SUPERCHARGED MATH

Algebra 2

A STEM-based Math Course for High School Students
taught by Engineers & Scientists

This Algebra 2 course is designed for homeschool families who want more than just worksheets and textbook problems. While students will master the traditional high school concepts—like quadratic equations, systems of equations, polynomials, and logarithmic functions—they'll also use these skills to solve real-world problems through hands-on STEM labs and discovery-based projects.

This course is taught by real engineers and scientists who are passionate about their field to engage with students and bring to life the complex concepts in Algebra. From modeling roller coaster paths to analyzing signal strength and flight paths, students apply what they're learning in meaningful ways that show how math connects to science, engineering, and everyday life. This course provides a solid academic foundation while encouraging students to think critically, work independently, and explore how math works in the real world.

Contents

Welcome to Algebra 2!

We're so glad you're here! This course was created to make Algebra 2 not just understandable, but genuinely interesting and applicable to the real world. Whether your student is a math enthusiast or someone who's still building confidence, they'll find plenty of support, encouragement, and engaging activities here. We blend traditional problem-solving with hands-on STEM projects, data-based discoveries, and real-world math challenges to help students see why the math works—not just how. Our goal is to build strong thinkers, not just calculators. With flexible lessons, real-time support, and a clear learning path, this course is designed to work for homeschool families just like yours. We're excited to dive in and explore together!

Instructor Information

Instructor: Aurora Lipper
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Aurora Lipper is an astronomer, mechanical engineer, and science educator with over 25 years of teaching experience. She holds a Master's degree in Mechanical Engineering with a focus on gas dynamics and complex fluid flow for high performance jet engines. Aurora has taught engineering courses at the university level and currently serves as a guest lecturer for local high schools and Cal Poly State University.

She is the founder of *Supercharged Science*, an award-winning STEM curriculum used by thousands of homeschool families and charter schools. Aurora is also the president of the Central Coast Astronomy Society, where she leads public star parties, telescope demonstrations, and community science outreach. In 2025, she was appointed a NASA/JPL Solar System Ambassador in recognition of her efforts to bring astronomy to wider audiences. Aurora is the author of *Astronomy Activities for Kids* (Penguin Random House, 2021), a bestselling book with over 1,000 five-star reviews. She brings her passion for space, teaching, and hands-on learning into every lesson to spark curiosity and confidence in her students.

Course Description

Algebra 2 continues the journey from foundational algebra into more advanced topics, including functions, polynomials, rational expressions, logarithms, and trigonometry. This course emphasizes conceptual understanding, problem-solving, and how algebra connects to real-world applications in science, engineering, and everyday life. Students will develop mathematical fluency while building the skills and confidence needed for upper-level math courses like Precalculus and beyond.

Course Overview

What this Course Covers

✔ Functions

- **Polynomial, Rational, Radical Functions** Covered through factoring, solving, graphing, and applications of polynomial and rational functions
- **Exponential and Logarithmic Functions** Thoroughly covered, including properties, solving equations, and modeling real-world growth/decay scenarios
- **Piecewise and Step Functions** Introduced and practiced with graphing and application tasks
- **Inverse Functions** Included through lessons on reflection, inverse relationships, and solving for inverse algebraically
- **Transformations of Functions** Shifts, stretches, reflections for all core parent functions are explored through graphing and discovery-based labs

✔ Number & Quantity

- **Complex Numbers** Covered through operations, solving quadratics, and imaginary unit
- **Radicals and Rational Exponents** Covered with simplification, operations, and solving radical equations

✔ Algebra

- **Solving Quadratic, Polynomial, Rational, and Radical Equations** Includes factoring, completing the square, quadratic formula, and using multiple strategies
- **Systems of Equations and Inequalities** Includes 2- and 3-variable linear systems, nonlinear systems, and applications
- **Absolute Value Equations & Inequalities** Covered with graphing, real-world problem solving, and analysis of solution sets

✔ Modeling

- **Use of Real-World Problems and Data Analysis** Each unit is paired with hands-on applications, STEM discovery projects
- **Mathematical Modeling in Context** Emphasis on interpreting, building, and applying functions to represent authentic scenarios

✔ Statistics & Probability (Basic Introduction)

- **Analyzing graphs & trends**
- **Using real data sets** (especially in STEM-based labs)
- **Basic probability & statistical literacy**

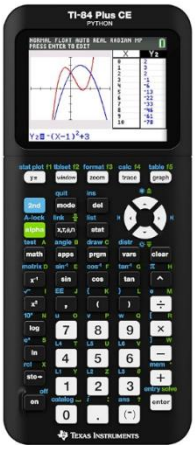
(Please refer to last page for Common Core alignment.)

Materials Required

- **3-ring binder with 5 dividers** (2-2 ½" size recommended) Students will use this binder as their main organizer for coursework and handouts. Insert the syllabus and schedule before the first divider tab with blank paper (lined and graph) underneath. Suggested divider tabs for your binder are as follows:

    1. **Notes & Reading** – daily lesson notes on reading, examples, and key concepts
    2. **Homework** – completed assignments and practice problems
    3. **Quizzes/Tests** – study guides, test prep, quizzes and chapter tests
    4. **Labs & Projects** – STEM activities, capstone projects, lab instructions
    5. **Reference** – cheat sheets, formula lists, vocabulary, reference materials

- Graph paper (four square inches per inch), 3-hole punched for binders
- Lined Paper (college or wide ruled) in a binder
- Ruler (cm & inches) and protractor
- Pencils and erasers
- Text: Algebra & Trigonometry, 11 ed by Sullivan
- Ti-84 Graphing Calculator
- Software: Desmos (free)



Prerequisites

This is a hands-on, project-based Algebra 2 course focused on real-world applications, taught by instructors who actually use math in their daily work. Students should have completed Algebra 1 and High School Geometry before enrolling. Additional expectations:

- **Take the** Algebra 2 Readiness Test
- **Be able to read and understand** high school–level textbooks, including sample problems, diagrams, and data
- **Be ready for independent learning**—managing weekly assignments, reading, and projects
- **Bring curiosity and commitment**—we'll explore how math applies to science, engineering, and everyday life

And don't worry—if math isn't your favorite subject or you don't feel confident with it, you're still absolutely welcome! We'll walk through the math step-by-step together, and there's plenty of room for asking questions, building confidence, and learning by doing. All students with an interest in engineering, space or the natural sciences will find themselves right at home.

Recommended Math Skills for This Course

✅ **Algebra 1 Foundations**

- Solving multi-step linear equations and inequalities
- Understanding and using slope-intercept and point-slope form (y = mx + b)
- Simplifying and factoring polynomials
- Working with rational expressions (fractions with variables)
- Rearranging formulas to isolate a variable

✅ **Operations with Exponents & Radicals**

- Applying the laws of exponents (product rule, quotient rule, power rule)
- Simplifying square roots and other radicals
- Understanding how to rewrite expressions with fractional exponents

✅ **Coordinate Graphing & Functions**

- Plotting points on the coordinate plane
- Graphing linear equations and inequalities
- Identifying domain, range, and intercepts
- Understanding the concept of a function and using function notation $f(x)$

✅ **Geometry Connections**

- Using the Pythagorean Theorem
- Working with right triangle trigonometry basics (sine, cosine, tangent)
- Understanding basic geometric shapes and their properties (especially circles and parabolas)

✅ **Problem Solving & Mathematical Reasoning**

- Translating real-world problems into algebraic expressions or equations
- Using tables, graphs, and equations to represent relationships
- Applying logic and reasoning to multi-step word problems

✅ **Calculator & Graphing Skills (helpful but not required)**

- Using a graphing calculator or graphing tool to plot functions
- Tracing and analyzing function behavior
- Checking solutions graphically

If your student has successfully completed Algebra 1, they'll be ready for this course. We'll also review key concepts as we go. The focus is on using math to solve real problems—not just memorizing steps—so students develop a true understanding of how Algebra 2 connects to the world around them.

How this Course Works

Lessons with a teacher are about 30 minutes long twice per week. Lessons are completed fully before moving on to the next lesson. Math homework should take 30-60 minutes each day in addition to the class lesson, so plan to spend 30-90 minutes on math each day, five days every week. Do not skip a day.

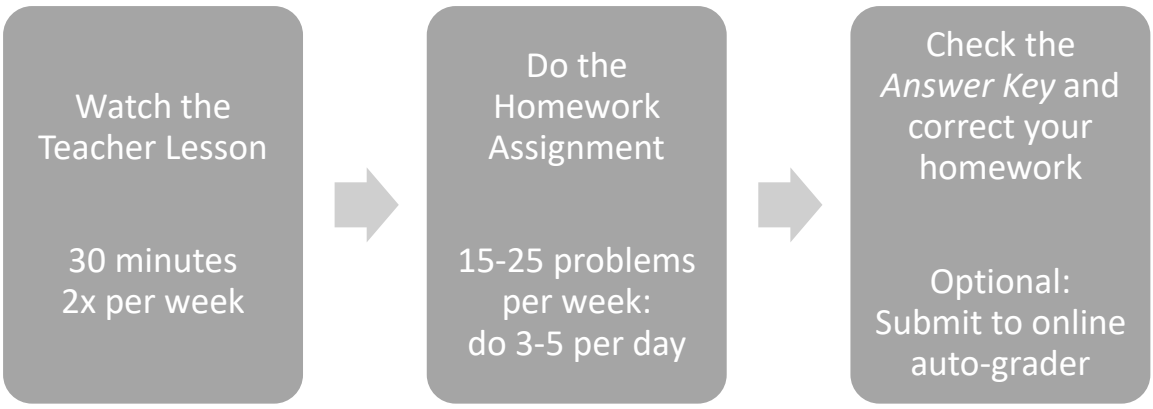
During the Math Lesson:

- First 5-10 minutes: teacher introduces a new math concept
- Next 10-20 minutes: students take notes in class while the teacher is demonstrating the skill through example problems
- Final 10-20 minutes: students start on the homework so the teacher can answer questions before they leave class for the day (in live class).

After Math Lesson:

- Students continue to work on homework immediately following class
- *Optional:* Students may attend the Study Hall with a teacher
- Students continue with assignments on days without a teacher lesson (these will be homework assignments of exercises, projects, and activities)
- Important: don't cram, and only do one lesson each day. Don't double-up and don't rush. Students should feel relaxed enough to think about assignments and relating math concepts to those already learned.

How to not fall behind: Look at the total number of problems due for the assignment, and divide it up so you are working on math each day. Do not leave it to the night before.



Course Format

This course blends rigorous math content with engaging, hands-on learning experiences tailored specifically for high school homeschoolers—whether your student loves math or needs a little extra inspiration to stick with it.

Each week includes:

- **Math Class Session (2x/week):** Classes are led by an experienced teacher who breaks down tough concepts using guided instruction, visual demonstrations, and collaborative lab activities. Students are encouraged to ask questions, participate in discussion, and take ownership of their learning. Lessons are designed to be interactive—not just lectures—and build a deep understanding of Algebra 2 topics. Students are expected to come prepared, having reviewed the assigned material ahead of time. If classes are taught live, students always have access to the recordings after class.
- **Weekly Assignments:** Homework is thoughtfully designed to reinforce the key concepts covered in class—no busywork here. Students complete textbook-based practice, weekly review quizzes, and targeted reflection exercises that build problem-solving confidence and mathematical reasoning.
- **Lab Activities & Projects:** Labs are where math comes to life. Students use algebraic concepts in real-world scenarios—designing roller coaster paths, modeling drone flight, or optimizing city traffic lights—to see how math is used by engineers, scientists, and data analysts. Some labs are quick and hands-on, while others unfold over several weeks, leading to a final capstone project at the end of the year. Labs are inquiry-based, fun, and designed to spark curiosity while developing critical thinking skills.
- **Optional Study Hall (1x/week):** This dedicated hour-long session is a drop-in time where students can ask questions, get clarification, or work quietly with teacher support available. It's especially helpful for students who need a little extra time to master tricky concepts or want help preparing for tests. No new material is taught—just support, encouragement, and answers when they're needed most from a real teacher.

What Makes This Course Different:

- Built with homeschoolers in mind—flexible, structured, and supportive
- STEM-focused labs that connect Algebra 2 to real-world careers
- Accessible to all levels—whether your student is college-bound or building confidence in math
- Live support and real community—students don't just learn, they belong
- Parent-friendly tools—including grading rubrics, pacing guides, and support for tracking progress

This flexible yet structured format is designed to build deep understanding while allowing room for creativity, curiosity, and student-led exploration. It's a full high school Algebra 2 credit—taught in a way that finally makes sense.

Course Objectives & Learning Goals

This course is designed to deepen students' understanding of algebra while building the problem-solving, logical reasoning, and mathematical modeling skills used by scientists, engineers, and professionals in STEM fields. By the end of this course, students will be able to:

- Master advanced algebraic concepts, including functions, polynomials, rational expressions, radicals, and exponential and logarithmic equations.
- Analyze and interpret real-world problems using systems of equations, inequalities, and mathematical modeling techniques.
- Understand and apply key function concepts, including domain, range, composition, and transformations, using multiple representations (graphical, numerical, algebraic, and verbal).
- Work with complex numbers and imaginary solutions to extend their understanding of the number system.
- Use graphing technology and hands-on tools to explore patterns, test conjectures, and visualize mathematical relationships.
- Design and complete STEM-based labs and projects that show how algebra is used in real-life scenarios—from drone delivery paths to traffic light coordination.
- Develop precision in mathematical communication through written explanations, collaborative problem solving, and presentations.
- Grow in confidence as an independent learner by practicing goal-setting, study strategies, and reflection techniques that prepare them for future success in math, science, and technical careers.

More than just solving equations, students will gain a stronger sense of how math connects to the world around them—learning to think like a mathematician, problem-solver, and innovator.

Course Scope & Sequence

Date	Week	Topic	Ch.	Topic	HW	Lab Project
9/08	1	Ch. 1: Equations & Inequalities	1.1	Linear Equations	#1	
			1.2	Quadratic Equations		
9/15	2		1.3	Complex Numbers	#2	
			1.4	Radical Equations		
9/22	3		1.5	Solving Inequalities	#3	
			1.6	Absolute Value		
9/29	4	Ch. 2: Graphs	2.1	Distance & Midpoint	#4	
			2.2	Graphs of Equations		
10/06	5		2.3	Lines	#5	
			2.4	Circles		
10/13	6		2.5	Variation	#6	
			p.197	Review & Test #1		
10/20	7	Ch. 3: Functions & Graphs	3.1	Functions	#7	
			3.2	Graphs		
10/27	8		3.3-3.4	Properties of Functions	#8	
			3.5	Transformations		
11/03	9		3.6	Building Functions	#9	
			p. 273	Review & Test #2		
11/10	10	Ch. 4: Linear & Quadratic Functions	4.1	Linear Function Properties	#10	
			4.2	Building Models from Data		
11/17	11		4.3	Quadratic Functions	#11	
			4.4	Building Models from Data		
11/24	12		4.5	Quadratic Inequalities	#12	
			p. 329	Review & Test #3		
12/02		Exam #1	p. 325	Full Review (Chapters 1-4)		

(Scope and Sequence continued from previous page.)

Date	Week	Topic	Ch.	Topic	HW	Lab Project
1/05	13	Ch. 5: Polynomial & Rational Functions	5.1	Polynomial Functions	#13	
			5.2	Graphing Polynomials		
1/12	14		5.3	Rational Functions	#14	
			5.4	Graphing Rational Functions		
1/19	15		5.5	Inequalities	#15	
1/26	16		5.6	Real Zeros	#16	
			5.7	Complex Zeros		
2/02	17		p. 408	Review & Test #4	#17	
2/09	18	Ch. 6: Exponential & Logarithmic Functions	6.1	Composite Functions	#18	
			6.2	Inverse Functions		
2/16	19		6.3	Exponential Functions	#19	
2/23	20		6.4	Logarithmic Functions	#20	
3/02	21		6.5	Properties of Logarithms	#21	
3/09	22		6.6	Logs & Exp Functions	#22	
3/16	23		6.7-6.9	Modeling with Data	#23	
				Review & Test #5		
3/23	*No class due to Spring Break!*					
3/30	24	Ch. 12: Systems of Equations & Inequalities	12.1	Systems of Linear Equations	#24	
4/06	25		12.2	Matrices	#25	
4/13	26		12.3	Determinants	#26	
4/20	27		12.4	Matrix Algebra	#27	
4/27	28		12.5	Partial Fraction Decomposition	#28	
5/04	29		12.6	Systems of Nonlinear Equations	#29	
5/11	30		12.7	Systems of Inequalities	#30	
5/18		Exam #2	p. 957	Review & End of year Exam		

How to do this Course

Weekly Routine to Stay on Track

To succeed in this course, it's important to build strong math habits. Here's your guide so you always know what to do—and never fall behind. Don't rush and don't cram—use this plan to stay on track.

📖 Before Class (preferably 1–2 days before)

- Read the assigned textbook section for the upcoming lesson (listed in the schedule)
- Skim example problems and think about where you might get stuck
  📂 File this under your **Notes & Reading** binder section

👩‍🏫 During the Class Lesson

- Take notes during the lesson (don't worry if they are a bit messy)
- Ask questions—we want to help you understand, not just watch!
  📂 File these in your **Notes & Reading** section

✏️ Immediately After the Class Lesson

- Rewrite your notes so they are organized and easy to understand
- Do the sample problems from the textbook and 📂 File this in **Notes & Reading**

- Begin the assigned **homework problems** (skip any that stump you)
  📂 File your homework in the **Homework** section

📆 Continue to Work on Assignments Every Day (until finished)

- Finish your weekly **homework assignment** (including more difficult ones you skipped)
- Review vocabulary, key formulas, and example problems
- Reach out for help if needed—ask questions during Study Hall or by email
  📂 Keep updated work in the **Homework & Quizzes** section

🧪 The Day Before Class – Quiz + Assignments Due

- Submit your completed **homework** to the autograder and record your score
- Take the **weekly quiz** from the textbook to check your understanding
- Wrap up any lab activities and projects
  📂 File your quiz in **Quizzes/Tests** and project/lab work in **Labs & Projects**

Step-by-Step Guide on How to Stay on Track

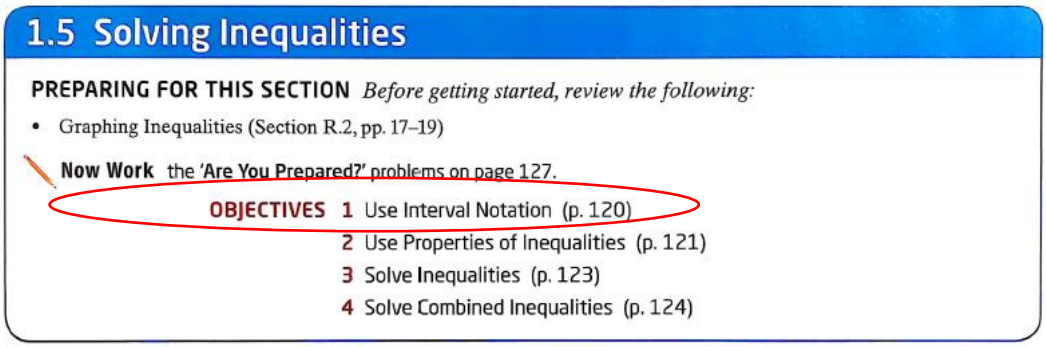
Math is not just about getting the right answer—it's about showing the reasoning behind it in a way others can understand. Your teacher will expect you to work strategically through the course, and mastering these concepts will be much easier when you use a prepared weekly structure:

📚 Step 1: Read the Material *BEFORE* Class

BEFORE the Math Lesson, open your textbook to the section you are about to have a lesson on with the teacher. For example, in Week 3, we're in sections 1.5 and 1.6 (circled in red):

Date	Week	Ch.	Topic	HW
9/08	1	1.1	Linear Equations	#1
		1.2	Quadratic Equations	
9/15	2	1.3	Complex Numbers	#2
		1.4	Radical Equations	
9/22	3	1.5	Solving Inequalities	#3
		1.6	Absolute Value	

Open your textbook, find section 1.5. Look over the *blue box* and follow the instructions. This is an example:



1.5 Solving Inequalities

PREPARING FOR THIS SECTION *Before getting started, review the following:*

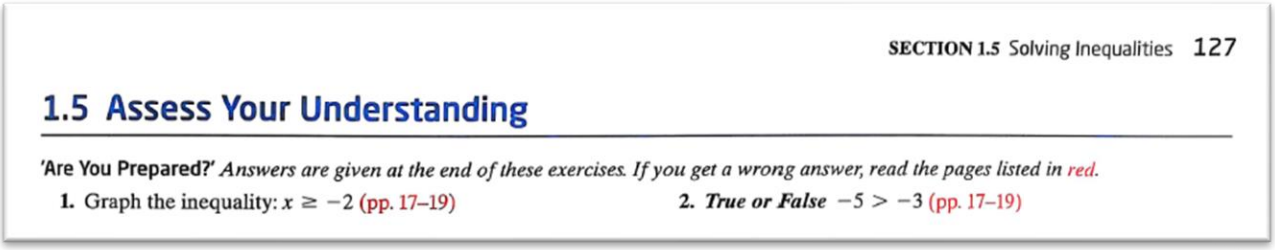
- Graphing Inequalities (Section R.2, pp. 17–19)

Now Work the 'Are You Prepared?' problems on page 127.

OBJECTIVES 1 Use Interval Notation (p. 120)
2 Use Properties of Inequalities (p. 121)
3 Solve Inequalities (p. 123)
4 Solve Combined Inequalities (p. 124)

In the above example, you would go to pages 17-19, read it and copy down the example problems from those pages into your notebook.

Now go the problems on page 127 in the section circled in red: *"Are You Prepared?"*



SECTION 1.5 Solving Inequalities 127

1.5 Assess Your Understanding

'Are You Prepared?' *Answers are given at the end of these exercises. If you get a wrong answer, read the pages listed in red.*

1. Graph the inequality: $x \geq -2$ (pp. 17–19)
2. ***True or False*** $-5 > -3$ (pp. 17–19)

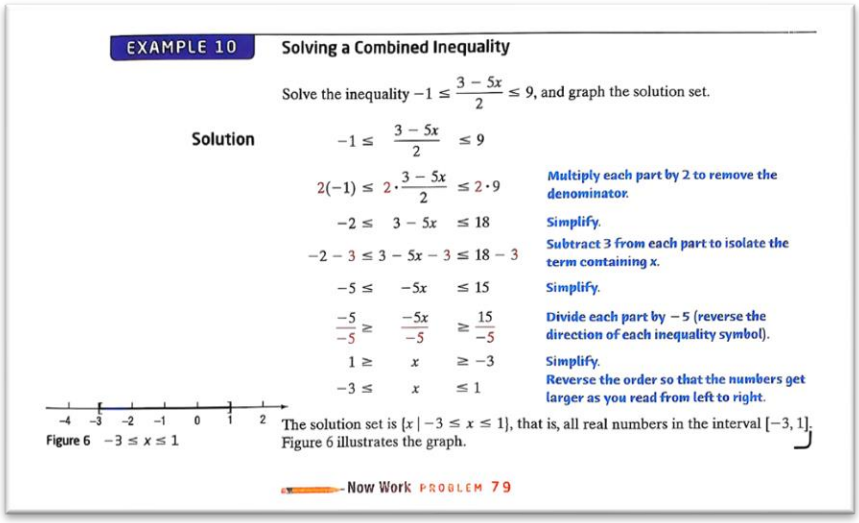
File these in your **Notes & Reading** binder sections.

Step 2: Math Lesson - Which is better for you? Choose one:

You can either **do the math lesson with the teacher *first*** and then do the steps below, *OR* you can **do the steps below and *then* take the teacher lesson**.

Which should you do? This depends on your preference for learning new information – some students prefer to read about a concept first, take notes on example problems, and then they ask their questions during the lesson with the teacher. Others prefer to wait for the teacher to explain it, and then explore the example problems in the book and take detailed notes after class. It's up to you.

1. Open your textbook to the appropriate section, and copy down every example problem from that section into your notebook. The act of writing down is important… don't just read it, **write in your notebook!**



EXAMPLE 10 Solving a Combined Inequality

Solve the inequality $-1 \le \frac{3-5x}{2} \le 9$, and graph the solution set.

Solution

$$-1 \le \frac{3-5x}{2} \le 9$$

$2(-1) \le 2 \cdot \frac{3-5x}{2} \le 2 \cdot 9$ — Multiply each part by 2 to remove the denominator.

$-2 \le 3-5x \le 18$ — Simplify.

$-2-3 \le 3-5x-3 \le 18-3$ — Subtract 3 from each part to isolate the term containing x.

$-5 \le -5x \le 15$ — Simplify.

$\frac{-5}{-5} \ge \frac{-5x}{-5} \ge \frac{15}{-5}$ — Divide each part by −5 (reverse the direction of each inequality symbol).

$1 \ge x \ge -3$ — Simplify.

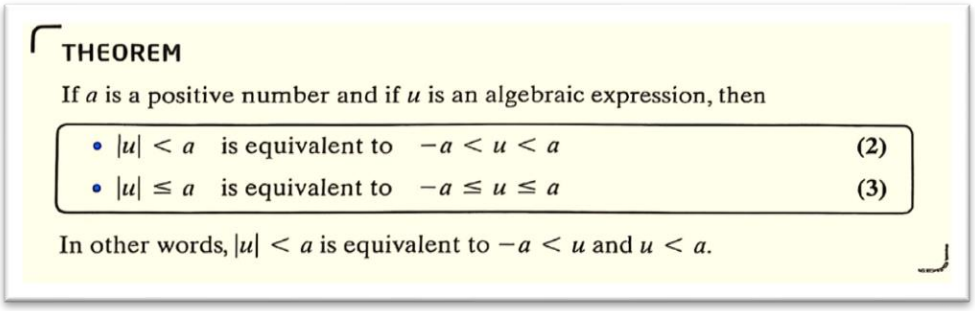
$-3 \le x \le 1$ — Reverse the order so that the numbers get larger as you read from left to right.

Figure 6 $-3 \le x \le 1$

The solution set is $\{x \mid -3 \le x \le 1\}$, that is, all real numbers in the interval $[-3, 1]$. Figure 6 illustrates the graph.

Now Work PROBLEM 79

2. Copy all yellow box details into your notes. These are important concepts that the example problems explore in depth.



THEOREM

If a is a positive number and if u is an algebraic expression, then

- $|u| < a$ is equivalent to $-a < u < a$ (2)
- $|u| \le a$ is equivalent to $-a \le u \le a$ (3)

In other words, $|u| < a$ is equivalent to $-a < u$ and $u < a$.

Step 3: Immediately Following the Lesson: Do the Work

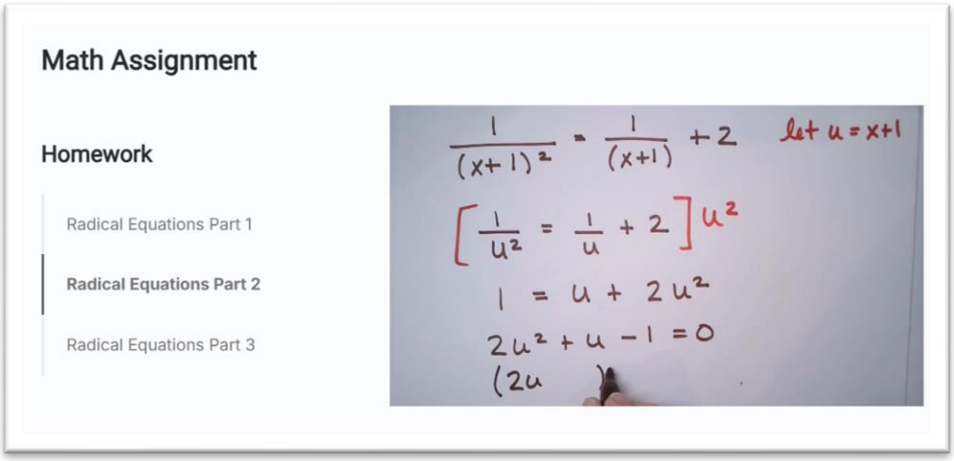
1. The best time to start your homework is right after class. At the very least, get a start on a couple of problems to get your momentum going.
    a. Look at the number of homework problems you have for the entire set. Divide that number by five, so you know how many homework problems to do each day. For example, in Week 2, Homework Set #2 is circled in red:

9/15	2	1.3	Complex Numbers	#2	4, 15, 29, 33, 43, 53, 63, 71, 77, 89, 91
		1.4	Radical Equations		13, 23, 29, 45, 53, 55, 67, 103, **114**, 83, **84**

In this example, there are 22 problems, which means you have about 4-5 problems to do each day. Don't cram and don't wait until the last minute. Be sure to leave yourself plenty of time to work on the problems without feeling rushed.

If you get stuck, go back to the example problems you copied down and see if you can find similar problems with worked out solutions. (Hint – problems with a "pencil" icon next to them are similar to the examples!)

Only *after* you've spent time working on the homework, giving yourself time to *think first*, should you go to the homework videos. These are fully worked out solutions to many (not all) homework problems. You'll find them under each Math Lesson video.
Please do not watch homework videos until *after* you've worked the "Are You Prepared" problems *AND* copied down all example problems into your notebook *AND* tried several homework problems.



Tip #1: Math can't be learned in a vacuum or by reading a textbook alone. Students need to be actively engaged with peers, projects, and activities to bring these concepts to life.

Tip #2: The publisher has created extensive videos, resources, test prep and guided notes and visualizations you can use as you work through this course! Be sure to use the login information provided by the publisher to access this bonus content.

Tips for Success

Best MATH Practices

We're so glad you're here! Whether you're just starting out or picking up where you left off, this is the perfect place to grow, explore, and discover how fun learning can be. Here are my best tips for learning math the easy way!

📚 **Understand, Don't Memorize**
Focus on *why* the math works, not just plugging in numbers into formulas.

🧠 **Practice Actively, Not Passively**
Do problems *yourself* – watching someone else isn't enough.

📈 **Build Conceptual Foundations**
Make sure you're solid on earlier topics (fractions, equations, etc.) because math builds on itself, and if you skip a step, it's going to be harder later.

🔁 **Review Regularly**
Don't cram. Practice each day to move math concepts to your long-term memory.

📝 **Show All Your Work**
Write all steps clearly and neatly, usually this means writing *larger* than you usually do. This helps catch mistakes and makes reviewing easier later when you go back through your notes.

🧩 **Solve Word Problems**
Math isn't about getting the right answer. We're learning to apply these concepts to real-life situations to build problem-solving skills.

📊 **Use Visual Aids**
Use graphs, charts, number lines, and diagrams help you understand abstract ideas. Most of your time should be spent *understanding* the problem, more than doing the actual steps to solving.

👥 **Work with Someone Else**
Working with others helps you learn math better because you get exposed to different problem-solving approaches though discussions and explanations. You'll build confidence while learning in a more engaging, fun, and interactive way!

🧮 **Use Tools Wisely**
Use calculators, apps, and manipulatives help you *to understand*, not to bypass thinking. Don't be over-dependent on the solution videos for the math assignments, only use them when you're really stuck on a problem.

📌 **Stay Curious and Ask *Why***
We love curiosity! Keep asking questions like: *"Why does this work?"* and *"What happens if I change this?"* You'll understand deeper the more thought you put into it.

Build Real Mathematical Thinking (Not Just Memorization)

Algebra 2 isn't just about learning formulas—it's about learning how to think. In this course, your student won't just "plug and chug" their way through worksheets. Instead, they'll learn how to approach problems the way real mathematicians and engineers do: with curiosity, creativity, and confidence.

🧠 **They learn how to *figure things out*, not just follow steps** Your student will tackle real-world challenges—like how to program traffic lights to avoid collisions, or how to map a meteorite's trajectory—and learn how to break down complex problems into manageable parts. They'll develop problem-solving habits that will serve them far beyond math class.

🌉 **They connect numbers to the *real world*** We use meaningful projects to show students that math isn't just numbers on a page—it's a language we use to describe motion, speed, height, energy, and more. Students learn to see equations as tools for making sense of the world.

🗣️ **They *explain their thinking* and learn from others** Through specially designed activities and questions, students get practice sharing their strategies and seeing how others think too. This builds confidence and deepens their understanding.

📊 **They use *math to model and solve real problems*** Whether they're analyzing roller coaster paths or tracking an object in motion, students use math to make predictions and test solutions. They'll learn to trust their tools—and themselves.

🛠️ **They choose the *right tools for the job*** Students will learn how and when to use calculators, graphing apps, spreadsheets, rulers, and other tools to help solve problems efficiently and accurately, just like real engineers and scientists do!

✏️ **They build precision and accuracy** We teach students how to communicate math clearly—with the right terms, labels, units, and calculations—while also helping them understand where small mistakes come from and how to fix them.

🧩 **They spot patterns and understand structure** Your student will discover how math is built on patterns—like the way expressions factor, or how certain types of graphs behave—and use that knowledge to solve problems faster and smarter.

🔁 **They develop reusable strategies** By practicing techniques across many situations (like solving different types of equations), students start to recognize what works and apply it in new ways. This turns math from something mysterious into something manageable.

Why This Matters No matter what your student goes on to do—whether it's science, business, tech, or the arts—these thinking skills will give them a huge advantage. And yes, this approach is **fully aligned** with national standards like Common Core… but more importantly, it's aligned with how kids actually *learn best.* Whether you're here for academic excellence or for a more meaningful learning experience, this course is designed to support your family's goals.

What to Expect (and Do) During Class Time

Class sessions are designed to be focused, active, and super helpful—but they go by fast! Here's how to get the most out of each lesson:

1. **Be Ready to Jump In**
   Have your notebook, pencil, and calculator ready to go. You'll be working problems by hand in your own notebook before checking answers online (which is optional and just for feedback).

2. **Limit Distractions**
   Try to create a quiet space with your phone and other media turned off so you can really focus during the short lessons.

3. **Follow Along Actively**
   Whether it's a live class or a recording, follow along by doing what the teacher is doing. Many students find it helpful to pause or rewatch parts of the video to make sure they understand and can apply each step.

4. **Write It All Down**
   Take careful notes and write down the examples just like you see them in the lesson. This trains your brain to work through the process—not just guess at the answers in your head.

5. **Think It Through Yourself**
   You'll get the most out of this class by doing the work on your own, not just watching someone else solve problems. Real progress comes from thinking through the steps and practicing them yourself.

Assessment and Grading Breakdown

Grading Policy: Every assignment has a step-by-step walkthrough video and fully worked out solutions in the answer key. Assignments are not completed unless all answers are checked, and all mistakes are corrected. Only after this may assignments be marked as complete. Students do all homework on paper from the textbook assignments, and may use the online auto-grading system to submit work for a grade.

Grading Categories
This course uses a weighted grading system to reflect all aspects of student learning and engagement. You may use the online autograder from the textbook publisher to submit work for a score for the homework assignments, but please do your homework on paper first.

Category	Weight	What It Includes
Notes & Reading	10%	Organized, clearly written class notes, prep summaries, and problem-solving references
Homework	30%	Weekly problem sets
Weekly Quizzes	10%	Short concept checks
Tests & Exams	35%	Unit tests, midterms, and final exams assessing depth of understanding
Projects & Applications	15%	Math investigations, real-world modeling activities, and capstone projects

Communications: If you're stuck on a math problem, don't wait too long to ask for help—reach out to your teacher as soon as possible. Getting support early will keep you from feeling frustrated and help you stay on track with the material.

Tutoring / Study Hall: We offer an optional small group private tutoring session for students that need additional help during the week. Please ask about how to enroll if interest

End-of-Year Checklist

Use this checklist to help your student stay on track and ensure they've completed all the major components of the Algebra 2 course. It's a great way to wrap up the year with confidence, stay organized for your portfolio, and verify that all essential learning objectives have been met.

📘 Coursework & Class Participation

☐ Worked through all assigned textbook chapters, taking notes and writing up reference sheets

☐ Attended (or watched recordings of) all math class sessions

☐ Filed all reading notes and class notes in your **Notes & Reading section**

📝 Assignments & Homework

☐ Completed all weekly homework assignments (30 total)

☐ Completed all review quizzes (30 total)

☐ Submitted chapter tests (6) and exams (2 total)

☐ Filed all homework, quizzes, and exams in **Homework** and also **Quizzes/Tests**

📊 Labs & Projects

☐ Completed all assigned math labs and real-world projects (28 total)

☐ Filed all lab worksheets, data, and models in **Labs & Projects**

🧠 Enrichment Activities

☐ Completed all mini-Captone projects (2 total)

☐ Completed end-of-year Capstone project (1 total)

📂 Binder & Organization

☐ Binder has all 5 dividers and is organized with class notes, labs, quizzes, tests, and reference sheets

☐ Binder is complete and ready to be submitted, reviewed, or kept for your portfolio

☐ Final Grade is calculated (see next page)

Calculating Your Total Grade in this Course

Add up numbers in right column to find your percent for the entire course:_____

Category	Weight	Score
Notes & Reading* 10 points each, 30 total	10%	Add up all points for weekly note-taking (maximum 300). Divide by 300 to find the percentage score: _____ Multiply by 0.1 to calculate the weighted score: _____
Homework 10 points each, 30 total	30%	Add up all scores for weekly homework assignments and convert to a 10-point scale. Add these points for all 30 assignments, divide by 300, and write the percentage here: _____ Now multiply this percentage by 0.3 and write your final weighted score here: _____
Quizzes 10 points each, 30 total	10%	Add up all points for your weekly quizzes (300 max). Divide by 300 to get your percentage score: _____ Multiply by 0.1 to calculate the weighted score: _____
Tests & Exams 5 Tests, 2 Exams	35%	Add all your test and exam scores here: _____ Divide by 700 to get your average percentage: _____ Multiply by 0.35 to calculate the weighted score: _____
Projects & Applications	15%	Add up all points for your real-world math projects, applications, and math labs (maximum 150 points). Divide by 150 to get your percentage score: _____ Multiply by 0.15 to calculate the weighted score: _____

***Note Taking & Reference Sheets Rubric– see next page**

Note Taking & Reference Sheets Rubric (10 points per week)

Score	Description
9–10 points	Notes are complete, organized by topic or unit, and show clear effort throughout the course. Includes vocabulary, key concepts, examples, and personal annotations (questions, reminders, etc.). Dividers are used to organize sections.
7–8 points	Notes are mostly complete with only minor gaps. Organization is mostly consistent. Some effort to highlight key ideas and examples is visible.
5–6 points	Notes are present but inconsistent. Several lessons or concepts are missing. Organization may be unclear or incomplete.
3–4 points	Notes are minimal, poorly organized, or missing large sections. Not very useful for review.
0–2 points	Little to no notes kept. May include only partial or copied notes without evidence of understanding or engagement.

Capstone & Enrichment

🎓Capstone Project

Twice during the year, students will complete a Capstone Project—a chance to apply everything they've learned in a creative and meaningful way. This project is student-designed with guidance from the instructor and can take many forms: analyzing real-world data, modeling a real-life situation with algebraic functions, creating a hands-on STEM design, or researching and solving a complex math-based problem.

The purpose of the capstone is to give students an opportunity to demonstrate understanding, synthesize multiple concepts, and explore math in a way that connects to their personal interests or future goals. It's a celebration of their progress and a practical application of their skills. We'll walk students through the planning process, provide examples, and offer plenty of support along the way.

✨ Enrichment Activities

For students who want an extra challenge—or just want to dive deeper into how math is used in the real world—we offer a variety of optional enrichment activities throughout the course. These may include:

- Data-based investigations using real-world statistics
- Engineering-style design challenges (build & test!)
- Math puzzles and logic problems
- STEM career spotlights and interviews
- Integration with topics in physics, astronomy, and economics
- Opportunities to use math modeling and simulations

These activities are completely optional but highly encouraged for curious learners. They're designed to **spark creativity, reinforce critical thinking**, and provide opportunities to go beyond traditional textbook problems.

Support Materials

Frequently Asked Questions for Algebra 2

Q: What does this Algebra 2 course cover?
This course covers all major Algebra 2 concepts, including linear, quadratic, polynomial, exponential, and logarithmic functions, as well as systems of equations, conic sections, radical and rational expressions, sequences and series, probability, and an introduction to trigonometry.

Q: Is this course aligned with Common Core standards?
Yes, it is fully aligned with the Common Core State Standards for Algebra 2. It prepares students for success in Precalculus or Trigonometry and supports college readiness.

Q: Does this course include tests and quizzes?
Yes. Students complete regular review quizzes, unit tests, and a final exam. The assessments are designed to measure understanding and build confidence.

Q: Do I need to teach the material myself?
No! The course includes guided video lessons, lab activities, and step-by-step instructions taught by an experienced educator. Parents don't need to be math experts.

Q: How much time should my student expect to spend each week?
Most students spend **45–90 minutes per day**, 4–5 days a week, which includes instruction, practice problems, projects, and review time.

Q: Is this self-paced or scheduled?
It's designed to be flexible. You can follow the weekly schedule provided or adjust the pace to match your family's needs.

Q: What materials are required?
You'll need the textbook (linked in the materials list), a binder for organizing notes and assignments, and access to the video lessons and project guides. A graphing calculator or free online equivalent is recommended.

Q: How are students supported if they get stuck?
Weekly study halls and on-demand support are available so students can ask questions, get clarification, and stay on track. Please contact us for details.

Q: Will this prepare my student for college math?
Absolutely. This course is academically rigorous and serves as an excellent foundation for Precalculus, Trigonometry, and beyond. It also builds the critical thinking and problem-solving skills needed in higher education.

Q: Can I use this course for high school credit?
Yes. This is a full-credit Algebra 2 course appropriate for high school transcripts. We provide grading guidance and a course syllabus for your records.

Common Core Alignment

Algebra: Structure in Expressions (HS.A-SSE)

- **HS.A-SSE.1**: Interpret expressions that represent a quantity in terms of its context.
- **HS.A-SSE.2**: Use the structure of an expression to identify ways to rewrite it.
- **HS.A-SSE.3**: Choose and produce an equivalent form of an expression to reveal and explain properties.
- **HS.A-SSE.4**: Derive the formula for the sum of a finite geometric series and use it to solve problems.

Algebra: Arithmetic with Polynomials and Rational Expressions (HS.A-APR)

- **HS.A-APR.1**: Understand polynomials form a system analogous to integers.
- **HS.A-APR.2**: Know and apply the Remainder Theorem.
- **HS.A-APR.3**: Identify zeros of polynomials and use them to construct graphs.
- **HS.A-APR.4**: Use polynomial identities to solve problems.
- **HS.A-APR.6**: Rewrite simple rational expressions in different forms.
- **HS.A-APR.7**: Understand the relationship between rational expressions and rational numbers.

Algebra: Creating Equations (HS.A-CED)

- **HS.A-CED.1**: Create equations that describe numbers or relationships.
- **HS.A-CED.2**: Create equations to solve problems in context.
- **HS.A-CED.3**: Represent constraints by equations or inequalities.
- **HS.A-CED.4**: Rearrange formulas to highlight quantities of interest.

Algebra: Reasoning with Equations and Inequalities (HS.A-REI)

- **HS.A-REI.1**: Explain each step in solving equations.
- **HS.A-REI.2**: Solve simple rational and radical equations in one variable.
- **HS.A-REI.4**: Solve quadratic equations in one variable.
- **HS.A-REI.6**: Solve systems of linear equations algebraically.
- **HS.A-REI.7**: Solve systems of equations including quadratic and linear systems.
- **HS.A-REI.11**: Use graphs and tables to approximate solutions.

Functions: Interpreting Functions (HS.F-IF)

- **HS.F-IF.1–3**: Understand the concept of a function and use function notation.
- **HS.F-IF.4–6**: Interpret and analyze functions using graphs and tables.
- **HS.F-IF.7–9**: Graph functions expressed symbolically and understand transformations.

Common Core Alignment… continued from previous page.

Functions: Building Functions (HS.F-BF)

- **HS.F-BF.1**: Build a function that models a relationship between quantities.
- **HS.F-BF.2**: Write arithmetic and geometric sequences as functions.
- **HS.F-BF.3**: Identify effects of transformations on functions.
- **HS.F-BF.4**: Find inverse functions.

Functions: Linear, Quadratic, and Exponential Models (HS.F-LE)

- **HS.F-LE.1–3**: Construct and compare linear, quadratic, and exponential models.
- **HS.F-LE.5**: Interpret the parameters in context of the model.

Functions: Trigonometric Functions (HS.F-TF)

- **HS.F-TF.1–3**: Understand radian measure and the unit circle.
- **HS.F-TF.5**: Choose trigonometric functions to model periodic phenomena.

Number and Quantity: The Real Number System (HS.N-RN)

- **HS.N-RN.1–3**: Extend the properties of exponents to rational exponents.

Number and Quantity: The Complex Number System (HS.N-CN)

- **HS.N-CN.1–3**: Perform arithmetic operations with complex numbers.
- **HS.N-CN.7–9**: Solve quadratic equations with complex solutions and use the complex plane.

Statistics & Probability: Interpreting Categorical & Quantitative Data (HS.S-ID)

- **HS.S-ID.6**: Represent data using regression models and analyze residuals.

In Summary: By the end of this Algebra 2 course, your student will have mastered the full range of topics required by the Common Core Standards for high school Algebra, including functions, systems of equations, complex numbers, polynomials, rational expressions, exponential and logarithmic functions, and more.

This solid foundation prepares them for success in the next level of math—Trigonometry and Precalculus—which begins where this course leaves off, using the second half of the same textbook. Students who complete this course will be ready to move confidently into upper-level math and science courses with the skills, reasoning, and problem-solving strategies they need to thrive.