Pre-Calculus: Part 1

Course number: MA061_21_1
Credits: .5 credit
Prerequisites: Algebra II

INSTRUCTIONAL TEAM

Our Academic Advisors are also available to help you when you need it. They are trained to provide answers to your questions about the course or program.
Phone: 1-800-224-7234
Hours: 8:30AM – 8:30PM (Eastern Standard Time), Monday-Friday

MAIL

James Madison High School
5051 Peachtree Corners Circle, Suite 200
Norcross, GA 30092

TEXTBOOK

Precalculus Common Core Edition. Glencoe McGraw-Hill Education, 2014.

COURSE DESCRIPTION

Pre-Calculus weaves together previous study of algebra, geometry, and mathematical functions into a preparatory course for calculus. The course focuses on mastery of critical skills and exposure to new skills necessary for success in subsequent math courses. Throughout the course, Common Core standards are taught and reinforced as the student learns how to apply the concepts in real life situations. Topics include fundamental concepts of Algebra, functions and graphs, polynomials and rational functions, exponential and logarithmic functions, trigonometric functions, analytic trigonometry, topics in trigonometry, systems of equations and inequalities, matrices and determinants, conic sections and analytic geometry, sequences, induction, probability, and an introduction to Calculus. Pre-Calculus Part I includes six multiple choice lesson exams and a midterm written exam that requires the student to demonstrate understanding by showing work.

LEARNING OBJECTIVES

After completing Pre-Calculus: Part 1, students will be able to:

- Recall and apply basic algebra skills
- Explore symmetries of graphs, determine continuity and average rates of change of functions, use limits to describe end behavior, and find inverse functions algebraically and graphically
- Model real-world data with polynomial functions, use the Remainder and Factor Theorems, find real and complex zeros of polynomial functions, analyze and graph rational functions, and solve polynomial and rational inequalities
- Evaluate, analyze and graph exponential and logarithmic functions, apply properties of Logarithms, solve exponential and logarithmic equations, and model data using exponential, logarithmic and logistic functions
- Use trigonometric functions to solve right triangles, find values of trigonometric functions for any angle, and graph trigonometric and inverse trigonometric functions
- Use and verify trigonometric identities, solve trigonometric equations, use sum and difference
- identities to evaluate trigonometric expressions and solve equations, and use double-angle, power-reducing, half-angle, and product-sum identities to evaluate trigonometric expressions and solve equations

LESSONS	TOPICS
Lesson 1: Preparing for Precalculus	Review and Expand: Sets, Operations with Complex Numbers, Quadratic Functions and Equations, nth Roots and Real Exponents, System of Linear Equations and Inequalities, Matrix Operations, Probability with Permutations and Combinations, and Statistics
Lesson 2: Functions from a Calculus Perspective	Review and Expand: Functions, Analyzing Graphs of Functions and Relations, Continuity, End Behavior, Limits, Extrema and Average Rates of Change, Parent Functions, Transformations, Function Operations and Composition of Functions Inverse Relations and Functions.
Lesson 3: Power, Polynomial, and Rational Functions	Review and Expand: Power and Radical Functions, Polynomial Functions, Remainder and Factor Theorems, Zeros of Polynomial Functions, Rational Functions, Nonlinear Inequalities
Lesson 4: Exponential and Logarithmic Functions	Review and Expand: Exponential Functions, Logarithmic Functions, Properties of Logarithms, Exponential and Logarithmic Equations Modeling with Nonlinear Regression
Lesson 5: Trigonometric Functions	Right Triangle Trigonometry, Degrees and Radians, Trigonometric Functions on the Unit Circle, Graphing Sine and Cosine Functions, Graphing Other Trigonometric Functions, Inverse Trigonometric Functions, Laws of Sines and Cosines
Lesson 6: Trigonometric Identities and Equations	Trigonometric Identities, Verifying Trigonometric Identities, Solving Trigonometric Equations, Sum and Difference Identities, Multiple-Angle and Product-to-Sum Identities

GRADING

The following point totals correspond to the following grades:

POINTS	GRADE
100-90	A
89-80	B
79-70	C
65-69	D
Below 65	F

James Madison High School allows 2 attempts on exams. If a student is not satisfied with his/her score on the 1st attempt, an exam may be resubmitted. The 2nd attempt is not required as long as the final course average is above 65%. The higher of the 2 attempts will be the score that counts towards the final average.

Exams are timed and once you begin an exam, the timer runs continuously, even if you leave the course. Refer to the exam instructions for the time limit (in most cases 3 hours), but the time limit cannot be spread over multiple days.

GRADE WEIGHT

TOPIC	ACTIVITY	PERCENTAGE
Lesson 1: Title	MC Quiz	12%
Lesson 2: Title	MC Quiz	12%
Lesson 3: Title	MC Quiz	12%
Lesson 4: Title	MC Quiz	12%
Lesson 5: Title	MC Quiz	12%
Lesson 6: Title	MC Quiz	12%
Midterm Exam	Midterm Exam	28%

ACADEMIC AND COURSE POLICIES

Please see the Academic Policies section in the James Madison High School Catalog for information on Course policies, including the Exam/Assignment Retake Policy, Grading Policy, Academic Honesty Policy, and Student Conduct Policy.

Pre-Calculus: Part 2

Course number: MA062_21_1
Credits: .5 credit
Prerequisites: Pre-Calculus: Part 1

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LEARNING OBJECTIVES

After completing Pre-Calculus: Part 2, students will be able to:

- Multiply matrices, and find determinants and inverses of matrices, solve systems of linear equations, write partial fraction decomposition of rational expressions, and use linear programming to solve applications
- Use equations to identify types of conic sections, graph rotated conic sections, and solve problems related to the motion of projectiles
- Represent and operate with vectors algebraically in the two- and three-dimensional coordinate systems, find the projection of one vector onto another, find cross products of vectors in space and find volumes of parallelepipeds, and find the dot products of and angles between vector
- Graph polar coordinates and equations, convert between polar and rectangular coordinates and equations, identify polar equations of conic sections, and convert complex numbers between polar and rectangular form
- Relate sequences and functions, represent and calculate sums of series with sigma notation, use arithmetic and geometric sequences and series, prove statements by using mathematical induction, and expand powers by using the Binomial Theorem
- Evaluate limits of polynomial and rational functions, find instantaneous rates of change, find and evaluate derivatives of polynomial functions, approximate the area under a curve, and find antiderivatives, and use the Fundamental Theorem of Calculus.

LESSONS	TOPICS
Lesson 1: Systems of Equations and Matrices	Multivariable Linear Systems and Row Operations, Solving Linear Systems using Inverses and Cramer's Rule, Partial Fractions and Linear Optimization
Lesson 2: Conic Section and Parametric	Parabolas, Ellipses and Circles, Hyperbolas, Rotations of Conic Sections, and Parametric Equations
Lesson 3: Vectors	Vectors, Vectors in the Coordinate Plane, Dot Product and Vector Projections, Vectors in Dimensional Space, and Dot and Cross Products of Vectors in Space
Lesson 4: Polar Coordinates and Complex Numbers	Polar Coordinates, Graphs of Polar Equations, Polar & Rectangular Forms of Equations, Polar Forms of Conic Sections, and Complex Numbers and DeMoivre's Theorem
Lesson 5: Sequences & Series	Sequences, Series and Sigma Notation, Arithmetic Sequences and Series, Geometric Sequences & Series, Mathematical Induction, Binomial Theorem, and Functions as Infinite Series
Lesson 6: Limits & Derivatives	Estimating Limits Algebraically, Tangent Lines and Velocity, Derivatives, Area Under a Curve and Integration, and The Fundamental Theorem of Calculus

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GRADE WEIGHT

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Lesson 1: Title	MC Quiz	12%
Lesson 2: Title	MC Quiz	12%
Lesson 3: Title	MC Quiz	12%
Lesson 4: Title	MC Quiz	12%
Lesson 5: Title	MC Quiz	12%
Lesson 6: Title	MC Quiz	12%
Final Exam	Assignment	28%

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