

Mathematics – *PLANNED COURSE OUTLINE*

Avon Grove School District

Grade 11-Basic Algebra

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"> What makes an answer exact? What makes a solution optimal? Why do we classify numbers? How can numbers be used to compare quantities and describe relationships between them? What numbers should be used to compare quantities and describe relationships between them? 	
A. Use operations (e.g., opposite, reciprocal, absolute value, raising to a power, finding roots, finding logarithms). M11.A Numbers and Operations M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems. 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). M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other. M11.A.2.2 Use exponents, roots and/or absolute value to solve problems.	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 Simplify square roots. (e.g., $\sqrt{24} = 2\sqrt{6}$) (2.1.11.A) M11.A.1.1.3 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 Simplify/evaluate expressions involving multiplying with exponents (e.g. $x^6 * x^7 = x^{13}$), powers of powers (e.g., $(x^6)^7 = x^{42}$) and powers of products $(2x^3)^6 = 8x^{18}$ (positive exponents only). (2.1.11.A) M11.A.2.2.2 S	<ul style="list-style-type: none"> Simplify and evaluate expressions and formulas (1.1&1.2) Evaluate expressions containing grouping symbols (1.2) To use the distributive property (1.4) Simplify algebraic expressions (1.4) Compare integers on a number line (2.1) Compare and order integers (2.1) Add, subtract, multiply and divide integers (2.3 – 2.6) To solve absolute value equations (3.7) To add, subtract, multiply and divide rational numbers (3.2, 4.2, 4.3) To find percent of change (5.5) 	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

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Standard: 2.1. Numbers, Number Systems and Number Relationships			
A. (Continued)		<ul style="list-style-type: none"> To evaluate exponential expressions (8.1) Apply the properties of exponents: multiply and raise to a power (8.2) Apply the properties of exponents: to divide powers and raise a quotient to a power (8.2) To simplify expressions with zero and negative exponents (8.2, 8.3) To write and use numbers in scientific notation (8.4) Simplify square roots using the product and quotient rules (8.5) To estimate, find, and use square roots to the nearest hundredth (8.6) To simplify radicals involving products and quotients (Drop between 8.6 & 8.7) 	<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>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)</p> <p>M11.A.1.1.2</p>	<ul style="list-style-type: none"> Write numbers in scientific notation (8.4) 	

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<p>C. Simplify and expand algebraic expressions using exponential forms. (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"> Find the GCF of a polynomial (10.1) 	<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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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?	
A. Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations. M11.A Numbers and Operations M11.A.2 Understand the meanings of operations, use operations and understand how they relate to each other. M11.A.2.1 Apply ratio and/or proportion in problem solving situations M11.A.3 Compute accurately and fluently and make reasonable estimates. M11.A.3.1 Apply the order of operations in computation and in problem-solving situations.	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.2.1.1 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	<ul style="list-style-type: none"> Use the order of operations to simplify expressions (1.2) To use the distributive property (1.4) Simplify algebraic expressions (1.4) Identify properties (1.4) Classify and compare numbers (3.1) To add, subtract, multiply and divide rational numbers (3.2,4.1, 4.3) Use scale models and drawings to find a missing part (5.2) Use the percent proportion (5.3) Use the percent equation (5.4) Model relationships with equations and formulas (6.2-6.4) Evaluate exponential expressions (8.1) Multiply powers and raise powers to powers (8.2) Divide powers and raise a quotient to a power (8.2) Simplify expressions with zero and negative exponents (8.2 & 8.3) 	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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Standard: 2.2. Computation and Estimation			
B. Use estimation to solve problems for which an exact answer is not needed. M11A. Numbers and Operations M11.A.3 Compute accurately and fluently and make reasonable estimates. M11.A.3.1 Apply the order of operations in computation and in problem-solving situations.	Use estimates to solve problems. (2.2.11.B) M11.A.3.2.1	<ul style="list-style-type: none"> Use and estimate square roots (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
C. Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities. M11.A Numbers and Operations M11.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems. M11.A.1.3 Estimate the value of an irrational number.	Locate/identify irrational numbers at the approximate location on a number line. (2.2.8.C) M11.A.1.3.1 Compare and/or order any real numbers (rational and irrational may be mixed). (2.2.8.C) M11.A.1.3.2	<ul style="list-style-type: none"> To write an equation for a line of best fit and use it to make predications (7.2, 7.3 & drop in) Analyze data using scatter plots (7.4) Compare and order rational and irrational numbers (drop in with 8.6) 	
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 (5.5) 	
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 (5.5) 	
F. Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.		<ul style="list-style-type: none"> Use the Fundamental Counting Principle (4.2) Find, use and estimate square roots (8.6) 	

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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. Demonstrate mathematical solutions to problems (e.g., in the physical sciences).		<ul style="list-style-type: none"> • Write direct variation equations (6.5) • Use ratios and proportions using direct variations (6.5) • Solve inverse variations (6.6) • Solve problems using the Pythagorean theorem (8.7) • Write systems of linear equations (Ch 13 Drop In of word problems) 	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			
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. 		<ol style="list-style-type: none"> 1. Essential Questions: 2. How do you make sense of different strategies? 3. How do you determine their strengths and weaknesses? 4. How do you determine similarities and differences? 5. What information in the problem is relevant to solve the problem? 6. How do we determine the appropriate strategy to solve a problem? 7. What should be included in the work shown to affectively represent our thinking and understanding? 8. What should be included in our writing to effectively communicate our thinking and understanding? 9. 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 (1.4) • Use the distributive property (1.4) • Use the Problem Solving Plan (1.5) • Solve rational equation (3.4) • Solve proportions (5.1) • Solve problems using the Pythagorean Theorem (8.7) • Identify right triangles (8.7) • Write systems of linear equations (Drop in Chapter 13 of word problems) 	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) • Simplify algebraic expressions (1.1) • Evaluate expressions containing grouping symbols (1.2) • Use the distributive property (1.4) • Use and make stem and leaf plots (1.7) • Use mean, median, mode and range (3.3) • Find percent of change (5.5) • Find theoretical probability (5.6) • Find the probability of dependent and independent events (5.7) • Write numbers in scientific and standard notation (8.4) • Use scientific notation (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			
<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 (1.3) • Use the distributive property to combine like terms and solve equations (1.4) • Solve 2-step equations (4.5) • Solve equations with variables on both sides (4.6) • Identify equations that are identities or have no solutions (4.6) • Solve equations with grouping symbols (4.7) • Find ratios and rates (5.1) • Solve proportions (5.1) • Solve systems of equations using substitution (13.3) 	<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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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 (3.2, 4.1, 4.3) • Solve 2-step equations (4.5) • Solve equations with variables on both sides (4.6) • Solve proportions (5.1) • Find the probability and odds of independent or dependent events (5.6) • Compare direct and inverse variations (6.5 & 6.6) • Solve inverse variations (6.6) • Evaluate exponential expressions (8.1, 8.2) • Simplify expressions with negative and zero exponents (8.2 & 8.3) • Solve problems using the Pythagorean theorem (8.7) • Find the square of a binomial (9.5) • Find the difference of 2 squares (10.5) • Solve systems by elimination (13.4, 13.5) 	<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: 2.6. 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 distribution using statistical measures of center and spread. Organize and represent the results with graphs. (Use standard deviation, variance and t-tests.) M11.E Data Analysis and Probability M11.E.1 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. M11.E.2 Select and/or use appropriate statistical methods to analyze data. M11.E.2.1 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.2.1.1 Describe how outliers affect measures of central tendency. (2.6.11.A) M11.E.2.1.3	<ul style="list-style-type: none"> • Collect and organize data (1.6) • Create and use stem and leaf plots (1.7) • Use mean, median, mode and range (3.3) • Create and interpret box and whisker plots (Chapter 5 investigation or drop in) 	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>C. 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 (7.4 and 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>
<p>D. 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 and 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 2.6.11.D) M11.E.4.2.2</p>	<ul style="list-style-type: none"> Use tree diagrams and the Fundamental Counting Principle to count outcomes (4.2) Calculate theoretical probability and odds of a simple event (5.6) Calculate theoretical probability of mutually exclusive and inclusive events (5.7) Write an equation of best fit and use it to make a predication (7.4) 	

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Standard: 2.6. Statistics and Data Analysis			
<p>E. 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"> • Construct and interpret box-and-whisker plots (Chapter 5 investigation/drop in) • Calculate quartiles and interquartile range (Chapter 5 investigation/drop in) • Describe how outliers affect the measures of central tendency (Chapter 5 investigation/drop in) 	<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>G. Describe questions of experimental design, control groups, treatment groups, cluster sampling and reliability.</p>		<ul style="list-style-type: none"> • Find theoretical probabilities and odds (5.6) • Find compound probabilities (5.7) 	

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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	❖ Find theoretical probabilities and odds (5.6)	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
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 (5.6) Find probabilities of independent and dependent events (5.7) 	
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 (5.6) Find probabilities of independent and dependent events (5.7) Write an equation of best fit and use it to make predictions (7.4) 	

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Standard: 2.7. Probability and Predictions			
<p>D. Solve problems involving independent simple and compound events.</p>		<ul style="list-style-type: none"> Find theoretical probabilities (5.6) Find probabilities of independent and dependent events (5.7) 	<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. Solve problems involving independent, simple and compound events. Make valid inferences, predications and arguments based on probability. (Grade 8)</p> <p>M11.E Data Analysis and Probability</p> <p>M11.E.3 Understand and/or apply basic concepts of probability or outcomes.</p> <p>M11.E.3.1 Apply probability and/or odds to practical situations.</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 and probability.</p>	<p>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</p> <p>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</p>	<ul style="list-style-type: none"> Find probabilities of independent, dependent, and compound events (5.7) 	<p>Assessments: Publisher made Teacher made</p>

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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.	Determine if a relation is a function given a set of points or a graph. (2.8.11.A) M11.D.1.1.2	<ul style="list-style-type: none"> • Identify relations and functions (6.1, 6.4) • Evaluate functions (6.2, 6.4) • Model functions using rules, tables and graphs (6.2, 6.4) • Write a function rule given a table or real world situation (6.2, 6.4) • Write a function rule (6.4) • Recognize relationships in functions (6.4) • Write an equation of a direct variation (6.5) • Use ratios and proportions with direct variations (6.5) 	Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials
B. Give examples of patterns that occur in data from other disciplines. M11.D Algebraic Concepts M11.D.3 Analyze change in various contexts. M11.D.3.1 Describe and/or determine change.	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	<ul style="list-style-type: none"> • Solve word problems with slope (7.1) 	Assessments: Publisher made Teacher made

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Standard: 2.8 Algebra and Functions			
<p>C. 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) • Solve 2-step equations (4.5) • Solve equations with variables on both sides (4.6) • Use the distributive property when combining like terms and solving equations (4.7) • Write a function rule (6.4) • Recognize relationships in functions (6.4) • Graph equations using intercepts (7.3) • Interpret linear graphs (7.3, 7.4) • Graph linear equations (7.5) • Solve systems of equations by graphing (13.1) • Analyze special types of systems (13.2) • Solve systems using substitution (13.3) • Solve systems by elimination (13.4) • Write systems of linear equations (Chapter 13 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
<p>D. 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>	<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</p>	<ul style="list-style-type: none"> • Solve systems of equations by graphing (13.1) • Analyze special types of systems (13.2) 	

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Standard: 2.8 Algebra and Functions			
<p>E. Analyze and explain systems of equations, systems of inequalities and matrices.</p>		<ul style="list-style-type: none"> • Solve systems of equations by graphing (13.1) • Analyze special types of systems (13.2) • Solve systems by substitution (13.3) • Solve systems by elimination (13.4 & 13.5) 	<p>Instructional Strategies: Guided Practice Lecture Projects Group Work Discussion Independent Practice</p>
<p>F. 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 (13.1) • Analyze special types of systems (13.2) • Solve systems by substitution (13.3) • Solve systems by elimination (13.4 & 13.5) 	<p>Resources: Textbook Publisher made supplemental materials Teacher made supplemental materials</p> <p>Assessments: Publisher made Teacher made</p>
<p>G. Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p>		<ul style="list-style-type: none"> • Add, subtract and solve matrices with scalar multiplication (Chapter 2 investigation) • Add, subtract, multiply and divide rational numbers (3.2, 4.1, 4.3) 	

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Standard: 2.8 Algebra and Functions			
<p>H. 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 (6.6) • Write linear equations in slope-intercept form (7.3) • Graph linear equations (7.5) • Write and solve systems of equations from real world problems (Drop in at the end of Chapter 13) 	<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>I. 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"> • Graph and write linear equations using point-slope form (7.2) • Given the graph of a line, match to the table or equation (7.2) • Write linear equations in slope-intercept form (7.3) • Graph equations using intercepts (7.3) • Write a linear equation using data (7.4 and drop in) • Graph linear equations (7.5) 	<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: 2.8 Algebra and Functions			
<p>J. 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.3.2.3</p>	<ul style="list-style-type: none"> • Write linear equations in slope-intercept form (7.3) • Graph linear equations (7.5) • Graph equations using intercepts (7.4) • Write equations in standard form (7.4) • Graph and write linear equations using point-slope form (7.2) • Write a linear equation using data (7.4) 	<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>
<p>K. 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) 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 (7.4) 	

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Standard: 2.8 Algebra and Functions			
<p>L. Solve linear, quadratic and exponential equations both symbolically and graphically.</p>		<ul style="list-style-type: none"> • Use the distributive property to combine like terms and solve equations (1.4) • Solve equations using addition and subtraction (3.6) • Solve equations using multiplication and division (4.4) • Solve 2-step equations (4.5) • Solve equations with variables on both sides (4.6) • Identify equations that are identities or have no solutions (6.3) • Graph and write linear equations using point-slope (7.2) • Write equations in slope-intercept form (7.3) • Write a linear equation using data (7.4) • Graph linear equations and interpret their graphs (7.5) • Graph equations using intercepts (7.5) 	<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>
<p>M. 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"> • Determine domain (6.1) • Determine range (6.2) • Model functions using rules, tables and graphs (6.2-6.4) • Identify relations and functions (6.3) • Evaluate functions (6.4) • Write a function rule (6.4) • Recognize relationships in functions (6.4) 	

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Standard: 2.8 Algebra and Functions			
<p>N. 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 ratio 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 (5.1) • Solve proportions (5.1) • Use proportions in problem solving settings (5.5) • Write an equation of direct variation (6.5) • Use ratios and proportions with direct variations (6.5) • Solve inverse variations (6.6) 	<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>O. 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"> • Write a function rule given a table or real world situation (6.4) • Write an equation of a direct variation (6.5) • Use ratios and proportions with direct variations (6.5) 	

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Standard: 2.8 Algebra and Functions			
<p>P. Create and interpret functional models.</p>		<ul style="list-style-type: none"> • Find rates of change from tables and graphs (7.1) • Find slope (7.1) • Graph and write linear equations using point-slope (7.2) • Graph equations using intercepts (7.3) • Write equations in standard form (7.4) • Write a linear equation using data (7.4) • Write and solve systems of linear models (drop in with 7.6) • Determine whether lines are parallel or perpendicular (7.7) 	<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>Q. 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) M11.D.2.2.1</p> <p>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) 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 rates of change from tables and graphs (7.1) • Find slope (7.1) • Graph equations using intercepts (7.3) • Write equations in standard form (7.4) • Determine whether lines are parallel or perpendicular (7.7) • Simplify algebraic fractions (8.2 & 8.3) • Add, subtract, & multiply polynomials (9.2 & 9.3) • Use the distributive property to FOIL when multiplying 2 binomials (9.4) • Factor (10.2, 10.3, 10.4, 10.5) 	

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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. Solve problems using analytic geometry. M11.C Geometry M11.C.3 Locate points or describe relationships using the coordinate plane. M11.C.3.1 Solve problems using analytic geometry.	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). (2.9.11.G) M11.C.3.1.1 Relate slope to perpendicularity and/or parallelism (limit to linear algebraic expressions; slope formula provided on the reference sheet). (2.9.11.G) M11.C.3.1.2	<ul style="list-style-type: none"> • Calculate the slopes of parallel and perpendicular lines (7.7) 	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: 2.10 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? 	
B. 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 (8.7) 	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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