TEXAS TECH UNIVERSITY
TTU K-12

Algebra (ALG) 2B
Syllabus

Course Name

ALG 2B

Algebra II – Semester B

Course Information

ALG 2B is the second semester of this two-semester course.

Welcome to Algebra 2B! Algebra 2 is a continuation of Algebra 1, and you will have opportunities to extend your knowledge. In this second half of Algebra 2, you will study polynomial, radical, exponential, logarithmic, and rational functions. You will continue to use graphing technology to problem solve and analyze mathematical relationships.

This course has a total of five lessons. At the end of each chapter, you will find *Chapter Review, Chapter Test,* and *Standards Assessment* sections for that chapter in the textbook. These sections at the end of each chapter will serve as a great review for the final. These study tools should calm your nerves about the final exam.

You need to keep a positive attitude, study hard, read all assignments in your textbook and course, and never be afraid to ask for help or clarification. Your textbook and this course are meant to be used together. Do not attempt to work the assignment problems without reading the assigned section(s) in the textbook and corresponding discussion in the course.

In the “Instruction” portion of each section, I have also provided extra examples from the Teaching Edition, the supplement that teachers use in classrooms. You won’t see these problems in your textbook. The extra problems will give you more opportunities to see how concepts work as you study the chapter examples. I’ve provided solutions to these extra problems in the course.

Course Delivery Method

Online

Contacting Your Instructor

You may contact your instructor through the Blackboard messaging system. Technical support is available 24/7 at www.k12.ttu.edu.

Course Objectives

After completing this course, you should be able to:

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;
7. display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication;
8. graph the functions $f(x)=\sqrt{x}$, $f(x)=\frac{1}{x}$, $f(x)=x^3$, $f(x)=\sqrt[3]{x}$, $f(x)=b^x$, $f(x)=|x|$, and $f(x)=\log_b(x)$ where *b* is 2, 10, and *e*, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval;
9. graph and write the inverse of a function using notation such as $f^{-1}(x)$;
10. describe and analyze the relationship between a function and its inverse (quadratic and square root, logarithmic and exponential), including the restriction(s) on domain, which will restrict its range;
11. use the composition of two functions, including the necessary restrictions on the domain, to determine if the functions are inverses of each other;
12. determine the effect on the graph of $f(x)=\sqrt{x}$ when $f(x)$ is replaced by $af(x)$, $f(x)+d$, $f(bx)$, and $f(x-c)$ for specific positive and negative values of *a, b, c,* and *d*;
13. formulate quadratic and square root equations using technology given a table of data;
14. solve quadratic and square root equations;

15. identify extraneous solutions of square root equations;
16. determine the effects on the key attributes on the graphs of $f(x) = b^x$ and $f(x) = \log_b(x)$ where *b* is 2, 10, and *e* when $f(x)$ is replaced by $af(x)$, $f(x)+d$, and $f(x-c)$ for specific positive and negative real values of *a, c,* and *d*;
17. formulate exponential and logarithmic equations that model real-world situations, including exponential relationships written in recursive notation;
18. rewrite exponential equations as their corresponding logarithmic equations and logarithmic equations as their corresponding exponential equations;
19. solve exponential equations of the form $y = ab^x$ where *a* is a nonzero real number and *b* is greater than zero and not equal to one and single logarithmic equations having real solutions;
20. determine the reasonableness of a solution to a logarithmic equation;
21. analyze the effect on the graphs of $f(x) = x^3$ and $f(x) = \sqrt[3]{x}$ when $f(x)$ is replaced by $af(x)$, $f(bx)$, $f(x-c)$, and $f(x)+d$ for specific positive and negative real values of *a, b, c,* and *d*;
22. solve cube root equations that have real roots;
23. analyze the effect on the graphs of $f(x) = \frac{1}{x}$ when $f(x)$ is replaced by $af(x)$, $f(bx)$, $f(x-c)$, and $f(x)+d$ for specific positive and negative real values of *a, b, c,* and *d*;
24. formulate rational equations that model real-world situations;
25. solve rational equations that have real solutions;
26. determine the reasonableness of a solution to a rational equation;
27. determine the asymptotic restrictions on the domain of a rational function and represent domain and range using interval notation, inequalities, and set notation;
28. formulate and solve equations involving inverse variation;
29. add, subtract, and multiply complex numbers;
30. add, subtract, and multiply polynomials;
31. determine the quotient of a polynomial of degree three and of degree four when divided by a polynomial of degree one and of degree two;
32. determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods;
33. determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping;
34. determine the sum, difference, product, and quotient of rational expressions with integral exponents of degree one and of degree two;
35. rewrite radical expressions that contain variables to equivalent forms;
36. solve equations involving rational exponents;

37. write the domain and range of a function in interval notation, inequalities, and set notation;
38. analyze data to select the appropriate model from among linear, quadratic, and exponential models;
39. use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a given set of data; and
40. predict and make decisions and critical judgments from a given set of data using linear, quadratic, and exponential models.

ALG II addresses the required Texas Essential Knowledge and Skills (TEKS). These can be found at the Texas Education Agency website.

Textbook and Materials

Textbook(s)

The required digital textbook for this course is:

- Larson, R., & Boswell, L. (2015). *Big Ideas Math, Algebra 2.* Erie, PA: Big Ideas Learning, LLC. ISBN 978-1-68033-249-0.

This digital textbook can only be purchased through the TTU K-12 partner bookstore. You can find the link to the bookstore on the TTU K-12 website. Once you have purchased the digital textbook, you will receive a username and password via email. You will log in to Big Ideas Math to access your textbook.

Before you begin your course, take a few minutes and review the *Help* section in the upper right corner of your textbook dashboard. This section provides several resources that will teach you how to navigate your digital textbook.

Open the *Student Dynamic eBook*. This will provide you with all of the information that you will need for the course. This textbook was designed and chosen so that you can actively participate in your learning with your digital text, explore concepts, take notes, and answer practice questions in your digital textbook.

Big Ideas Math Algebra 2 is a research-based program that provides a rigorous, focused, and coherent curriculum. You will be encouraged to think and to make conjectures while explaining your thinking. I encourage you to look through your textbook and become familiar with the layout. Pages xvi, xviii, and xvix in your book explain how to use your math book. Be sure to read this before beginning the course.

Each chapter begins with “Maintaining Mathematical Proficiency” and “Mathematical Thinking.” Each section begins with an essential question and explorations. After that, the lesson concepts and examples are explained. Exercises follow. For extra practice in any chapter, use your *Online Resources, Skills Review Handbook,* or your *Student Journal*.

Other Required Materials

- pencils and erasers
- spiral notebook or paper to write down notes
- straight-edge (ruler)
- graphing calculator

PDF Assignments

You will submit all lessons for this course electronically. Your work for each lesson will need to be saved as a PDF in order to submit the lesson for grading. See **Requirements for Creating PDFs** in the Syllabus section of your course for information on PDF-creation options.

Be sure to follow the instructions below when preparing your lesson assignments for grading.

- Complete your work in pencil. Make sure the pencil mark is dark enough that it can read by a scanner or photographed.

- Begin each lesson's assignment on a clean sheet of notebook paper.

- Show your work process **down** your paper, **not across**. However, you may make two columns. **Do not write on the back of your paper.**

- Skip a line after each problem, and circle your answer(s).

- When you have completed the assignment, scan it or take a photograph of the pages and assemble the images into a ***single* PDF** to submit for grading (see **Requirements for Creating PDFs** in the Syllabus section of your course for information on PDF-creation options). Instructions are included in each lesson.

- Don't go too fast through a lesson or you will miss important information. *Don't forget—math takes time and practice, so don't give up!*

You will find a **Sample Lesson Assignment** in the **Resources** section of this course. Look at this sample before you begin Lesson One. Refer to it each time you begin a lesson until you are familiar with the format.

Technical Requirements

- Internet access – preferably high speed (for accessing Blackboard)
- Email
- Word processing software such as Microsoft Word

- Adobe Reader (download from Adobe.com)
- Audio and video capabilities (for watching/listening to course content)
- PDF app (free options available)

Technical Skill Requirements

Be comfortable with the following:

- using a word processor
- Internet search engines and browsers
- creating PDFs (see **Requirements for Creating PDFs** in the Syllabus section of your course)

Course Organization

This course consists of five lessons and a final examination. Each lesson is broken into multiple sections. Within each section, you will usually have an **Introduction**, **Exploration**, and **Communicate Your Answer** questions, an **Instruction** section, **Monitoring Progress** questions, and a section **Assignment**..

Each lesson contains the following:

- Introduction and Instructions
- Learning Objectives
- Learning Activities
- Assignments

Each lesson includes several activities that present content knowledge. Each lesson also includes multiple graded assignments to ensure that you learn the content that has been presented in the activities. Be sure you read all instructions carefully and ask your instructor for help if something is not clear.

Course Outline

Please note that some assignments will be hidden from you when you start the course. As you move through the lessons and complete assignments, more will unlock for you.

Lesson	Topic	Approximate Time for Completion
Lesson 1	Polynomial Functions	Three weeks
Lesson 2	Rational Exponents and Radical Functions	Three weeks
Lesson 3	Part 1: Exponential and Logarithmic Functions	Three weeks

Lesson	Topic	Approximate Time for Completion
Lesson 4	Part 2: Exponential and Logarithmic Functions	Three weeks
Lesson 5	Rational Functions	Four weeks
Final Exam		

Assignment Schedule

Each of the following must be completed to complete the course. Items with an asterisk (*) indicate that these are summative assessments for the course.

Lesson	Weeks	Assignments
1	1-3	Checkpoint 1 (Non-graded) Section 5-1 Assignment Upload Section 5-2 Assignment Upload Section 5-3 Assignment Upload Section 5-4 Assignment Upload Section 5-5 Assignment Upload Section 5-6 Assignment Upload Section 5-7 Assignment Upload Section 5-8 Assignment Upload Section 5-9 Assignment Upload *Chapter 5 Exam
2	4-6	Section 6-1 Assignment Upload Section 6-2 Assignment Upload Section 6-3 Assignment Upload Section 6-4 Assignment Upload Section 6-5 Assignment Upload Section 6-6 Assignment Upload *Chapter 6 Exam
3	7-9	Section 7-1 Assignment Upload Section 7-2 Assignment Upload Section 7-3 Assignment Upload Section 7-4 Assignment Upload Checkpoint 2 (Non-graded)

Lesson	Weeks	Assignments
4	10-12	Section 7-5 Assignment Upload Section 7-6 Assignment Upload Section 7-7 Assignment Upload *Chapter 7 Exam
5	13-16	Section 8-1 Assignment Upload Section 8-2 Assignment Upload Section 8-3 Assignment Upload Section 8-4 Assignment Upload Section 8-5 Assignment Upload *Chapter 8 Exam Checkpoint 3 (Non-graded)
		Final Exam

Course Credit

The course grade will be calculated as follows:

- 50% coursework average;
- 50% summative assessment average, including the final exam;
- A passing course grade is 70 or higher.

Students must attempt all assignments in the course. The final exam will not be available until all assignments have been accepted and graded by the teacher.

Students who score below 70% on the final exam will be eligible for one re-exam opportunity.

Coursework

The graded assignments within each lesson are formative in nature. This means that they are designed to assist you in applying and demonstrating the lesson concepts, as well as identifying areas in which you need additional review. You may use all the lesson's learning activities to assist you as you complete the graded assignments.

Summative Assessments

Summative assessments are those that allow you to demonstrate mastery of the course objectives. For summative assessments, you will NOT be allowed to use the learning materials. These are opportunities for you to show what you have learned by that point in the course. Summative assessments may be proctored using the online proctoring system Proctorio. Information about Proctorio is provided in **Remote Proctoring** in the Syllabus section of your course. The summative assessments for this course are as follows:

- Summative Assessments **(20% of Course Grade)**
    - Chapter 5 Exam (52 points)
    - Chapter 6 Exam (44 points)
    - Chapter 7 Exam (40 points)
    - Chapter 8 Exam (42 points)
- Summative Final Exam **(30% of Course Grade)**

Course Completion

- Students may not complete the course in less than 30 days.
- All courses expire six months after the enrollment date.

Academic Integrity

It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension.

"Scholastic dishonesty" includes, but is not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act.

Student Expectations

You will be expected to log into the Blackboard course regularly to be aware of possible announcements/reminders and to pace your progress in the course.

Students are expected to maintain an online environment conducive to learning, which includes "netiquette" (Internet etiquette). Please review the basic rules for Online Discussion Netiquette. Ensure that your email messages, discussion board postings, and other electronic communications are thoughtful and respectful. Diverse opinions are welcome in this course, and you are expected to demonstrate an open mind and courtesy when responding to the thoughts and ideas of others.

The following are prohibited:

- making offensive remarks in email or the discussion board;
- using inappropriate language or discussing inappropriate topics online;
- spamming;
- hacking;
- using TTU or Blackboard email or discussion boards for commercial purposes;
- using all caps (considered shouting in online communications); and
- cyber-bullying or online harassment of any type.

Inappropriate behavior shall result in consequences ranging from a request to correct the problem, to removal from the course or even the university, depending on the severity of the behavior. Disciplinary actions will be taken according to the TTU K-12 Student Handbook.

Communication

- You can expect a reply from your instructor within 2 business days.
- Use the Blackboard Course Messages tool for sending messages to your instructor.

Submitting Assignments

You will submit all assignments through the Blackboard Assignment Tool, rather than by mail or email.

Technical Difficulties

Getting Help

For student assistance with Blackboard, visit TTU K-12 Support.

Computer Problems

A working computer is necessary for online coursework. Computer problems will not be accepted as a valid reason for failure to complete course activities within the allotted time frame. Identify a second computer, before the course begins, that you can use if you experience computer problems.

Server Problems

When the Blackboard server needs to be taken down for maintenance, the Blackboard administrator will post an announcement in your course informing you of the time and date. If the server experiences unforeseen problems, your course instructor will notify you.

Lost or Corrupted Files

You must keep/save a copy of every project/assignment on an external disk or personal computer. In the event of any kind of technology failure (e.g., Blackboard server crash or virus infection, students' own computer problems, loss of files in cyberspace, etc.) or any disputes, the instructor may request or require you to resubmit the files. In some instances, the instructor may need to open another attempt within Blackboard, so communication with your instructor is critical in these circumstances.