

# Kolbe Academy Home School

## HIGH SCHOOL ALGEBRA II (K) ALGEBRA II & TRIGONOMETRY (H) *Foerster Algebra and Trigonometry*

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**COURSE TITLE:** Algebra II OR Algebra II & Trigonometry

**COURSE TEXTS:**

- ❖ *Algebra and Trigonometry: Functions and Applications*, Paul A. Foerster, © 2006 (T4102)
- ❖ Kolbe Academy Graphing Calculator Lab Manual, © 2009 (T4102B)
- ❖ Solutions Manual (T4102A), Optional
- ❖ Kolbe Academy Solution Manual to the Graphing Calculator Lab Manual (T4102C), Optional
- ❖ Math without Borders Foerster DVD Lecture Set (T4102D), Optional

**COURSE DESCRIPTION:**

This course plan includes a one year course in Algebra II/Trigonometry (H) and a one year course in Algebra II (K). Parents should preview the course plans to gain a better understanding of what each course entails.

The Algebra II/Trigonometry (H) course moves at a very quick pace and emphasizes the more difficult concepts and mathematical applications in the text. This course of study, although up to the parent's discretion, is recommended for students who received an A in either Algebra I or Geometry and received at least a B+ in both Algebra I and Geometry. Students who do well in the Honors Algebra II/Trig course will find themselves ready for the study of Calculus during the following year. All students pursuing honors should expect to find the content and pace of the coursework challenging and should be sure to allot extra time for their studies. Those wishing to pursue the Honors designation in this course will have a heavier emphasis on the mathematical applications of concepts learned in the course.

The Algebra II (K) course moves at a very reasonable pace for most high school students. It is meant to be a college preparatory course in nature, taking the student through a great number of Algebra II concepts but also spending a little more time on reviewing Algebra I than the honors course. This course of study can be completed by most average students. Upon completion of Algebra II (K), students will be ready to tackle any PreCalculus course the following year. If a student is struggling with this course, parents may want to call and speak with an advisor, but the following modifications could be made – omitting Chapters 9 & 10.

**SCOPE AND SEQUENCE:**

Algebra II (K and H students)

1. Linear functions
2. Systems of linear equations and inequalities
3. Quadratic functions and complex numbers
4. Exponential and Logarithmic functions
5. Rational Algebraic Functions
6. Irrational Algebraic Functions
7. Quadratic Relations and Systems (Circles, Ellipses, hyperbolas, and parabolas).

Trigonometry (H students only)

1. Trigonometric and circular functions
2. Properties of trigonometric and circular functions
3. Trigonometric Identities
4. Triangle Problems
5. Vectors

**DIPLOMA REQUIREMENTS:**

**Summa Cum Laude** diploma candidates are required to follow either the Kolbe Core course (K) or Kolbe Honors course (H) track outlined in this course plan. **Magna Cum Laude** and **Standard** diploma candidates may choose to pursue the (H) or (K) designation, but are not required to do so, and instead have the option of altering the course plan as they choose. **Summa** students must complete 4 years of mathematics during their high school course of study including Algebra I, Geometry, Algebra II, and Pre-Calculus (or higher). **Magna** students must complete 3 years of mathematics during their high school course of study including Algebra I, Geometry, and Algebra II (or higher). **Standard** diploma students must complete 2 years of mathematics including Algebra I. Please see below for specific course titles, quarterly reporting requirements and transcript designations for Algebra II (K) and Algebra II/Trigonometry (H).

**REQUIRED SAMPLE WORK:**

Designation*		K	H
Course Title	Algebra II	Algebra II	Algebra II/Trigonometry
Quarter 1	1. Any written sample of work	1. Completed Quarter 1 Exam	1. Completed Quarter 1 Exam
Quarter 2	1. Any written sample of work	1. Completed Quarter 2 Exam	1. Completed Quarter 2 Exam
Quarter 3	1. Any written sample of work	1. Completed Quarter 3 Exam	1. Completed Quarter 3 Exam
Quarter 4	1. Any written sample of work	1. Completed Quarter 4 Exam	1. Completed Quarter 4 Exam

\*Designation refers to designation type on transcript. K designates a Kolbe Academy Core course. H designates a Kolbe Academy Honors course.

If the student wishes to have the course distinguished on the transcript with a (K) as a Kolbe Academy Core course or with an (H) as a Kolbe Academy Honors course, please be sure to send the correct exams and components each quarter for verification as specified above. **If no designation on the transcript is desired, parents may alter the lesson plan and any written sample work is acceptable to receive credit for the course each quarter.** If you have any questions regarding what is required for the (K) or (H) designations or diploma type status, please contact the academic advisory department at 707-255-6499 ext. 5 or by email at [advisors@kolbe.org](mailto:advisors@kolbe.org).

**COURSE PLAN "AT A GLANCE" OUTLINE:****Core Algebra II (K)****Quarter 1**

Weeks 1-8: Chapters 1-1 to 4-6

Week 9: Quarter 1 Exam

**Quarter 2**

Weeks 1-8: Chapters 4-7 to 6-6

Week 9: Quarter 2 Exam

**Quarter 3**

Weeks 1-8: Chapters 6-7 to 7-6, 10-1 to 10-4, 9-1 to 9-6.

Week 9: Quarter 3 Exam

**Quarter 4**

Weeks 1-8: Chapters 7-7 to 8

Week 9: Quarter 4 Exam

**Honors Algebra II/Trigonometry (H)****Quarter 1**

Weeks 1-8: Chapters 1 to 5

Week 9: Quarter 1 Exam

**Quarter 2**

Weeks 1-8: Chapters 6 to 7-6, 10-1 to 10-4, 9-1 to 9-6

Week 9: Quarter 2 Exam

**Quarter 3**

Weeks 1-8: Chapters 7-7 to 8, and 13

Week 9: Quarter 3 Exam

**Quarter 4**

Weeks 1-8: Chapters 14 &amp; 15

Week 9: Quarter 4 Exam

**Please note that many chapters are not covered in their entirety. Be sure to refer to the course plan that follows for specific guidance.**

**COURSE PLAN METHODOLOGY:**

Mastery in mathematics is achieved through constant practice, so these course plans are written such that math is visited everyday (5 days/week). Each section, when assigned, is meant to be done in 1 day unless otherwise specified in the course plan. It is recommended that students keep to a 5 day/week schedule with mathematics despite the scheduling of their other courses.

The ***Do These Quickly*** problems (i.e. Q1-Q10) that appear at the beginning of the exercises with each lesson are meant to be completed in 5 minutes or less. Students should **not** write out all the steps neatly for these problems, but instead try to quickly write down the answer and move on. These problems are meant to recall concepts learned in previous courses (Geometry, Algebra I, and even basic mathematics) and in later chapters to review concepts learned in earlier portions of the book. Overall, these problems will help a student to think quickly, a skill that is useful in taking standardized tests, and will assist the student in remembering useful mathematical tools learned in the past. **These problems can be used as quiz grades, if desired.**

The ***Exercise Assignments*** for each section generally include odd numbered problems for both Core (K) and Honors (H) students. Most odd numbered problems are answered in the back of the student text to aid students in understanding whether they have understood the methodology of the problem. If additional work is needed, students may want to pick a few of the even numbered problems for further practice.

At the end of every chapter, a ***Chapter Review*** is assigned. The Chapter Review could be used as a test for the student. The Chapter Review questions, if used as a test, should be completed in less than one hour. During review week (Week 8 of each quarter), ***Chapter Tests*** are assigned from the book as a solid review for the student. Alternatively, parents could use these as actual Chapter Tests at the end of a chapter. It is not

recommended to use them as tests if the student is completing them during test week. Two sets of comprehensive **Quarterly Exams** are included at the end of the course plan: one set for Kolbe Core (K) students and a second set for Kolbe Honors (H) students. Please be sure to discard the exams you will not be using. A full two hours should be allotted for the student to complete Kolbe Academy's Quarterly Exams. All questions are taken from the Test bank provided by the author.

The **Graphing Calculator Supplement** is written into the course plan as they correspond with the appropriate sections. Solutions to the graphing calculator problems are provided in the Kolbe Academy Solution Manual to the Graphing Calculator Lab Manual. While it isn't absolutely essential for students to learn how to use a graphing calculator, it is preferable, especially in courses of Algebra II and beyond. Students need to know how to graph things on paper, but it is very useful to know how to appropriately use a graphing calculator for the more complex problems where graphing (or other calculations) would bog the student down with unnecessary busy work. Furthermore, the ACT and SAT both allow the use of a graphing calculator, so it can greatly benefit students to know some short cuts to aid them on the math portions of these exams.

The Graphing Calculator Lab Manual includes an overview of the functions of the TI-84. Kolbe has also provided the same overview in this course plan on page 30. The Texas Instruments (TI) graphing calculators are the most widely used by high school and college students and is the recommended calculator for this course. Note that the TI-83+ or TI-84 is highly recommended as it has far more capabilities than the earlier versions of the graphing calculator. Any special program or function will be outlined in the Texas Instruments Guidebook that comes with your calculator. Note that the TI-85 and TI-86 are set up quite differently from the TI-83, and 84. However, with a little independent study, these versions can also be used easily with the Graphing Calculator Lab Manual.

◆◆◆ FIRST QUARTER ◆◆◆

WEEK 1			
Core Algebra II (K)		Honors Algebra II/Trig (H)	
◆◆◆ Chapter 1 ◆◆◆ Preliminary Information		◆◆◆ Chapter 1 ◆◆◆ Preliminary Information	
Students should spend 2 days on section 1-3.			
1-1	Read Section 1-1. Do problems 1 – 9	1-1	Read Section 1-1. Do problems 1 – 9
1-2	Read Section 1-2. Do problems Q1-Q10, 1-9.	1-2	Read Section 1-2. Do problems Q1-Q10, 1-9.
1-3	Read Section 1-3. Do problems Q1-Q10, 1 – 23 (odd) on day 1. On day 2, do problems 25-42 (all).	1-3	Read Section 1-3. Do problems Q1-Q10, 1 – 37 (odd), 38 – 41
1-4	Read Section 1-4. Do problems Q1-Q10, 1 – 33 (odd)	1-4	Read Section 1-4. Do problems Q1-Q10, 1 – 33 (odd)
Some notes on polynomials: Polynomials can have no operations on the variable except for +, –, or x (add, subtract, or multiply). For example, $5x^2 + 8x + 6$ is a polynomial, but $5\sqrt{x} + 8x + 6$ is not. Other examples of polynomials: $2x$ (monomial, first degree); $x^2 + 6$ (binomial, second degree); $5x^4 + 2x + 1$ (trinomial, fourth degree). Note, a monomial is still considered a polynomial.			
		1-5	Read Section 1-5. Do problems Q1-Q10, 1-31 (odd), 34, 36 and lab assignment below.
		CALC	Read Appendix A and do Lab Worksheet 1-5.
<div style="border: 1px solid black; padding: 2px; display: inline-block;">Notes</div>			
WEEK 2			
Core Algebra II (K)		Honors Algebra II/Trig (H)	
1-5	Read Section 1-5. Do problems Q1-Q10, 1-21 (odd) on day one. On day 2, do 23-31 (odd), 34, 36 and the lab assignment below.	1-6	Read Section 1-6. Do problems Q1-Q10, 1-13 (odd), 19a, 21a, 21b, 23, 31 and the lab assignment below.
		CALC	Do Lab Worksheet 1-6A & 1-6B
CALC	Read Appendix A and Lab Worksheet 1-5.	1-8	Do R1, R2, R3 (a-c), and R4.
1-6	Read Section 1-6. Do problems Q1-Q10, 1-13 (odd), 19a on day 1. On day 2, do 10, 12, 21a, 21b, 23, 31 and lab worksheets below.	◆◆◆ Chapter 2 ◆◆◆ Functions and Relations	
		2-1	Read Section 2-1. Do problems 1-5.
CALC	Do Lab Worksheet 1-6A & 1-6B	2-2	Read Section 2-2. Do problems Q1-Q10, 1-15 (odd), 19

1-7	Read Section 1-7. Do problems Q1-Q10, 1-6, 7. Students should not get bogged down on this section. They are not expected to become expert theorem-provers after this section. But, we want students to be convinced that these properties <i>can</i> be proved.	2-3	Read Section 2-3. Do problems Q1-Q10, 1-11 (odd)
Notes			
<b>WEEK 3</b>			
<b>Core Algebra II (K)</b>		<b>Honors Algebra II/Trig (H)</b>	
Students should take two days each to do Section 2-2 and 2-3.		2-4	Read Section 2-3. Do problems Q1-Q10, 1-9 (odd), 11-26 (all).
1-8	Chapter 1 review. Do R1, R2, R3 (a-c), and R4.	Students should always keep in mind that if there is more than y-value that corresponds to the same x-value, then the relationship is not a function. The vertical line test is a good way to decipher this distinction. If a vertical line can be drawn anywhere on the graph in which it hits the line of the graph more than once, then it is not a function.	
<b>◆◆◆ Chapter 2 ◆◆◆ Functions and Relations</b>			
2-1	Read Section 2-1. Do problems 1-5 and the Calc worksheet below.		
CALC	Lab Worksheet 2-1		
2-2	Read Section 2-2. Do problems 1, 3, 5, 7, 13 & 15 on day one. Do problems 9, 11, 19 on day 2 as well as the lab worksheet below.		
CALC	Lab Worksheet 2-2.	CALC	Lab Worksheet 2-4
		2-5	Do problems R1, R2, R3
		<b>◆◆◆ Chapter 3 ◆◆◆ Linear Functions</b>	
CALC	Lab Worksheet 2-2.	3-1	Read Section 3-1. Do problems 1-3.
2-3	Read Section 2-3. Do problems Q1-Q10, 1-11 (odd).	3-2	Read Section 3-2. Do problems Q1-Q10, 1-21 (odd), 22, 23-25.
		CALC	Lab Worksheet 3-2A & 3-2B
		3-3	Read Section 3-3. Do problems Q1-Q10, 1-13 (odd).
		3-4	Read Section 3-4. Do problems Q1-Q10, 1, 5, 9, 15-25 (odd), 28, 31, 34.
Notes			