Odysseyware®

CURRICULUM OVERVIEW

Pre-calculus

Table of Contents

Pre-calculus Course Overview

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.

- **Relations and Functions**: Student will examine functions, inverses of functions and combine functions to verify inverses, as well as distinguish between linear and quadratic functions.
- **Functions**: Student will solve polynomials using the quadratic theorem, remainder theorem and factor theorem, identify graphs of different polynomial equations and inequalities, and understand complex numbers.
- **Trigonometric Functions**: Student will identify and solve for missing components of trigonometric functions, calculating trigonometric values for different angles and relate degrees to radians, and radians to degrees.
- **Circular Functions and their Graphs**: Student will use parametric equations with trigonometric operations to model and solve problems, and calculate amplitude, period, and phase shift for graphed trigonometric functions.
- **Identities and Functions of Multiple Angles**: Student will simplify trigonometric expressions utilizing trigonometric identities, and double and half-angel formulas, and combine the identities and angle formulas learned in this unit to prove trigonometric relationships.
- **Application of Trigonometric Functions**: Student will solve problems using trigonometric functions and combine trigonometric functions and vectors to solve incline plane problems and navigation problems.
- **Inverse Trigonometric Functions and Polar Coordinates**: Student will solve for unknowns using inverse trigonometric functions, recognize their graphs, and convert equations from Cartesian to polar coordinates, and from polar to Cartesian coordinates.
- **Quadratic Equations**: Student will identify properties and equations of circles, ellipses, parabolas and hyperbolas, and calculate point rotations and apply them to equations.
- **Counting Principles**: Student will distinguish between mutually exclusive, independent and dependent events, and between combination and permutation, and use the explicit formula and the recursive formula to find the nth term as well as the general term of an arithmetic sequence, or geometric sequence.
- **Calculus**: Student will solve functions involving numbers and conditions, understand limit notation, and evaluate limits using the limit theorems, and find the slope of curves, and calculate the angle between two curves

Pre-calculus

Unit 1: Relations and Functions

Assignments

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

Pre-calculus

Unit 2: Functions

Assignments

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

Pre-calculus

Unit 3: Trigonometric Functions

Assignments

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

Pre-calculus

Unit 4: Circular Functions and Their Graphs

Assignments

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

Pre-calculus

Unit 5: Identities and Functions of Multiple Angles

Assignments

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

Pre-calculus

Unit 6: Semester Review and Exam

Assignments

1. Review
2. Exam
3. Alternate Exam—Form A*
4. Alternate Exam—Form B*

Pre-calculus

Unit 7: Application of Trigonometric Functions

Assignments

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

Pre-calculus

Unit 8: Inverse Trigonometric Functions and Polar Coordinates

Assignments

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

Pre-calculus

Unit 9: Quadratic Equations

Assignments

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

Pre-calculus

Unit 10: Counting Principles

Assignments

1. Definitions, Sample Spaces, and Probability
2. Addition of Probabilities
3. Multiplication of Probabilities
4. Quiz 1: Probability
5. Definitions
6. Permutation of N Things: Different
7. Permutation of N Things: Not All Different
8. Circular Permutations
9. Combinations
10. Binomial Theorem
11. Quiz 2: Probability
12. Arithmetic and Geometric Sequences
13. Summation
14. Arithmetic and Geometric Series
15. Quiz 3: Sequences and Series
16. Proofs by Mathematical Induction
17. Special Project
18. Test
19. Alternate Test
20. Glossary and Credits

Pre-calculus

Unit 11: Calculus and Review

Assignments

1. Functional Notation
2. Difference Quotient
3. Limits
4. Quiz 1: Limits
5. Slope of a Curve
6. Slope of a Line
7. Angle Between Curves
8. Quiz 2: Slopes and Curves
9. Review: Relations and Functions
10. Review: Trigonometric and Circular Functions
11. Review: Identities, Multiple Angle Functions
12. Review: Inverse Trig Functions; Polar Coordinates; Quadratics
13. Review: Probability and Calculus
14. Quiz 3: Reviews
15. Special Project
16. Test
17. Alternate Test
18. Glossary and Credits

Pre-calculus

Unit 12: Semester Review and Exam

Assignments

1. Review
2. Exam
3. Alternate Exam—Form A*
4. Alternate Exam—Form B*

Pre-calculus

Unit 13: Final Exam

Assignments

1. Exam
2. Alternate Exam—Form A*
3. Alternate Exam—Form B*

(*) Indicates alternative assignment