

PRECALCULUS, SEMESTER A

COURSE OVERVIEW

Precalculus combines reviews of algebra, geometry, and functions into a preparatory course for calculus. The course focuses on the mastery of critical skills and exposure to new skills necessary for success in subsequent math courses. The first semester includes linear, quadratic, exponential, logarithmic, radical, polynomial, and rational functions; systems of equations; and conic sections. The second semester covers trigonometric ratios and functions; inverse trigonometric functions; applications of trigonometry, including vectors and laws of cosine and sine; polar functions and notation; and arithmetic of complex numbers.

Within each lesson, students are supplied with a post-study checkup activity that provides them the opportunity to hone their computational skills by working through a low-stakes problem set before moving on to formal assessment. Unit-level assessments include a computer-scored test and a scaffolded, teacher-scored test.

The course is built to state standards and the National Council of Teachers of Mathematics (NCTM) standards.

COURSE COMPONENTS AND GRADING RUBRIC

The table gives a breakdown of the weight for each component in the course. Weight represents the percentage of the total score coming from each activity.

Course Components	Count	Weight
Practice. <i>A practice activity provides instruction similar to that found in a study so that students can practice or review skills necessary to complete their assignment with mastery.</i>	5	15%
Discussion. <i>A discussion activity is an opportunity for students to collaborate with their peers. This activity gives students the opportunity to practice speaking and listening in a clear and logical manner and to receive feedback from peers.</i>	5	5%
Mastery Test. <i>A mastery test is a computer-scored lesson-level summative assessment.</i>	28	25%
Posttest. <i>A posttest appears at the end of each unit.</i>	5	15%
End-of-Semester Test. <i>An end-of-semester test (EOS) appears at the end of each course.</i>	1	10%
Teacher-Graded Posttest. <i>A posttest that prompts students for written responses appears at the end of each unit.</i>	5	25%

Course Components	Count	Weight
Teacher-Graded End-of-Semester Test. <i>An end-of-semester test (EOS) that prompts students for written responses appears at the end of each course.</i>	1	5%
Total	50	100%

**Teachers may manually adjust these weights if desired, per district grading requirements.*

UNIT 1: FUNCTIONS

Lesson and Duration	Description
Functions: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 What Is a Function?: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Relating to Functions: Study <i>50 minutes</i>	Learn about functions, their graphs, and some special functions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on functions.
What Is a Function?: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Graphing Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Testing and Special Functions: Study <i>50 minutes</i>	Learn the vertical line and horizontal line tests for evaluating a function. Evaluate a function for given values and explore special functions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphing functions.

Lesson and Duration	Description
Graphing Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Linear Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Walking the Line: Study <i>50 minutes</i>	Learn about slope and the three main forms of linear functions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on linear functions.
Linear Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4 Arithmetic Sequences and Series: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
It All Adds Up: Study <i>50 minutes</i>	Learn about arithmetic sequences and series.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on arithmetic sequences and series.
Arithmetic Sequences and Series: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 5 Linear Equations and Inequalities: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
On Equal Footing: Study <i>50 minutes</i>	Learn how to solve linear equations and inequalities.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on linear equations and inequalities.
Linear Equations and Inequalities: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 6 Linear Systems: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Finding the Point of Intersection: Study <i>50 minutes</i>	Find the point of intersection of linear systems using algebra, graphing, and matrices.
Connection to Business: Linear Programming: Study <i>30 minutes</i>	Learn how businesses solve problems using linear programming.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on linear systems.
Linear Systems: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 7 Arithmetic of Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Mixing and Matching: Study <i>50 minutes</i>	Learn how to add, subtract, multiply, divide, and compose functions.

Lesson and Duration	Description
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on the arithmetic of functions.
Arithmetic of Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 1 WRAP-UP	
Functions: Review <i>50 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Calculator Skills: Review <i>25 minutes</i>	Review key calculator skills.
Practice: Functions <i>50 minutes</i>	Complete a set of practice problems.
Prepare to Discuss: What Questions Do You Have? <i>5 minutes</i>	Prepare for a discussion.
Discuss: What Questions Do You Have? <i>30 minutes</i>	Discuss ideas about this unit that are still unclear. Help to answer your classmates' questions.
Posttest: Functions <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Functions <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 2: QUADRATIC FUNCTIONS

Lesson and Duration	Description
---------------------	-------------

Lesson and Duration	Description
Quadratic Functions: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Forms of Quadratic Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Express Yourself: Study <i>50 minutes</i>	Express quadratic functions in a variety of forms.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on forms of quadratic functions.
Forms of Quadratic Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Graphing Quadratic Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Putting the Pieces Together: Study <i>50 minutes</i>	Use key components such as vertex, axis of symmetry, and x - and y -intercepts to sketch the graphs of quadratic functions and solve quadratic inequalities.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphing quadratic functions.
Graphing Quadratic Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 3 Transformations: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Getting a Move On: Study <i>50 minutes</i>	Learn how to reflect about the x - and y -axes. Learn about horizontal and vertical shifts and horizontal and vertical stretches.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on transformations.
Transformations: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4 Solving Quadratic Equations: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Answers to Your Questions: Study <i>50 minutes</i>	Use factoring and the quadratic formula to solve an equation. Also relate solutions to zeros and work with complex numbers.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on solving quadratic equations.
Solving Quadratic Equations: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 5 Applications of Quadratic Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
Solving Problems Using Quadratic Functions: Study <i>50 minutes</i>	Set up and solve application problems involving quadratic functions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on applications of quadratic functions.
Applications of Quadratic Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 2 WRAP-UP	
Quadratic Functions: Review <i>50 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Calculator Skills: Review <i>25 minutes</i>	Review key calculator skills.
Practice: Quadratic Functions <i>50 minutes</i>	Complete a set of practice problems.
Prepare to Discuss: What Questions Do You Have? <i>5 minutes</i>	Prepare for a discussion.
Discuss: What Questions Do You Have? <i>30 minutes</i>	Discuss ideas about this unit that are still unclear. Help to answer your classmates' questions.
Posttest: Quadratic Functions <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Quadratic Functions <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 3: POLYNOMIAL AND RATIONAL FUNCTIONS

Lesson and Duration	Description
Polynomial and Rational Functions: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Polynomial Expressions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
What Is a Polynomial?: Study <i>50 minutes</i>	Learn what makes a polynomial and how to test for one.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on polynomial expressions.
Polynomial Expressions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Dividing Polynomials: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Synthetic Doesn't Mean Fake: Study <i>50 minutes</i>	Learn the technique for dividing polynomials and testing for factors.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on dividing polynomials.
Dividing Polynomials: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 3 Solving Polynomial Equations: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
These Roots Grow Deep: Study <i>50 minutes</i>	Find all solutions to polynomial equations.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on solving polynomial equations.
Solving Polynomial Equations: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4 Graphing Polynomial Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
What Goes Up Sometimes Comes Down: Study <i>50 minutes</i>	Explore the behavior of polynomial functions and find key points of the graph of the function.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphing polynomial functions.
Graphing Polynomial Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 5 Rational Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Top and Bottom: Study <i>50 minutes</i>	Identify rational functions, find domain and range, look at asymptotes, and sketch complete graphs.

Lesson and Duration	Description
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on rational functions.
Rational Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 3 WRAP-UP Polynomial and Rational Functions: Review <i>50 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Calculator Skills: Review <i>25 minutes</i>	Review key calculator skills.
Practice: Polynomial and Rational Functions <i>50 minutes</i>	Complete a set of practice problems.
Prepare to Discuss: What Questions Do You Have? <i>5 minutes</i>	Prepare for a discussion.
Discuss: What Questions Do You Have? <i>30 minutes</i>	Discuss ideas about this unit that are still unclear. Help to answer your classmates' questions.
Posttest: Polynomial and Rational Functions <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Polynomial and Rational Functions <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 4: EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Lesson and Duration	Description
Exponential and Logarithmic Functions: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Exponents and Radicals: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Rational Exponents and Radical Expressions: Study <i>50 minutes</i>	Learn the rules of exponents and how to express radicals.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on exponents and radicals.
Exponents and Radicals: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Exponential Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Exponential Functions and Their Graphs: Study <i>50 minutes</i>	Explore the basic exponential graphs.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on exponential functions.
Exponential Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 3 Geometric Sequences: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Leaps and Bounds: Study <i>50 minutes</i>	Learn about geometric sequences and series.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on geometric sequences.
Geometric Sequences: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4 Introduction to Logarithms: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Logarithms: Study <i>50 minutes</i>	Learn how logarithms are used to express exponents.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on logarithms.
Introduction to Logarithms: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 5 Graphs of Logarithmic Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Undoing What You Have Done: Study <i>50 minutes</i>	Learn the graphs of key logarithmic functions.

Lesson and Duration	Description
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphs of logarithmic functions.
Graphs of Logarithmic Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 6 Applications of Logarithms: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Logs Are Natural: Study <i>50 minutes</i>	Solve application problems involving exponential and logarithmic expressions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on applications of logarithms.
Applications of Logarithms: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 4 WRAP-UP Exponential and Logarithmic Functions: Review <i>50 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Calculator Skills: Review <i>25 minutes</i>	Review key calculator skills.
Practice: Exponential and Logarithmic Functions <i>50 minutes</i>	Complete a set of practice problems.
Prepare to Discuss: What Questions Do You Have? <i>5 minutes</i>	Prepare for a discussion.

Lesson and Duration	Description
Discuss: What Questions Do You Have? <i>30 minutes</i>	Discuss ideas about this unit that are still unclear. Help to answer your classmates' questions.
Posttest: Exponential and Logarithmic Functions <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Exponential and Logarithmic Functions <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 5: CONIC SECTIONS

Lesson and Duration	Description
Conic Sections: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Introduction to Conic Sections: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
How Do You Cut a Cone?: Study <i>50 minutes</i>	Explore the various ways a cone can be cut to produce conic sections such as a circle.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on conic sections.
Introduction to Conic Sections: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 2	
Ellipses: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Stretching Circles: Study <i>50 minutes</i>	Learn how ellipses are defined and formed.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on ellipses.
Ellipses: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3	
Hyperbolas: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Turning Inside Out: Study <i>50 minutes</i>	Learn how hyperbolas are defined and formed.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on hyperbolas.
Hyperbolas: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4	
Parabolas: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
A Familiar Friend: Study <i>50 minutes</i>	Learn how parabolas are defined and formed.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on parabolas.

Lesson and Duration	Description
Parabolas: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 5 Systems of Conic Sections: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Finding the Intersections: Study <i>50 minutes</i>	Find the solutions to systems of conic sections.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on systems of conic sections.
Systems of Conic Sections: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 5 WRAP-UP Conic Sections: Review <i>50 minutes</i>	Prepare for the unit test by reviewing key concepts and skills.
Calculator Skills: Review <i>25 minutes</i>	Review key calculator skills.
Practice: Conic Sections <i>50 minutes</i>	Complete a set of practice problems.
Prepare to Discuss: What Questions Do You Have? <i>5 minutes</i>	Prepare for a discussion.
Discuss: What Questions Do You Have? <i>30 minutes</i>	Discuss ideas about this unit that are still unclear. Help to answer your classmates' questions.

Lesson and Duration	Description
Posttest: Conic Sections <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Conic Sections <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

SEMESTER WRAP-UP

Lesson and Duration	Description
Semester Review: Review <i>1 hour, 30 minutes</i>	Prepare for the semester exam by reviewing key concepts covered in Semester 1.
End-of-Semester Test: Semester Exam <i>1 hour</i>	Take a computer-scored exam to demonstrate your mastery of concepts and skills covered in Semester 1.
Teacher-Graded End-of-Semester Test: Semester Exam <i>1 hour</i>	Take a teacher-scored exam to demonstrate your mastery of concepts and skills covered in Semester 1.