Use similar figures when measuring indirectly (3.5) 	

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Standard: 2.9. Geometry			
<p>E. Solve problems using analytic geometry.</p> <p>M11.C Geometry</p> <p>M11.C.3 Locate points or describe relationships using the coordinate plane.</p> <p>M11.C.3.1 Solve problems using analytic geometry.</p>	<p>Calculate the distance and/or mid-point between 2 points on a number line or on a coordinate plane (formula provided on the reference sheet). (2.9.11G) M11.C.3.1.1</p> <p>Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet). (2.9.11.G) M11.C3.1.2</p>	<ul style="list-style-type: none"> Calculate the slope of parallel and perpendicular lines (6.6) 	<p>Instructional Strategies:</p> <p>Guided Practice Lecture Projects Group Work Discussion Independent Practice</p> <p>Resources:</p> <p>Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments:</p> <p>Publisher made Teacher made</p>

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Standard: 2.10. Trigonometry			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Six trigonometric functions and their inverses. • Trig graphs have practical applications. • Identities are used to evaluate, simplify, and solve trigonometric expressions and equations. • The law of cosines and the law of sines can be used to find missing measures. • Complex numbers can be used to convert from rectangular to polar coordinates and vice versa. • Vectors are added and multiplied and this helps with mathematical calculations for engineering and physics. 		Essential Questions: <ol style="list-style-type: none"> 1. How is trigonometry used to find unknown values? 2. Why are certain values undefined for certain functions? 3. How can you compare the graphs of the sine, cosine, tangent functions and their inverses? 4. What approaches can be used to verify an identity? 5. What is the best approach? 6. How can you determine if a triangle had no solution, one solution, or two solutions? 7. How can you solve triangles using these laws? 8. Why is it important to understand complex numbers to understand polar coordinates? 9. Why can't physical models of vector quantities be represented by scalar quantities? 	
A. Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem. M11.C Geometry M11.C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships. M11.C.1.4 Solve problems involving right triangles using the Pythagorean Theorem.	Find the measure of a side of a right triangle using the Pythagorean Theorem (Pythagorean Theorem included on the reference sheet). (2.10.11.B) M11.C.1.4.1	<ul style="list-style-type: none"> • Solve problems using Pythagorean Theorem (3.9) • To find trigonometric ratios (11.5) (if time allows) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made

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Standard: 2.11. Concepts of Calculus			
Enduring Understandings: Students will understand that: <ul style="list-style-type: none"> • Calculus would not be possible without the concept of the limit. • Limits allow us to divide by zero and sum infinite values. 		Essential Questions: <ol style="list-style-type: none"> 1. Why is the limit necessary to determine continuity? 2. How is the limit used to determine asymptotes? 3. When does a limit not exist? 	
A. Determine maximum and minimum values of a function over a specified interval.		<ul style="list-style-type: none"> • Graph quadratic functions and inequalities in standard form (10.1) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials Assessments: Publisher made Teacher made
B. Interpret maximum and minimum values in problem situations.		<ul style="list-style-type: none"> • Graph quadratic functions and inequalities in standard form (10.1) 	
C. Graph and interpret rates of growth/decay.		<ul style="list-style-type: none"> • Model exponential growth and decay (8.8) 	
D. Determine sums of finite sequences of numbers and infinite geometric series.		<ul style="list-style-type: none"> • Use geometric sequences (8.6) • Use formulas when describing geometric sequences (8.6) 	

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