



Unit 1: Fundamental Skills

Draft Date 09-19-2025	Course HS CP Algebra 3	Duration 16 Day(s)	Grades 10, 11, 12	Subjects Mathematics	Team William Graber, Amanda Manuel, Brittany Torres, Bethany Hovan, CHRIS HIGH, Mark Pieters, Dana Keares, Theodora Bevan-Xenelis, Hanna Garber, Makenna Nicarry
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Focus

Master the Math Toolkit: Solve Anything Life Throws Your Way! In this fundamental skills unit, students will review and strengthen essential algebraic concepts, including polynomial operations, exponents, rational and radical expressions, complex numbers, and solving a variety of equations and inequalities—linear, absolute value, radical, rational, and quadratic. The focus is on building fluency and confidence with these core skills to support success in advanced algebra topics.

Stage 1: Learning Goals

Established Goals	Transfer
Standards	Long-Term Transfer Goals
Pennsylvania Core Standards Mathematics (2014): 9 ■ Apply inverse operations to solve equations or formulas for a given variable. (CC.2.2.HS.D.8) ■ Use reasoning to solve equations and justify the solution method. (CC.2.2.HS.D.9) Mathematical Practices ■ Look for and make use of structure. (MP7) ■ Look for and express regularity in repeated reasoning. (MP8)	What kinds of long-term, independent accomplishments are desired? Students will be able to independently use their learning to... ■ Solve Problems Effectively: Based on an examination of the problem/situation, initiate a plan, execute it, evaluate and explain the reasonableness of the solution. (Innovative Problem Solver) (T1) ■ Solve Problems Efficiently: Use skills, strategies, models, or manipulatives to increase efficiency and accuracy. (Innovative Problem Solver) (T2) ■ Grow Confidence: Demonstrate perseverance and self-efficacy by making an attempt, using reflection, monitoring progress, and changing course as needed. (Lifelong Learner) (T3)

Pennsylvania Academic Standards

Career Education and Work (2026): 9-12

- Identify solutions to existing conditions or problems using critical thinking skills. (13.2.9-12.A)

Profile of a CV Learner

- Life-Long Learner: Students will be able to independently use their learning to analyze past and ongoing performance, adjust thinking processes to new contexts, and use information to make informed and conscientious decisions. (PCVL.LLL)

Meaning

Understandings

What specifically do you want students to understand? What inferences should they make? Students will understand that...

- Every problem can be categorized based on a similar structure and set of characteristics. (U1)
- Recognize that patterns and structures foster efficiency in problem solving. (U2)

Essential Questions

What thought-provoking questions will foster inquiry, meaning making, and transfer? Students will keep considering...

- How am I getting better over time? What do I need to continue to work on? (Q1)
- How will I know if my learning was successful? What sources of data should I consider? (Q2)
- What motivates me to keep learning? What do I still wonder about? How might I transfer what I have learned to another situation? (Q3)
- (8+) How does evaluating a function show relationships between quantities? (U1) (Q4)
- (9+) How are solutions justified when solving a problem? (U2,3) (Q5)
- (9+) How do I use what I know about operations, factors, and graphs when making sense of polynomials? (U1,2,3) (Q6)
- (9+) How do you write equivalent expressions to solve problems? (U2,3) (Q7)

Acquisition of Knowledge & Skill	
Knowledge	Skills
What facts and basic concepts should students know and be able to recall? Students will know... ■ Algebraic equations across multiple representations (Linear, Absolute Value, Quadratic, Radical, and Rational) (K1) ■ Standard forms, properties, and simplification rules for algebraic and complex expressions (Polynomial, Rational, Radical, and Complex) (K2)	What discrete skills and processes should students be able to use? Students can... ■ I can factor different polynomial expressions. (S1) ■ I can add, subtract, multiply, and divide polynomials, rational expressions, and radicals accurately. (S2) ■ I can solve linear, absolute value, radical, rational, and quadratic equations. (S3) ■ I can perform operations with complex numbers and simplify expressions involving them. (S4)



Unit 2: Rational Functions

Draft Date 09-19-2025	Course HS CP Algebra 3	Duration 14 Day(s)	Grades 10, 11, 12	Subjects Mathematics	Team Hanna Garber, Amanda Manuel, Brittany Torres, William Graber, Bethany Hovan, CHRIS HIGH, Mark Pieters, Dana Keares, Theodora Bevan-Xenelis, Makenna Nicarry
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Focus

If you upload 5 TikToks in an hour and your friend uploads 8 in the same time, how long to post 20 together? In this unit on rational expressions, students will learn to simplify, multiply, divide, add, and subtract rational expressions while identifying restrictions on the variable. They will also apply these skills to solve equations and model real-world problems involving ratios and rates.

Stage 1: Learning Goals

Established Goals	Transfer	
Standards	Long-Term Transfer Goals	
Pennsylvania Core Standards Mathematics (2014): 9 ■ Apply and extend the properties of exponents to solve problems with rational exponents (CC.2.1.HS.F.1) ■ Extend the knowledge of rational functions to rewrite in equivalent forms. (CC.2.2.HS.D. 6) Mathematical Practices ■ Model with mathematics. (MP4) ■ Attend to precision (MP6)	What kinds of long-term, independent accomplishments are desired? Students will be able to independently use their learning to... ■ Solve Problems Efficiently: Use skills, strategies, models, or manipulatives to increase efficiency and accuracy. (Innovative Problem Solver) (T1) ■ Solve Problems Effectively: Based on an examination of the problem/situation, initiate a plan, execute it, evaluate and explain the reasonableness of the solution. (Innovative Problem Solver) (T2)	
	Meaning	
	Understandings	Essential Questions
	What specifically do you want students to understand? What inferences should they make? Students will understand that... ■ Knowing the properties of exponents supports modeling situations and simplifying expressions. (9-12) (U1)	What thought-provoking questions will foster inquiry, meaning making, and transfer? Students will keep considering... ■ (8+) How are radicals and exponents related? (U1) (Q1)

Pennsylvania Academic Standards	■ Recognize that patterns and structures foster efficiency in problem solving. (U2)	■ (9-12) How can I apply the properties of _____ (i.e exponents, equality, etc.) to solve problems? (U1,2) (Q2)
Career Education and Work (2026): 9-12 ■ Identify solutions to existing conditions or problems using critical thinking skills. (13.2.9-12.A)	Acquisition of Knowledge & Skill	
	Knowledge	Skills
	What facts and basic concepts should students know and be able to recall? Students will know... ■ The structure and properties of rational expressions, including equivalent rational expressions and complex fractions. (K1) ■ The rules and relationships for addition, subtraction, multiplication and division of rational expressions. (K2) ■ The relationship between rational equations, restrictions on variable values and solutions. (K3)	What discrete skills and processes should students be able to use? Students can... ■ I can add, subtract, multiply, and divide rational expressions accurately. (S1) ■ I can set up and solve equations involving rational expressions, checking for extraneous solutions. (S2)
Profile of a CV Learner ■ Innovative Problem Solving: Students will be able to independently use their learning to approach new problems with curiosity and creativity while consistently seeking growth through self-reflection and a willingness to accept constructive feedback. (PCVL.IPS)		



Unit 3: Exponentials and Logarithms

Draft Date 09-19-2025	Course HS CP Algebra 3	Duration 16 Day(s)	Grades 10, 11, 12	Subjects Mathematics	Team Hanna Garber, Amanda Manuel, Brittany Torres, William Graber, Bethany Hovan, CHRIS HIGH, Mark Pieters, Dana Keares, Theodora Bevan-Xenelis, Makenna Nicarry
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Focus

A meme spreads to twice as many people each day. How many days until half the school sees it? In this unit on exponential and logarithmic functions, students will examine their inverse relationship, key properties, and transformations, while applying them to solve equations and model real-world growth and decay scenarios. Emphasis will be placed on interpreting graphs, using logarithms to solve exponential equations, and connecting concepts to practical applications.

Stage 1: Learning Goals

Established Goals	Transfer
Standards	Long-Term Transfer Goals
Pennsylvania Core Standards Mathematics (2014): 9 ■ Graph and analyze functions and use their properties to make connections between the different representations. (CC.2.2.HS.C.2) ■ Construct and compare linear, quadratic and exponential models to solve problems. (CC.2.2.HS.C.5) Mathematical Practices ■ Model with mathematics. (MP4) ■ Use appropriate tools strategically. (MP5) ■ Attend to precision (MP6)	What kinds of long-term, independent accomplishments are desired? Students will be able to independently use their learning to... ■ Recognize Relationships: Identify patterns and relationships to make sense of mathematical and/or real world situations. (Global Citizen) (T1) ■ Solve Problems Effectively: Based on an examination of the problem/situation, initiate a plan, execute it, evaluate and explain the reasonableness of the solution. (Innovative Problem Solver) (T2) ■ Solve Problems Efficiently: Use skills, strategies, models, or manipulatives to increase efficiency and accuracy. (Innovative Problem Solver) (T3)

- Look for and express regularity in repeated reasoning. (MP8)

Pennsylvania Academic Standards

Career Education and Work (2026): 9-12

- Analyze the relationship between career choices and career preparation opportunities to choose a path. (13.1.9-12.A)
- Identify solutions to existing conditions or problems using critical thinking skills. (13.2.9-12.A)

Profile of a CV Learner

- Innovative Problem Solving: Students will be able to independently use their learning to approach new problems with curiosity and creativity while consistently seeking growth through self-reflection and a willingness to accept constructive feedback. (PCVL.IPS)
- Global Citizenship: Students will be able to mindfully and respectfully seek to understand the ideas and perspectives of others to responsibly participate in all facets of local and global society. (PCVL.GC)
- Life-Long Learner: Students will be able to independently use their learning to analyze past and ongoing performance, adjust thinking processes to new contexts, and use information to make informed and conscientious decisions. (PCVL.LLL)

Meaning	
Understandings	Essential Questions
What specifically do you want students to understand? What inferences should they make? Students will understand that... ■ Recognize that patterns and structures foster efficiency in problem solving. (U1) ■ The language of mathematics allows us to communicate in a precise, efficient, and logical manner. (U2) ■ Effective justifications are based on local mathematical thinking and appropriate representations and/or vocabulary. (U3)	What thought-provoking questions will foster inquiry, meaning making, and transfer? Students will keep considering... ■ (9-12) How can I apply the properties of _____ (i.e exponents, equality, etc.) to solve problems? (U1,2) (Q1) ■ How do I solve real world problems using money? (U5) (Q2) ■ (9+) How are functions represented graphically? What are the properties of these graphs? (U1,2) (Q3)
Acquisition of Knowledge & Skill	
Knowledge	Skills
What facts and basic concepts should students know and be able to recall? Students will know... ■ The characteristics, components, and properties of exponential functions and exponential equations. (K1) ■ The characteristics, components, and properties of logarithmic functions and logarithmic equations. (K2) ■ The concepts of exponential growth and decay, including compound interest and the relationship between initial value, growth or decay factor, rate, and time. (K3)	What discrete skills and processes should students be able to use? Students can... ■ I can graph exponential and logarithmic functions. (S1) ■ I can solve exponential and logarithmic equations. (S2) ■ I can solve application problems for exponential functions. (S3)



Unit 4: Functions and Their Graphs

Draft Date 09-19-2025	Course HS CP Algebra 3	Duration 19 Day(s)	Grades 10, 11, 12	Subjects Mathematics	Team Theodora Bevan-Xenelis, Amanda Manuel, Brittany Torres, William Graber, Bethany Hovan, CHRIS HIGH, Mark Pieters, Dana Keares, Hanna Garber, Makenna Nicarry
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Focus

Why do sound waves look like ripples when graphed? In this unit, students will explore parent functions, linear through trigonometric, and see how transformations like shifts, stretches, and reflections change their graphs. By the end, they will be able to recognize, compare, and graph a variety of functions to model real-world relationships.

Stage 1: Learning Goals

Established Goals	Transfer	
Standards	Long-Term Transfer Goals	
Pennsylvania Core Standards Mathematics (2014): 9 ■ Graph and analyze functions and use their properties to make connections between the different representations. (CC.2.2.HS.C.2) ■ Interpret the effects transformations have on functions and find the inverses of functions. (CC.2.2.HS.C.4) ■ Construct and compare linear, quadratic and exponential models to solve problems. (CC.2.2.HS.C.5) Mathematical Practices ■ Model with mathematics. (MP4) ■ Look for and make use of structure. (MP7)	What kinds of long-term, independent accomplishments are desired? Students will be able to independently use their learning to... ■ Solve Problems Efficiently: Use skills, strategies, models, or manipulatives to increase efficiency and accuracy. (Innovative Problem Solver) (T1)	
	Meaning	
	Understandings	Essential Questions
	What specifically do you want students to understand? What inferences should they make? Students will understand that... ■ Recognize that patterns and structures foster efficiency in problem solving. (U1)	What thought-provoking questions will foster inquiry, meaning making, and transfer? Students will keep considering... ■ How do I come up with a solution that can potentially help with this problem? (Q1)

Profile of a CV Learner	Acquisition of Knowledge & Skill	
	Knowledge	Skills
■ Innovative Problem Solving: Students will be able to independently use their learning to approach new problems with curiosity and creativity while consistently seeking growth through self-reflection and a willingness to accept constructive feedback. (PCVL.IPS)	What facts and basic concepts should students know and be able to recall? Students will know... ■ The characteristics and properties of linear, quadratic, polynomial, rational, exponential, logarithmic, absolute value, and radical functions. (K1) ■ The key features of functions and their meanings, including intercepts, zeros, domain, range, intervals of increase and decrease, extrema, asymptotes, and end behavior. (K2) ■ The relationships among equations, tables, graphs, intercepts, transformations, and technology representations of functions. (K3) ■ The concept of function composition and the relationship between the domains and graphs of composed functions. (K4) ■ The concept of inverse functions and the relationship between a function and its inverse, including their graphs and domains. (K5)	What discrete skills and processes should students be able to use? Students can... ■ I can find critical points (zeros, extrema and points of inflections) given a graph or equation of a function. (S1) ■ I can determine the end behavior and state if a function is continuous. (S2) ■ I can test for symmetry of functions and determine even or odd. (S3) ■ I can apply transformations (shifts, reflections, stretches, compressions) to parent functions. (S4) ■ I can compose functions, find the sum, difference, product, and quotient of functions. (S5) ■ I can graph functions (linear, quadratic, polynomial, rational, exponential, logarithmic, absolute value, radical, piecewise). (S6) ■ I can graphically and algebraically find the inverse of a function and verify it. (S7)



Unit 5: Trigonometry

Draft Date 09-19-2025	Course HS CP Algebra 3	Duration 23 Day(s)	Grades 10, 11, 12	Subjects Mathematics	Team Hanna Garber, Amanda Manuel, Brittany Torres, William Graber, Bethany Hovan, CHRIS HIGH, Mark Pieters, Dana Keares, Theodora Bevan-Xenelis, Makenna Nicarry
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Focus

If you want to build a skateboard ramp at a 30° angle, how tall should it be for a 10-foot long ramp? In this trigonometry unit, students will explore the relationships between angles and side lengths in right and non-right triangles, learning how to apply trigonometric ratios, identities, and the unit circle to solve equations and model real-world periodic phenomena. The focus will be on building a deep understanding of trigonometric functions and their graphs to prepare for advanced applications in mathematics and science.

Stage 1: Learning Goals

Established Goals	Transfer	
Standards	Long-Term Transfer Goals	
Pennsylvania Core Standards Mathematics (2014): 9 ■ Apply trigonometric ratios to solve problems involving right triangles. (CC.2.3.HS.A.7) ■ Extend the concept of similarity to determine arc lengths and areas of sectors of circles. (CC.2.3.HS.A.9) ■ Apply geometric concepts to model and solve real world problems. (CC.2.3.HS.A.14) Mathematical Practices ■ Model with mathematics. (MP4) ■ Attend to precision (MP6)	What kinds of long-term, independent accomplishments are desired? Students will be able to independently use their learning to... ■ Work Together: Engage and meaningfully contribute to a team to reach a common goal, through mutual reflection, feedback, and shared responsibility. (Collaborator) (T1)	
	Meaning	
	Understandings	Essential Questions
	What specifically do you want students to understand? What inferences should they make? Students will understand that... ■ Analyzing someone else's mathematical thinking creates clarity about a problem, its model, and the viability of a solution. (U1)	What thought-provoking questions will foster inquiry, meaning making, and transfer? Students will keep considering... ■ How do I explain my ideas or approach to others? How does sharing that inspire my own and others' thinking? (Q1)

Pennsylvania Academic Standards

Career Education and Work (2026): 9-12

- Identify solutions to existing conditions or problems using critical thinking skills. (13.2.9-12.A)

Profile of a CV Learner

- Collaboration: Students will be able to independently engage and meaningfully contribute to a team to reach a common goal, through mutual reflection, feedback, and shared responsibility. (PCVL.CO)

Acquisition of Knowledge & Skill

Knowledge

What facts and basic concepts should students know and be able to recall?

Students will know...

- Definitions and ratio relationships of the six primary trigonometric functions (Sine, Cosine, Tangent, Cosecant, Secant, and Cotangent) (K1)
- Key points, structural characteristics, and features of trigonometric functions and their inverses (K2)
- Applied interpretations of trigonometric parameters (amplitude, period, phase shift, and vertical shift) (K3)
- Algebraic and graphical proofs, identities, and solutions for trigonometric equations (K4)

Skills

What discrete skills and processes should students be able to use? Students can...

- I can convert between degrees and radians. (S1)
- I can use trigonometric functions to solve triangles. (S2)
- I can graph trigonometric functions and their inverses. (S3)