

Pre-calculus

Pre-calculus is a full-year, high school credit course that is intended for the student who has successfully mastered the core algebraic and conceptual geometric concepts covered in the prerequisite courses: Algebra I, Geometry, and Algebra II. The course primarily focuses on the skills and methods of analytic geometry and trigonometry while investigating further relationships in functions, probability, number theory, limits, and the introduction of derivatives.

Upon successfully completing the course, students should have mastered the following concepts:

- Perform operations on functions including composition and inverses.
- Graph, evaluate, and solve exponential and logarithmic functions and equations.
- Utilize the unit circle in evaluating trigonometric identities; prove trigonometric identities; graph trigonometric functions and their inverses.
- Solve application problems involving right triangle trigonometry, special right triangles, and law of sines and cosines.
- Convert between Cartesian and polar forms; graph equations in polar coordinates.
- Graph and solve quadratic equations that include conic sections.
- Calculate probabilities, combinations, and permutations.
- Calculate summations and limits of functions.
- Relate analytical operations of limits, slope of a tangent line, and the definition of a derivative.

Unit 1: Relations and Functions	
Assignments	
Pre-calculus	1. Course Overview
	2. Ordered-Pair Numbers: Relations
	3. Ordered-Pair Numbers: Functions
	4. Ordered-Pair Numbers: Rules of Correspondence
	5. Quiz 1: Relations and Functions
	6. Algebra of Functions: Notation
	7. Algebra of Functions: Arithmetic
	8. Algebra of Functions: Composition
	9. Algebra of Functions: Inverse
	10. Quiz 2: Relations and Functions
	11. Special Project*
	12. Test
	13. Alternate Test*
	14. Glossary and Credits

Unit 2: Functions	
Assignments	
Pre-calculus	1. Linear Functions: Graphs
	2. Linear Functions: Equations
	3. Quiz 1: Linear Functions
	4. 2nd-Degree Functions: Solutions
	5. Relationships Between Zeros and Coefficients
	6. Quadratic Inequalities
	7. Quiz 2: Second-Degree Functions
	8. Polynomial Functions
	9. Nth-Degree Equations
	10. Solving Polynomial Equations
	11. Quiz 3: Polynomial Functions
	12. Complex Numbers
	13. Operations with Complex Numbers
	14. Conjugates and Polynomial Identities
	15. Distance and Midpoint
	16. Quiz 4: Complex Numbers
	17. Rational Inequalities
	18. Greatest Integer Function
	19. Exponential Function
	20. Logarithmic Function
	21. Function Combinations
	22. Quiz 5: Special Functions
	23. Special Project*
	24. Test
	25. Alternate Test*
	26. Glossary and Credits

Unit 3: Trigonometric Functions		
Assignments		
Pre-calculus	1. Definition of the Trigonometric Functions	10. Quiz 5: Quadrantal Angles
	2. Quiz 1: Trigonometric Functions	11. Special Angles
	3. Evaluation of Functions	12. Quiz 6: Special Angles
	4. Quiz 2: Evaluation of Functions	13. Radian Measure
	5. Angle Location	14. Quiz 7: Radian Measure
	6. Quiz 3: Angle Location	15. Special Project*
	7. Reduction Formulas	16. Test
	8. Quiz 4: Reduction Formulas	17. Alternate Test*
	9. Quadrantal Angles	18. Glossary and Credits

Unit 4: Circular Functions and Their Graphs		
Assignments		
Pre-calculus	1. Circular Functions	12. Amplitude of Circular Functions
	2. Quiz 1: Circular Functions	13. Quiz 6: Amplitude of Circular Functions
	3. Circular Functions of Special Angles	14. Period of Circular Functions
	4. Quiz 2: Circular Functions of Special Angles	15. Quiz 7: Period of Circular Functions
	5. Graphs of Sin and Cos	16. Phase Shift of Circular Functions
	6. Quiz 3: Graphs of Sin and Cos	17. Quiz 8: Phase Shift of Circular Functions
	7. Other Graphs	18. Special Project*
	8. Quiz 4: Other Graphs	19. Test
	9. Applications	20. Alternate Test*
	10. Parametric Equations	21. Glossary and Credits
	11. Quiz 5: Applications	

Unit 5: Identities and Functions of Multiple Angles		
Assignments		
Pre-calculus	1. Reciprocal Relations	12. Quiz 6: Additional Sum and Difference Formulas
	2. Quiz 1: Reciprocal Relations	13. Double- and Half-Angle Formulas
	3. Pythagorean Relations	14. Quiz 7: Double- and Half-Angle Formulas
	4. Quiz 2: Pythagorean Relations	15. Identities
	5. Quotient Relations	16. Quiz 8: Identities
	6. Quiz 3: Quotient Relations	17. Trigonometric Equations
	7. Trigonometric Identities	18. Quiz 9: Trigonometric Equations
	8. Quiz 4: Trigonometric Identities	19. Special Project*
	9. Cosine of the Sum of Two Angles	20. Test
	10. Quiz 5: Cosine of the Sum of Two Angles	21. Alternate Test*
	11. Additional Sum and Difference Formulas	22. Glossary and Credits

Unit 6: Semester Review and Exam		
Assignments		
Pre-calculus	1. Review	3. Alternate Exam—Form A*
	2. Exam	4. Alternate Exam—Form B*

Unit 7: Application of Trigonometric Functions		
Assignments		
Pre-calculus	1. Trigonometric Functions of Any Angle	12. Applications of Vectors
	2. Quiz 1: Trigonometric Functions of Any Angle	13. More Applications
	3. More Trigonometric Functions of Any Angle	14. Quiz 5: More Applications
	4. Quiz 2: Trigonometric Functions	15. Inclined Plane Application
	5. Applied Problems	16. Navigation Application
	6. Law of Cosines	17. Quiz 6: Additional Application Problems
	7. Quiz 3: Law of Cosines	18. Special Project*
	8. Law of Sines	19. Test
	9. Quiz 4: Law of Sines	20. Alternate Test*
	10. Vectors	21. Glossary and Credits
	11. Operations with Vectors	

Unit 8: Inverse Trigonometric Functions and Polar Coordinates		
Assignments		
Pre-calculus	1. The Inverse Sine Function	15. Converting Cartesian Equations to Polar Equations
	2. Quiz 1: The Inverse Sine Function	16. Quiz 8: Converting Cartesian Equations to Polar Equations
	3. The Inverse Cosine Function	17. Converting Polar Equations to Cartesian Equations
	4. Quiz 2: The Inverse Cosine Function	18. Quiz 9: Converting Polar Equations to Cartesian Equations
	5. The Inverse Tangent Function	19. Graphing Polar Equations
	6. Quiz 3: The Inverse Tangent Function	20. Quiz 10: Graphing Polar Equations
	7. Other Inverse Functions	21. Project: De Moivre's Theorem
	8. Quiz 4: Other Inverse Functions	22. Special Project*
	9. Graphs of Inverse Functions	23. Test
	10. Quiz 5: Graphs of Inverse Functions	24. Alternate Test*
	11. Graphing Polar Coordinates	25. Glossary and Credits
	12. Quiz 6: Graphing Polar Coordinates	
	13. Converting Coordinates	
	14. Quiz 7: Converting Coordinates	

Unit 9: Quadratic Equations		
Assignments		
Pre-calculus	1. The Circle	13. The Parabola Applied
	2. The Circle Continued	14. The Hyperbola
	3. Equation from Three Points	15. Quiz 2: Quadratic Equations
	4. Equation from Three Points Applied	16. Translation
	5. The Ellipse	17. Translation of Equations
	6. The Ellipse: Standard Form	18. Rotation
	7. The Ellipse: General Form	19. Rotation of Equations
	8. The Ellipse Applied	20. Quiz 3: Quadratic Equations
	9. Quiz 1: Quadratic Equations	21. Special Project*
	10. The Parabola	22. Test
	11. The Parabola Continued	23. Alternate Test*
	12. The Parabola: Standard Form	24. Glossary and Credits

Unit 10: Counting Principles																						
Pre-calculus	Assignments																					
	<table border="0"> <tr> <td>1. Definitions, Sample Spaces, and Probability</td> <td>11. Quiz 2: Probability</td> </tr> <tr> <td>2. Addition of Probabilities</td> <td>12. Arithmetic and Geometric Sequences</td> </tr> <tr> <td>3. Multiplication of Probabilities</td> <td>13. Summation</td> </tr> <tr> <td>4. Quiz 1: Probability</td> <td>14. Arithmetic and Geometric Series</td> </tr> <tr> <td>5. Definitions</td> <td>15. Quiz 3: Sequences and Series</td> </tr> <tr> <td>6. Permutation of N Things: Different</td> <td>16. Proofs by Mathematical Induction</td> </tr> <tr> <td>7. Permutation of N Things: Not All Different</td> <td>17. Special Project</td> </tr> <tr> <td>8. Circular Permutations</td> <td>18. Test</td> </tr> <tr> <td>9. Combinations</td> <td>19. Alternate Test</td> </tr> <tr> <td>10. Binomial Theorem</td> <td>20. Glossary and Credits</td> </tr> </table>	1. Definitions, Sample Spaces, and Probability	11. Quiz 2: Probability	2. Addition of Probabilities	12. Arithmetic and Geometric Sequences	3. Multiplication of Probabilities	13. Summation	4. Quiz 1: Probability	14. Arithmetic and Geometric Series	5. Definitions	15. Quiz 3: Sequences and Series	6. Permutation of N Things: Different	16. Proofs by Mathematical Induction	7. Permutation of N Things: Not All Different	17. Special Project	8. Circular Permutations	18. Test	9. Combinations	19. Alternate Test	10. Binomial Theorem	20. Glossary and Credits	
	1. Definitions, Sample Spaces, and Probability	11. Quiz 2: Probability																				
	2. Addition of Probabilities	12. Arithmetic and Geometric Sequences																				
	3. Multiplication of Probabilities	13. Summation																				
	4. Quiz 1: Probability	14. Arithmetic and Geometric Series																				
	5. Definitions	15. Quiz 3: Sequences and Series																				
	6. Permutation of N Things: Different	16. Proofs by Mathematical Induction																				
	7. Permutation of N Things: Not All Different	17. Special Project																				
	8. Circular Permutations	18. Test																				
	9. Combinations	19. Alternate Test																				
	10. Binomial Theorem	20. Glossary and Credits																				
	Unit 11: Calculus and Review																					
	Pre-calculus	Assignments																				
		<table border="0"> <tr> <td>1. Functional Notation</td> <td>11. Review: Identities, Multiple Angle Functions</td> </tr> <tr> <td>2. Difference Quotient</td> <td>12. Review: Inverse Trig Functions; Polar Coordinates; Quadratics</td> </tr> <tr> <td>3. Limits</td> <td>13. Review: Probability and Calculus</td> </tr> <tr> <td>4. Quiz 1: Limits</td> <td>14. Quiz 3: Reviews</td> </tr> <tr> <td>5. Slope of a Curve</td> <td>15. Special Project</td> </tr> <tr> <td>6. Slope of a Line</td> <td>16. Test</td> </tr> <tr> <td>7. Angle Between Curves</td> <td>17. Alternate Test</td> </tr> <tr> <td>8. Quiz 2: Slopes and Curves</td> <td>18. Glossary and Credits</td> </tr> <tr> <td>9. Review: Relations and Functions</td> <td></td> </tr> <tr> <td>10. Review: Trigonometric and Circular Functions</td> <td></td> </tr> </table>	1. Functional Notation	11. Review: Identities, Multiple Angle Functions	2. Difference Quotient	12. Review: Inverse Trig Functions; Polar Coordinates; Quadratics	3. Limits	13. Review: Probability and Calculus	4. Quiz 1: Limits	14. Quiz 3: Reviews	5. Slope of a Curve	15. Special Project	6. Slope of a Line	16. Test	7. Angle Between Curves	17. Alternate Test	8. Quiz 2: Slopes and Curves	18. Glossary and Credits	9. Review: Relations and Functions		10. Review: Trigonometric and Circular Functions	
		1. Functional Notation	11. Review: Identities, Multiple Angle Functions																			
		2. Difference Quotient	12. Review: Inverse Trig Functions; Polar Coordinates; Quadratics																			
		3. Limits	13. Review: Probability and Calculus																			
		4. Quiz 1: Limits	14. Quiz 3: Reviews																			
		5. Slope of a Curve	15. Special Project																			
6. Slope of a Line		16. Test																				
7. Angle Between Curves		17. Alternate Test																				
8. Quiz 2: Slopes and Curves		18. Glossary and Credits																				
9. Review: Relations and Functions																						
10. Review: Trigonometric and Circular Functions																						
Unit 12: Semester Review and Exam																						
Pre-calculus		Assignments																				
		<table border="0"> <tr> <td>1. Review</td> <td>3. Alternate Exam—Form A*</td> </tr> <tr> <td>2. Exam</td> <td>4. Alternate Exam—Form B*</td> </tr> </table>	1. Review	3. Alternate Exam—Form A*	2. Exam	4. Alternate Exam—Form B*																
		1. Review	3. Alternate Exam—Form A*																			
2. Exam		4. Alternate Exam—Form B*																				
Unit 13: Final Exam																						
Pre-calculus	Assignments																					
	<table border="0"> <tr> <td>1. Exam</td> <td>3. Alternate Exam—Form B*</td> </tr> <tr> <td>2. Alternate Exam—Form A*</td> <td></td> </tr> </table>	1. Exam	3. Alternate Exam—Form B*	2. Alternate Exam—Form A*																		
	1. Exam	3. Alternate Exam—Form B*																				
2. Alternate Exam—Form A*																						