ALGEBRA TWO WITH CIRCULAR FUNCTIONS (MERRILL MATHEMATICS SERIES FOR SECONDARY SCHOOLS) pdf

1: Mathematics / Algebra 2

*Algebra two with circular functions (Merrill mathematics series for secondary schools) [Glen D Vannatta] on www.enganchecubano.com *FREE* shipping on qualifying offers.*

Our goal as a mathematics department is to foster an ongoing interest in the study of mathematics and the skills it engenders, with as much consideration as possible for the different learning styles and needs of the individual student. In particular, our goal is to create students who take great joy in applying their skills in a logical and methodical way to complex and unfamiliar problems. You can view a flow chart of the math sequence possibilities here. We want students to shift from thinking of their teacher as a sole locus of knowledge, to thinking that mathematics is a subject in which each student can construct his or her own mathematical understandings. Within each unit of study, students are given daily problem sets from their teachers. New definitions are explained in the context of new problems. Class time is devoted to students solving problems and engaging in meaningful discussions about these problems, either with a nearby peer, in a small group of peers, or, sometimes, as an entire class. Topics studied include but are not limited to: Students move through basic principles and new concepts quickly, spending less time gaining basic practice, and more time engaging with larger multi-step problems. The Honors Analytic Geometry and Algebra course is as much a course in mathematical problem-solving as it is a course in traditional Euclidean geometry. Place into this class via departmental placement test. Integrated Geometry and Algebra Integrated Geometry and Algebra is designed for students who enter the ninth grade needing additional review and practice in foundational algebra skills. Although the focus of the first several units is on developing mechanical proficiency, we expect students to move beyond basic procedural competence to develop a strong conceptual understanding of the material. In addition, students will learn how to document their work and how to study effectively for assessments in mathematics. Beginning in the second quarter, the curriculum is integrated with geometry through examination of the following topics: An emphasis is placed on the development of problem solving strategies through applications of algebra to physical science, geometry, and finance. Connections to the ninth grade Physics curriculum are made through units covering mechanics and wave phenomena. Place into the class via departmental placement test. Algebra 2 This course introduces students to several topics in secondary mathematics: Emphasis is placed on process, depth of understanding, and the development of mathematical intuition, not on memorization of rote facts. Students are encouraged to use mathematical methods that are meaningful for them. Algebra 2 H This is an Honors course in Algebra 2. Topics studied include those listed for Algebra 2 plus a thorough treatment of rational functions, principles of end behavior as a precursor to studying limits, radian angle measure and trigonometric functions and their transformations. Problem Sets are designed to challenge students depth and flexibility of understanding, in addition to their mathematical creativity. Recommendation from freshmen math instructor in conjunction with the department chair. The heart of the course is devoted to a thorough presentation of the elementary transcendental functions: During the second semester students also explore some topics from discrete mathematics including sequences, series, elementary counting techniques and probability. Successful completion of Algebra 2. Analytic Pre-Calculus This course offers rigorous preparation for the traditional calculus sequence. Students refine their computational skills, extend their ability to exploit appropriate technology, and practice communicating their insights in written and oral form. After a brisk review of the unifying concept of function, students explore the algebraic complexities of polynomials and rational functions and discover new applications of the exponential and logarithmic functions. Emphasizing careful derivations, students then embark on a sophisticated study of the trigonometric functions and their applications. Students prepare to tackle calculus by exploring limits. During the second semester students will also spend time studying advanced topics selected from areas such as conic sections, linear programming, series, vectors, matrices, and probability and statistics. Recommendation of Algebra 2 teacher. It is aimed at the independent learners who are comfortable with handling symbolic

language and abstract thinking challenges. Students work together in small groups in an effort to discover new concepts and explain new ideas from multiple perspectives. Students begin the year by engaging with contest level math problems that address many of the topics from Honors Algebra 2. In addition to extending previously studied topics such as transformations of functions, quadratic maximization, graphing rational functions, and exponential and logarithmic functions, the course includes a thorough introduction to limits and the definition of the derivative, an extension of trigonometry including trigonometric identities, the Law of Sines and the Law of Cosines, parametric and polar functions and their graphs, an exploration of methods of proof, and a thorough treatment of vectors and matrices. Recommendation from the A2H instructor. In recent decades it has emerged to play a key role in the study of biology, medicine, economics, and finance. This course introduces students to the elements of differential and integral calculus, placing particular emphasis on applications drawn from the management, social, and life sciences. Students will sharpen and develop a new appreciation for their pre-calculus skills as they master and learn to apply derivatives, integrals, and the fundamental theorem of calculus. The focus is kept on conceptual understanding as students develop and apply new algebraic, numerical, and geometric skills. During the second semester the course also provides brief introductions to more advanced topics in mathematics, including partial derivatives, differential equations, and infinite series. Completion of Analytic Precalculus, or completion of Principles of Precalculus with a B or higher, or permission from the department. Statistics Statistics is an application of mathematics for understanding the connections in business, the world around us, and the factors that affect change and consideration of options. Students make substantial use of the TI calculator and Fathom statistical software. The course is designed to equip students with many skills: Students are exposed to the newspaper and various forms of media and the critical skills required for accurate interpretation and full comprehension of articles that require statistical thinking. Students also examine a large number of case studies, both to appreciate the breadth and power of statistical techniques and to understand the widespread misuse of statistical ideas. Completion of Algebra 2. We encourage students who have been successful with the previous pre-calculus course to consider an AP math class the following year. Teachers are dedicated to encouraging the development of a self-reliant learning style with strong inductive, deductive, and abstract reasoning skills to serve students well in a collegiate environment. Recommendation from Analytic Precalculus instructor or completion of Honors Precalculus. AP Calculus BC Beyond becoming prepared for the Advanced Placement examination, students in this course will be expected to acquire a deep understanding of the mathematics of single variable calculus. Recommendation from Precalculus instructor. The course covers many topics including: If you believe ignorance is bliss, you will find this course upsetting. Learning statistics may render you skeptical of claims that you read in the news or hear from friends. You may wonder if one can ever really be certain about anything. In other math classes, there are clear right and wrong answers. AP Statistics is the study of data in the face of variation. Questions we ponder include: Could a result be due to chance? Could results be biased? How can you guess what will happen in the future and how confident can you be of that guess? Advanced Topics in Math H Advanced Topics in Mathematics is designed to provide students who have completed the traditional calculus sequence with the opportunity to continue their mathematical studies, deepening and broadening their understanding and preparing them for the possible further study of mathematics. Topics covered may include multivariable calculus, linear algebra, differential equations, topics in discrete mathematics, and calculus-based probability theory. Placement in math courses is based on three pieces of information: At the Welcoming Event in late April, every student will take a Placement Test to determine which math course they are best suited for. We believe in appropriately challenging students and do our best to place students in the best class for them. However, because the process is not perfect, during the first few weeks of school, freshmen teachers are very vigilant about determining if their students have been appropriately placed. Thus, inevitably there are a few changes that happen early on in the school year. Our honors program is designed for those students who are mathematics enthusiasts and are developmentally ready to delve deep into math concepts. Not only is the pace faster in these courses, but also every day students are

expected to apply their knowledge to unfamiliar situations. In addition, honors students must be able to think flexibly across different strands of math, often picking and choosing from among a variety of mathematical tools in pursuit of a solution. Teachers of these courses usually serve as coaches, guiding the students along and offering help as needed, while the students work collaboratively during class to tackle challenging problems. As in our other courses, our honors students also are expected to display their work in a logical, organized manner. My child has already taken Algebra and Geometry at her middle school. We recognize that many middle school students have had courses involving algebra and geometry. However, our course, and our program as a whole, is different from and substantially more challenging than courses at area middle schools. We believe in the importance of strong foundational skills, but more importantly our program emphasizes applying those skills to problem solving, synthesizing material, analyzing situations, working collaboratively, and moving flexibly between topics in mathematics. Yes, every year we have a few students who move into the honors track from the regular one. In addition, usually some extra summer work is required. If my child is not in the honors track, can she still take Calculus? There also is the opportunity to take our non-AP Calculus course for those students not yet ready for the rigors of a college-level calculus course. We believe that strong algebra skills are the foundation of success both in our academic program here at Menlo as well as in advanced study. Mathematical development in students, like physical development, is a fits and spurts process. Some students arrive to Menlo with holes and weaknesses in their algebra knowledge that will prove problematic in future math and science classes. In addition, beginning in the second quarter, the curriculum is integrated with geometry. We want students to move beyond basic procedural competence to develop a strong understanding of material. In conjunction with the algebra and geometry topics, students will learn how to document their work and how to study effectively for assessments in mathematics. My child really wants to be able to take all of your math courses, including AP Statistics and Advanced Topics. AP Statistics also can be taken by those students who complete Analytic Precalculus and receive a recommendation from their instructor.

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2: Secondary Mathematics II Core

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No transfer coursework may be counted toward the program. A maximum of 3 credits Independent Study may be counted toward the program and must be approved by Petition prior to completion the Independent Study. Topics in the two-course sequence include: Students are required to have Internet-ready devices available for each class meeting. Skill development takes place online and outside scheduled class meetings. This course is offered for additive credit. Topics include equations and inequalities, linear, quadratic, polynomial, rational, logarithmic and exponential functions along wiht their graphs; application of these functions, systems of linear inequalities. F, W, S Prerequisite s: Topics to be covered include: Topics include equations and inequalities; linear, quadratic, polynomial, rational, logarithmic, exponential and trigonometric functions along with their graphs; application of these functions. Applications include modeling biological problems of medicine, genetics, Biomechanics, ecology, population growth and decay. This course does not fulfill the calculus requirements for concentration in chemistry, physics, biochemistry, engineering, or mathematics Student cannot receive credit for both Math and Math Problems in biology, medicine and physiology are used to illustrate how computation and mathematics can improve and enhance the understanding of these problems. Students cannot receive credit for both Math and Math This course includes computer labs. Students are encouraged to understand organizational tools of mathematics, including set theory and the use of deductive logic. Areas of application may include: Students intending to elect this course should have taken the equivalent of one year of high school algebra and one year of high school geometry. This course is not open to mathematics concentrators. Differential Equations with Linear Algebra This course provides an introduction to ordinary differential equations. Emphasis is placed on the development of abstract concepts and applications for first-order and linear higher-order differential equations, systems of differential equations, introductory numerical methods, matrix algebra, and Laplace transform techniques. Topics will be chosen from: Applications in various areas of computer engineering will be discussed. A few "Great Theorems" will be studied in their historical context, inter-connections between mathematics and science will be studied, and some famous personalities will be presented. The course focuses on developing the following: Students will also study topics in graph theory that are applicable to real world problems. Topics include basic counting principles, the principle of inclusion-exclusion, generating functions and recurrence relations. Topics from graph theory include graph models, paths, circuits, cycles, connectedness; additional topics include the theory and applications of planarity, coloring, directed graphs, and networks and network flows. Previously taught as Mathematical Statistics I. Geometric models and the history of geometry are stressed. Students learn to design customized Mathematica functions to solve specific problems in these areas using the symbolic, computational, graphics and programming tools provided within Mathematica. An inquiry approach is emphasized involving problem solving, problem posing, pattern seeking, reasoning, justification, representations, and communications. Topics in Math include numeration, meaning of operations, the reasoning behind procedures, and the rational number system, including fractions and decimals. Topics in Math include number theory, proportional reasoning, the geometry of two-dimensional shape and measurement, integers, and the real number system.

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3: Academics / Curriculum Guide: Mathematics

Algebra Two With Circular Functions (Merrill Mathematics Series For Secondary Schools) avg rating â€" 0 ratings.

The critical areas, organized into units, deepen and extend understanding of linear relationships, in part by contrasting them with exponential phenomena, and in part by applying linear models to data that exhibit a linear trend. Secondary Mathematics I uses properties and theorems involving congruent figures to deepen and extend understanding of geometric knowledge from prior grades. The final unit in the course ties together the algebraic and geometric ideas studied. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. By the end of eighth grade, students have had a variety of experiences working with expressions and creating equations. Students continue this work by using quantities to model and analyze situations, to interpret expressions, and by creating equations to describe situations. In earlier grades, students define, evaluate, and compare functions, and use them to model relationships between quantities. Students will learn function notation and develop the concepts of domain and range. They move beyond viewing functions as processes that take inputs and yield outputs, and start viewing functions as objects in their own right. They explore many examples of functions, including sequences; they interpret functions given graphically, numerically, symbolically, and verbally, translate between representations, and understand the limitations of various representations. They work with functions given by graphs and tables, keeping in mind that, depending upon the context, these representations are likely to be approximate and incomplete. Their work includes functions that can be described or approximated by formulas, as well as those that cannot. When functions describe relationships between quantities arising from a context, students reason with the units in which those quantities are measured. Students build on and informally extend their understanding of integer exponents to consider exponential functions. They compare and contrast linear and exponential functions, distinguishing between additive and multiplicative change. They interpret arithmetic sequences as linear functions and geometric sequences as exponential functions. By the end of eighth grade, students have learned to solve linear equations in one variable and have applied graphical and algebraic methods to analyze and solve systems of linear equations in two variables. This area builds on these earlier experiences by asking students to analyze and explain the process of solving an equation and to justify the process used in solving a system of equations. Students develop fluency writing, interpreting, and translating between various forms of linear equations and inequalities, and using them to solve problems. They master the solution of linear equations and apply related solution techniques and the laws of exponents to the creation and solution of simple exponential equations. Students explore systems of equations and inequalities, and they find and interpret their solutions. All of this work is grounded on understanding quantities and on relationships between them. Students use regression techniques to describe approximately linear relationships between quantities. They use graphical representations and knowledge of the context to make judgments about the appropriateness of linear models. With linear models, they look at residuals to analyze the goodness of fit. In previous grades, students were asked to draw triangles based on given measurements. They also have prior experience with rigid motions translations, reflections, and rotations and have used these to develop notions about what it means for two objects to be congruent. In this unit, students establish triangle congruence criteria, based on analyses of rigid motions and formal constructions. They solve problems about triangles, quadrilaterals, and other polygons. They apply reasoning to complete geometric constructions and explain why they work. Building on their work with the Pythagorean Theorem in eighth grade to find distances, students use a rectangular coordinate system to verify geometric relationships, including properties of special triangles and quadrilaterals and slopes of parallel and perpendicular lines. Core Standards of the Course Strand: Students become mathematically proficient in engaging with mathematical content and concepts as they learn, experience, and apply these skills

and attitudes Standards MP. Explain the meaning of a problem and look for entry points to its solution. Analyze givens, constraints, relationships, and goals. Make conjectures about the form and meaning of the solution, plan a solution pathway, and continually monitor progress asking, "Does this make sense? Check answers to problems using a different method. Make sense of the quantities and their relationships in problem situations. Translate between context and algebraic representations by contextualizing and decontextualizing quantitative relationships. This includes the ability to decontextualize a given situation, representing it algebraically and manipulating symbols fluently as well as the ability to contextualize algebraic representations to make sense of the problem. Understand and use stated assumptions, definitions, and previously established results in constructing arguments. Make conjectures and build a logical progression of statements to explore the truth of their conjectures. Justify conclusions and communicate them to others. Respond to the arguments of others by listening, asking clarifying questions, and critiquing the reasoning of others. Apply mathematics to solve problems arising in everyday life, society, and the workplace. Make assumptions and approximations, identifying important quantities to construct a mathematical model. Routinely interpret mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Consider the available tools and be sufficiently familiar with them to make sound decisions about when each tool might be helpful, recognizing both the insight to be gained as well as the limitations. Identify relevant external mathematical resources and use them to pose or solve problems. Use tools to explore and deepen their understanding of concepts. Communicate precisely to others. Use explicit definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose. Specify units of measure and label axes to clarify the correspondence with quantities in a problem. Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. Look closely at mathematical relationships to identify the underlying structure by recognizing a simple structure within a more complicated structure. See complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. Notice if reasoning is repeated, and look for both generalizations and shortcuts. Evaluate the reasonableness of intermediate results by maintaining oversight of the process while attending to the details. Q Reason quantitatively and use units to solve problems. Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions Standards N. Interpret complicated expressions by viewing one or more of their parts as a single entity. CED Create equations that describe numbers or relationships. Limit these to linear equations and inequalities, and exponential equations. In the case of exponential equations, limit to situations requiring evaluation of exponential functions at integer inputs Standards A. Include equations arising from linear and simple exponential functions. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. Solve equations and inequalities in one variable Standard A. Solve systems of equations. Build on student experiences graphing and solving systems of linear equations from middle school. Include cases where the two equations describe the same line - yielding infinitely many solutions - and cases where two equations describe parallel lines - yielding no solution; connect to GPE. Represent and solve equations and inequalities graphically Standards A. Construct a viable argument to justify a solution method. Solve one-variable equations and literal equations to highlight a variable of interest. Solve compound inequalities in one variable, including absolute value inequalities. Solve simple exponential equations that rely only on application of the laws of exponents limit solving exponential equations to those that can be solved without logarithms. IF Understand the concept of a linear or exponential function and use function notation. Recognize arithmetic and geometric sequences as examples of linear and exponential functions Standards F. Interpret linear or exponential functions that arise in applications in terms of a context Standards F. Analyze linear or exponential functions using different representations Standards F. If f is a function and x is an element of its domain, then f x denotes the output of f corresponding to the input x. Emphasize arithmetic and geometric sequences as examples of linear and exponential functions. Key features include intercepts; intervals where the

function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. For example, if the function h n gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. Estimate the rate of change from a graph. Graph exponential functions, showing intercepts and end behavior. BF Build a linear or exponential function that models a relationship between two quantities Standards F. Build new functions from existing functions Standard F. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. Limit to linear and exponential functions. Connect arithmetic sequences to linear functions and geometric sequences to exponential functions. Relate the vertical translation of a linear function to its y-intercept. Experiment with cases and illustrate an explanation of the effects on the graph using technology. LE Construct and compare linear and exponential models and solve problems Standards F. Interpret expressions for functions in terms of the situation they model. Prove that linear functions grow by equal differences over equal intervals; exponential functions grow by equal factors over equal intervals. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

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4: Overview / Mathematics

Books by Glen D. Vannatta, Algebra two with circular functions (Merrill mathematics series for secondary schools), The metric system, Advanced Mathematical Concepts, Advanced Mathematical Concepts.

Deals with percent, areas, volumes, proportions, statistics, etc. The student also becomes well acquainted with the metric system and the US Common system. Intermediate Algebra 3 F, W, S Sets, real number system, functions, graphs, algebraic manipulations, linear and quadratic equations, systems of equations, word problems. Approximately equivalent to second year high school algebra. Intermediate Algebra background Applied Calculus 4 F, W Introduction to plane analytic geometry and one-dimensional calculus. One semester terminal course designed for students in business, life sciences, management, social sciences, and related applied disciplines. College Algebra experience Principles of Statistics 3 F, W, S Descriptive statistics, elementary probability, central tendency, variability, random variables discrete and continuous confidence intervals, hypothesis testing, linear regression, ANOVA, contingency tables. MATH or R. Activities related to the major and employment will be approved. Prior approval is necessary, a program coordinated by a faculty member and an on-site supervisor. Applications in two dimensional analytic geometry are provided. Calculus II 5 F, W, S Methods of integration, analytic geometry, transcendental and hyperbolic functions, infinite sequences and series, and polar coordinates. Multivariable Calculus 5 W, S Basic concepts and applications of vector calculus, multidimensional calculus, partial derivatives, and multiple integration. Foundations of Mathematics 3 F-even, W-even, S-odd Set theory, logic, development of number systems and axiomatic systems. Attention is also given to the history of mathematics and famous mathematicians. Foundations of Geometry 3 F-odd An axiomatic development of Euclidean geometry. It also includes a study of non-Euclidean geometries and related subjects. Mathematics for Elementary Teachers 3 F, W The course is designed to teach a perspective elementary teacher the understanding of mathematics needed to teach in grades K The focus will be on the mathematics not on methods since all pre-service elementary teachers will take a separate methods course as part of their program. Although learning the appropriate mathematics is the primary objective, it is hoped that some of the instructional techniques used in the class model the desired methods for teaching elementary mathematics. MATH or higher Mathematics Using Technologies 3 S-even Introduction to current math-specific software and calculators which are used in the teaching and learning of mathematics. Technology will be used to investigate topics from algebra, statistics, calculus, linear algebra, etc. MATH , Introduction to Numerical Methods 3 Variable Interpolation, curve fitting, numerical differentiation and integration, and numerical solutions to linear, non-linear and differential systems. Introduction to Complex Variables 3 W-odd, S-even Complex algebra, analytical functions, integration and differentiation in the complex plane, infinite series, theory of residues, conformal mappings. Differential Equations 3 W-even, S-odd Methods used in solving ordinary differential equations and their applications. Numerical methods, series solutions, and Laplace Transforms. Matrix Methods 3 S Basic concepts of matrices and inverse matrices, determinants, Simplex method, vectors, linear independence, eigenvalues, eigenvectors, diagonalization, and differential equations or probability and Markov Chains. MATH or Elementary Linear Algebra 3 F-odd, W-odd, S-even Linear systems, matrices, vectors and vector spaces, linear transformation, determinants, quadratic forms, Eigen values, and Eigenvectors. Secondary Mathematics Teaching Methods 2 Fâ€”even Designed especially for prospective secondary school teachers. Techniques of presentation unique to mathematics. Emphasis placed on helping the prospective teacher to be more fully prepared to meet the daily problems of the classroom. Must be taken before student teaching. Special Topics in Mathematics Variable R. Internship in Mathematics Variable Credit for applied experience in mathematics. Prior approval must be obtained and coordinated by a faculty member and on-site supervisor. Mathematical Statistics 3 F Probability, random variables, sampling distributions, estimation and hypothesis testing, regression and correlation. Introduction to Analysis I 3 F Elementary topological aspects of the real numbers, metric properties,

sequences, limits, continuity, differentiation, and Riemann Integration. Introduction to Analysis II 3 W Series in one real variable, sequences and series of functions, measure, and metric spaces. Abstract Algebra I 3 F An examination of algebraic systems: A study of fields, vector spaces, extension fields, and Galois theory. Mathematics Seminar 2 S A lecture course that provides a capstone experience for mathematics and mathematics education majors. A brief review of major courses will be given and students will take a standardized exams. Other topics may include current issues in research employment and graduate school. Independent Study Variable Topic and credit to be arranged between the student and instructor. Permission of Instructor R. Student Research Variable Supervised individual research for students who have been granted a student research associateship.

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5: Algebra 2 â€“ Mathplanet

Algebra 2 is the third math course in high school and will guide you through among other things linear equations, inequalities, graphs, matrices, polynomials and radical expressions, quadratic equations, functions, exponential and logarithmic expressions, sequences and series, probability and trigonometry.

The need for extending the set of rational numbers arises, and real and complex numbers are introduced so that all quadratic equations can be solved. The link between probability and data is explored through conditional probability and counting methods, including their use in making and evaluating decisions. The study of similarity leads to an understanding of right triangle trigonometry and connects to quadratics through Pythagorean relationships. Circles, with their quadratic algebraic representations, round out the course. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations. Students extend the laws of exponents to rational exponents and explore distinctions between rational and irrational numbers by considering their decimal representations. Students explore relationships between number systems: The guiding principle is that equations with no solutions in one number system may have solutions in a larger number system. Students consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. They select from among these functions to model phenomena. Students learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. In particular, they identify the real solutions of a quadratic equation as the zeros of a related quadratic function. When quadratic equations do not have real solutions, students learn that the graph of the related quadratic function does not cross the horizontal axis. Students begin this unit by focusing on the structure of expressions, rewriting expressions to clarify and reveal aspects of the relationship they represent. They create and solve equations, inequalities, and systems of equations involving exponential and quadratic expressions. Building on probability concepts that began in the middle grades, students use the languages of set theory to expand their ability to compute and interpret theoretical and experimental probabilities for compound events, attending to mutually exclusive events, independent events, and conditional probability. Students should make use of geometric probability models wherever possible. They use probability to make informed decisions. Students apply their earlier experience with dilations and proportional reasoning to build a formal understanding of similarity. They identify criteria for similarity of triangles, use similarity to solve problems, and apply similarity in right triangles to understand right triangle trigonometry, with particular attention to special right triangles and the Pythagorean Theorem. It is in this unit that students develop facility with geometric proof. They use what they know about congruence and similarity to prove theorems involving lines, angles, triangles, and other polygons. They explore a variety of formats for writing proofs. Students prove basic theorems about circles, such as a tangent line is perpendicular to a radius, inscribed angle theorem, and theorems about chords, secants, and tangents dealing with segment lengths and angle measures. In the Cartesian coordinate system, students use the distance formula to write the equation of a circle when given the radius and the coordinates of its center, and the equation of a parabola with vertical axis when given an equation of its directrix and the coordinates of its focus. Given an equation of a circle, they draw the graph in the coordinate plane, and apply techniques for solving quadratic equations to determine intersections between lines and circles or a parabola and between two circles. Students develop informal arguments justifying common formulas for circumference, area, and volume of geometric objects, especially those related to circles. Core Standards of the Course Strand: Students become mathematically proficient in engaging with mathematical content and concepts as they learn, experience, and apply these skills and attitudes Standards MP. Explain the meaning of a problem and look for entry points to its solution. Analyze givens, constraints, relationships, and goals. Make conjectures about the form and meaning of the solution, plan a solution pathway, and continually monitor progress asking, "Does

this make sense? Check answers to problems using a different method. Make sense of the quantities and their relationships in problem situations. Translate between context and algebraic representations by contextualizing and decontextualizing quantitative relationships. This includes the ability to decontextualize a given situation, representing it algebraically and manipulating symbols fluently as well as the ability to contextualize algebraic representations to make sense of the problem. Understand and use stated assumptions, definitions, and previously established results in constructing arguments. Make conjectures and build a logical progression of statements to explore the truth of their conjectures. Justify conclusions and communicate them to others. Respond to the arguments of others by listening, asking clarifying questions, and critiquing the reasoning of others. Apply mathematics to solve problems arising in everyday life, society, and the workplace. Make assumptions and approximations, identifying important quantities to construct a mathematical model. Routinely interpret mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose. Consider the available tools and be sufficiently familiar with them to make sound decisions about when each tool might be helpful, recognizing both the insight to be gained as well as the limitations. Identify relevant external mathematical resources and use them to pose or solve problems. Use tools to explore and deepen their understanding of concepts. Communicate precisely to others. Use explicit definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose. Specify units of measure and label axes to clarify the correspondence with quantities in a problem. Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. Look closely at mathematical relationships to identify the underlying structure by recognizing a simple structure within a more complicated structure. See complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. Notice if reasoning is repeated, and look for both generalizations and shortcuts. Evaluate the reasonableness of intermediate results by maintaining oversight of the process while attending to the details. RN Extend the properties of exponents to rational exponents Standards N. Use properties of rational and irrational numbers Standard N. Connect to physical situations e. CN Perform arithmetic operations with complex numbers Standards N. Use complex numbers in polynomial identities and equations Standards N. Limit to multiplications that involve i2 as the highest power of i. Limit to quadratics with real coefficients. Write expressions in equivalent forms to solve problems, balancing conceptual understanding and procedural fluency in work with equivalent expressions Standard A. Interpret increasingly more complex expressions by viewing one or more of their parts as a single entity. Exponents are extended from the integer exponents to rational exponents focusing on those that represent square or cube roots. For example, development of skill in factoring and completing the square goes hand in hand with understanding what different forms of a quadratic expression reveal. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines. Use the properties of exponents to transform expressions for exponential functions. For example the expression 1. APR Perform arithmetic operations on polynomials. Focus on polynomial expressions that simplify to forms that are linear or quadratic in a positive integer power of x Standard A. CED Create equations that describe numbers or relationships. Extend work on linear and exponential equations to quadratic equations Standards A. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. Solve systems of equations. Extend the work of systems to include solving systems consisting of one linear and one nonlinear equation Standard A. Derive the quadratic formula from this form. Solve quadratic equations by inspection e. IF Interpret quadratic functions that arise in applications in terms of a context Standards F. Analyze functions using different representations Standards F. Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior. Focus on quadratic functions; compare with linear and exponential functions. For example, if the function h n gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. Estimate the rate of change from a graph. Graph piecewise-defined functions and absolute value

functions. Compare and contrast absolute value and piecewise-defined functions with linear, quadratic, and exponential functions. Highlight issues of domain, range, and usefulness when examining piecewise-defined functions. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. Use the properties of exponents to interpret expressions for exponential functions. Extend work with quadratics to include the relationship between coefficients and roots, and that once roots are known, a quadratic equation can be factored. For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. BF Build a function that models a relationship between two quantities Standard F. Build new functions from existing functions Standard F. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. LE Construct and compare linear, quadratic, and exponential models and solve problems Standard F. TF Prove and apply trigonometric identities.

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6: Glen D. Vannatta (Author of Algebra Two With Circular Functions)

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