

PRECALCULUS, SEMESTER B

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>	6	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>	6	5%
Mastery Test. <i>A mastery test is a computer-scored lesson-level summative assessment.</i>	21	20%
Posttest. <i>A posttest appears at the end of each unit.</i>	6	20%
End-of-Semester Test. <i>An end-of-semester test (EOS) appears at the end of each course.</i>	1	5%
Teacher-Graded Posttest. <i>A posttest that prompts students for written responses appears at the end of each unit.</i>	6	30%

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	47	100%

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

UNIT 1: INTRODUCTION TO TRIGONOMETRY

Lesson and Duration	Description
Introduction to Trigonometry: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Right Triangles: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
All the Right Moves: Study <i>1 hour</i>	Review right triangles and get an introduction to trigonometric ratios.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on trigonometry.
Introduction to Trigonometry: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Angles and Radians: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
A Slice of Pi: Study <i>1 hour</i>	Learn about angles expressed in degrees and radians.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on angles and radians.

Lesson and Duration	Description
Angles and Radians: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Trigonometric Ratios and the Unit Circle: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Terminal Conditions: Study <i>1 hour</i>	Learn the six trigonometric ratios and how the unit circle defines them.
Pythagorean Theorem: Study <i>30 minutes</i>	Review the Pythagorean theorem.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on trigonometric functions and the unit circle.
Trigonometric Functions and the Unit Circle: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 1 WRAP-UP Introduction to Trigonometry: 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: Introduction to Trigonometry <i>1 hour</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: Introduction to Trigonometry <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Introduction to Trigonometry <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 2: TRIGONOMETRIC FUNCTIONS

Lesson and Duration	Description
Trigonometric Functions: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Graphs of Sine and Cosine: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
What Is a Sinusoid Anyway?: Study <i>1 hour</i>	Learn to build the graphs of sine and cosine.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphs of sine and cosine.
Graphs of Sine and Cosine: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 2 Graphs of Other Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Graphing More Trigonometric Functions: Study <i>1 hour</i>	Learn the graphs of the other four trigonometric functions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphs of other functions.
Graphs of Other Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Simple Transformations of Sinusoids: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Stretches, Shifts, and Flips, Oh My!: Study <i>50 minutes</i>	Learn how to transform trigonometric graphs with reflections, shifts, and stretches.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on transformations of periodic graphs.
Simple Transformations of Sinusoids: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4 General Transformations of Periodic Graphs: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
Putting It All Together: Study <i>50 minutes</i>	Learn how to transform trigonometric graphs with reflections, shifts, and stretches.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on transformations of trigonometric functions.
General Transformations of Periodic Graphs: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 2 WRAP-UP	
Trigonometric 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: Trigonometric Functions <i>1 hour</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: Trigonometric Functions <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Trigonometric Functions <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 3: WORKING WITH TRIGONOMETRIC FUNCTIONS

Lesson and Duration	Description
Working with Trigonometric Functions: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Inverse Trigonometric Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Arc! Who Goes There?: Study <i>1 hour</i>	Learn how to solve for angles using the inverse trigonometric ratios.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on inverse trigonometric functions.
Inverse Trigonometric Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Solving Trigonometric Equations: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
2 Pi or Not 2 Pi?: Study <i>1 hour</i>	Learn to find all solutions to a trigonometric equation.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on solving trigonometric equations.
Solving Trigonometric Equations: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 3 Modeling Simple Harmonic Motion: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
You Are Getting Sleepy: Study <i>50 minutes</i>	Explore simple harmonic motion settings.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on simple harmonic motion.
Modeling Simple Harmonic Motion: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 3 WRAP-UP Working with Trigonometric 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: Working with Trigonometric Functions <i>1 hour</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: Working with Trigonometric Functions <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Working with Trigonometric Functions <i>50 minutes</i>	Take a teacher-scored test to assess what you have learned in this unit.

UNIT 4: TRIGONOMETRIC IDENTITIES

Lesson and Duration	Description
Trigonometric Identities: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Identities and Proof: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Overcoming an Identity Crisis: Study <i>1 hour</i>	Learn how to prove identities.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on identities and proof.
Identities and Proof: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 2 Trigonometric Identities: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.

Lesson and Duration	Description
Just the Facts, Ma'am: Study <i>1 hour</i>	Learn the key trigonometric identities.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on trigonometric identities.
Trigonometric Identities: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Applications of Identities: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Use 'Em or Lose 'Em: Study <i>50 minutes</i>	Use the key trigonometric identities to solve trigonometric equations.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on identities.
Applications of Identities: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 4 WRAP-UP Trigonometric Identities: 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: Trigonometric Identities <i>50 minutes</i>	Complete a set of practice problems.

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

UNIT 5: APPLICATIONS OF TRIGONOMETRY

Lesson and Duration	Description
Applications of Trigonometry: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Law of Cosines: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
It's the Law: Study <i>1 hour</i>	Use the law of cosines to solve triangles.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems using the law of cosines.
Law of Cosines: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 2	
Law of Sines: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
The Long Arm of the Law: Study <i>1 hour</i>	Use the law of sines to solve triangles and to explore the ambiguous case.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems using the law of sines.
Law of Sines: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3	
Vectors: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Getting Around: Study <i>1 hour</i>	Use vectors to describe motion.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on vectors.
Vectors: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 5 WRAP-UP	
Applications of Trigonometry: 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: Applications of Trigonometry <i>50 minutes</i>	Complete a set of practice problems.

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

UNIT 6: COMPLEX NUMBERS

Lesson and Duration	Description
Complex Numbers: Unit Overview <i>1 minute</i>	Read the unit overview.
LESSON 1 Polar Coordinates: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
The Polar Express: Study <i>1 hour</i>	Learn to use polar coordinates to express locations of points.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on polar coordinates.
Polar Coordinates: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.

Lesson and Duration	Description
LESSON 2 Graphs of Polar Functions: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
From Lemniscates to Limaçons: Study <i>1 hour</i>	Produce a variety of new graphs using polar functions.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on graphs of polar functions.
Graphs of Polar Functions: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 3 Polar Form of Complex Numbers: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
A Good Complex to Have: Study <i>1 hour</i>	Express complex numbers in polar form.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on the polar form of complex numbers.
Polar Form of Complex Numbers: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 4 Arithmetic of Complex Numbers: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
This Math Isn't Complex: Study <i>1 hour</i>	Add, subtract, multiply, and divide complex numbers.

Lesson and Duration	Description
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on the arithmetic of complex numbers.
Arithmetic of Complex Numbers: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
LESSON 5 Powers and Roots of Complex Numbers: Lesson Overview <i>5 minutes</i>	Read the lesson objectives.
Feel the Power: Study <i>1 hour</i>	Express powers and roots of complex numbers.
Lessons Learned: Checkup <i>50 minutes</i>	Complete a set of practice problems on powers and roots of complex numbers.
Powers and Roots of Complex Numbers: Mastery Test <i>40 minutes</i>	Take a quiz to assess your understanding of the material.
UNIT 6 WRAP-UP Complex Numbers: 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: Complex Numbers <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: Complex Numbers <i>50 minutes</i>	Take a computer-scored test to assess what you have learned in this unit.
Teacher-Graded Posttest: Complex Numbers <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>2 hours</i>	Prepare for the semester exam by reviewing key concepts covered in Semester 2.
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 2.
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 2.