

## Algebra III, Honors and Regular

It is the fundamental philosophy of the Temple Christian School Math Department that the observable complexity and order demonstrated in nature is the result of God's creative power and design rather than "cosmic happenstance". It would indeed seem to us that Galileo Galilei was correct when he said that mathematics is the language "with which God has written the universe". In light of this, the department's desire is to teach mathematics with a spiritual emphasis in accordance with the Apostle Paul's assertion in Romans 1 that God's eternal power and divine nature are clearly seen in nature.

In light of the department philosophy and given the size of our school, we have instituted a college preparatory curriculum that has two tiers in concert with a Christian world view. It is designed so that students may aggressively pursue mathematics, or may simply prepare for the entry-level college algebra curriculum. As a result, the TCS Math Department hopes that critical thinking and exploration will run throughout our curriculum and coursework, increasing in emphasis as students rise higher in the degree of difficulty of the work attempted.

### Course Description

This course is designed for the students which have completed our Algebra I, Geometry, and Algebra II courses, but who intend to pursue liberal arts degrees in college rather than degrees in mathematics, engineering, architecture, and science. It covers the TEKS written for independent studies in mathematics for the state of Texas, references the College Board specifications for freshman college algebra, and gives students a look at college entrance testing. The honors-level students enrolled in the class are juniors and the regular-level students enrolled in the class are seniors. Note: this is the typical arrangement for the regular/honors curriculum at TCS; honors students are one year ahead of their peer group in class level.

### Scope & Sequence for Fall 2017

The primary units of the course will be taught first, with exploratory of additional units at the discretion of the instructor.

**Chapter 4 Review:** Students will review and enhance understanding of quadratic functions and factoring. TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Chapter 5 Review:** Students will review and enhance understanding of polynomials and polynomial functions. TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Chapter 6 Review:** Students will review and enhance understanding of rational exponents, radical equation solving, and radical functions. TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Chapter 7 Review:** Students will review the nature of logarithms and exponential/logarithmic functions. TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Chapter 8 Review:** Students will review the algebra of rational expressions and the characteristics of rational functions. TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

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Scope & Sequence for Spring 2018

**Chapter 9:** Students will explore elementary quadratic relations and conic sections.  
TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Chapter 12:** Students will study sequences and series, factorial and counting notations, and binomial expansions.  
TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Practical Mathematics Unit:** Students will conduct a study of philosophy of the use of money as a tool with a Christian world view. The unit will include videos involving the nature of spending and debt, and will conclude with a practical unit project that studies mortgage lending and automobile lending in modern America. Students will be graded on their tracking of the videos presented and will use the project as an exam grade for the unit. If opportunity arises, students will undertake another project on the nature of revolving credit.

**Introduction to Cyber Security:** Students will be introduced to the fundamental principles of cyber security, understand the variety of cyber threats that face them, discuss/review the need for ethical behavior in the cyber domain, and comprehend their role within the context of the cyber world we all live in.

**Review of Standardized Testing:** Materials drawn from various sources

*The following areas of study will also be explored as time allows:*

**Chapter 13:** Students will explore trigonometric ratios and functions, graphs, identities, and functions.  
TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

**Chapter 14:** Students will explore graphing sine, cosine, and tangent functions.  
TEKS §111.45 (c) 1-7 PLUS elements from the College Board Stipulations for student CLEP testing.

## Methodology

There will be two major methods emphasized in our coursework; all students will be (1) encouraged to take advantage of the inherent strengths generated by mathematics done without a calculator and (2) will be taught to use modern technology as an exploratory tool to enhance the learning process.

## Textbook

This document is linked to the Alg. II textbook in current use, Algebra II, Holt McDougal, ISBN 978-0-547-31526-3, in order to complete a well-rounded high school mathematics study mandated by the state of Texas. Additional materials will be referenced as needed.

## Evaluation

Assessment will include recall, understanding, and skill level for each class, and will occur in three primary ways. Students will undergo chapter assessments/tests (approximately every 3 weeks) and a semester cumulative assessment (Semester Exam). Students will also undertake assessments over the course of each chapter to include quizzes and homework assignments. Not all homework will be used in the grading process, but enough will be used to confirm and validate a student's demonstrated progress. In addition, a bi-weekly participation grade will be awarded to each student. As the name implies, it is based on in-class work

(answering questions, problem solving on the 'white board', and adherence to classroom policies/procedures). In assessing student work, mathematics department instructors will encourage student development of the ability to articulate what they know about the subject being studied in both written and oral form.

## **Texas Essential Knowledge & Skills**

### **§111.45. Algebra III, Adopted 2012 (One Credit)**

(a) General requirements. (1) Students shall be awarded one credit for successful completion of this course. Prerequisites: Geometry and Algebra II. (2) Students may repeat this course with different course content for up to three credits. (3) The requirements for each course must be approved by the local district before the course begins. (4) If this course is being used to satisfy requirements for the Distinguished Achievement Program, student research/products must be presented before a panel of professionals or approved by the student's mentor.

(b) Introduction.06/18/12 -- As approved by the State Board of Education on April 20, 2012, for second reading and final adoption, with technical edits, as authorized by State Board of Education operating rules. Not yet filed; will be subject to technical review by Texas Register editors. (1) The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on fluency and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century. (2) The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level and course. When possible, students will apply mathematics to problems arising in everyday life, society, and the workplace. Students will use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution. Students will select appropriate tools such as real objects, manipulatives, paper and pencil, and technology and techniques such as mental math, estimation, and number sense to solve problems. Students will effectively communicate mathematical ideas, reasoning, and their implications using multiple representations such as symbols, diagrams, graphs, and language. Students will use mathematical relationships to generate solutions and make connections and predictions. Students will analyze mathematical relationships to connect and communicate mathematical ideas. Students will display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication. (3) In Independent Study in Mathematics, students will extend their mathematical understanding beyond the Algebra II level in a specific area or areas of mathematics such as theory of equations, number theory, non-Euclidean geometry, linear algebra, advanced survey of mathematics, or history of mathematics. (4) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.

(c) Knowledge and skills: mathematical process standards.

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

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(1) apply mathematics to problems arising in everyday life, society, and the workplace; (2) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution; (3) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems; (4) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate; (5) create and use representations to organize, record, and communicate mathematical ideas; (6) analyze mathematical relationships to connect and communicate mathematical ideas; and (7) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

The above are augmented by the College Board Stipulations for the CLEP Test.

### 25% Algebraic operations

- Factoring and expanding polynomials
- Operations with algebraic expressions
- Operations with exponents
- Properties of logarithms

### 25% Equations and inequalities

- Linear equations and inequalities
- Quadratic equations and inequalities
- Absolute value equations and inequalities
- Systems of equations and inequalities
- Exponential and logarithmic equations

### 30% Functions and their properties

- Definition and interpretation
- Representation/modeling (graphical, numerical, symbolic, and verbal representations of functions)
- Domain and range
- Algebra of functions
- Graphs and their properties (including intercepts, symmetry, and transformations)
- Inverse functions

### 20% Number systems and operations

- Real numbers
- Complex numbers
- Sequences and series
- Factorials and Binomial Theorem
- Determinants of 2-by-2 matrices