

Course Name: Math Analysis

Course Code: H2311 Grades: 11-12 Level: Accelerated Year: 5X Credits: 5

Course Description: The course is designed for the academically gifted student with a strong mathematics background and self-motivation. Topics include the study of algebraic, exponential, logarithmic, trigonometric, and circular functions. The inverses of functions and operations on functions are emphasized. The general properties of functions, graphs of functions, and limits are major themes. Also included are an exploration of analytic geometry, mathematical induction, the binomial theorem, sequences and series, matrices and determinants. Applications, such as those in probability and statistics, are often used to develop student problem solving abilities.

Prerequisite: Algebra II

Course Proficiencies: The following is a list of the proficiencies that describe what students are expected to know and be able to do as a result of successfully completing this course. The proficiencies are the basis of the assessment of student achievement. The learner will demonstrate the ability to:

1. Fit a model to data (exponential, logarithmic, and trigonometric functions). *A-CED.2, A-REI.10, F-BF.1c*
2. Solve systems of non-linear inequalities. *A-REI.12, A-CED.3, A-REI.11*
3. Perform transformations of parent functions and analyze their domain, range and graph behavior (increasing and decreasing intervals, continuity, and extrema). *F-BF.3*
4. Add, subtract, multiply and divide polynomials. *A-APR.1*
5. Solve, graph, and analyze polynomial functions using polynomial long division, synthetic division, factoring, the Rational Root Theorem, the Remainder Theorem, and the Fundamental Theorem of Algebra. *N-CN.7, A-SSE.3a & b, A-REI.4, F-IF-7a, F-IF.8a, A-APR.3, A-APR.2*
6. Discuss and analyze arithmetic and geometric series. *F-IF.3, F-BF.1a, F-BF.2, F-LE.2*
7. Explore piece-wise functions. *F-IF.7b*
8. Graph exponential and logarithmic functions and use their properties to solve real-life problems (compound interest, growth and decay). *F-LE.1, F-LE.3, F-LE.4, F-LE.5, A-SSE.1b, F-BF.5*
9. Use properties of radicals and/or rational exponents to solve equations and apply to real-life problems. *N-RN.1, N-RN.2, A-SSE.3c, F-IF.8b*
10. Use exponent properties (integral and rational) and simplify radicals. *N-RN.1, N-RN.2*
11. Perform operations with rational expressions and solve rational equations. *A-APR.7, A-REI.2*
12. Use the relationship between the sine and cosine of complementary angles to solve real-life problems. *G-SRT.7, G-SRT.8, G-CO.8*
13. Use inverse trigonometric functions to solve right triangles. *G-SRT.8*

Math Analysis Proficiencies – cont'd.

14. Solve and classify oblique triangles using the Law of Sines and Law of Cosines.
G-SRT.10, G-SRT.11
15. Graph and analyze periodic functions and their inverses. **F-TF.4, F-TF.5, F-TF.6**
16. Measure angles in standard position using degree and radian measure. Derive the unit circle and apply the definitions of reference angles and conterminal angles towards solving real-life problems. **F-TF.1, F-TF.2**
17. Find arc lengths and sector areas of circles. **G-C.5**
18. Solve trigonometric equations and simplify trigonometric expressions using identities.
F-TF.8, F-TF.9
19. Compare and contrast rectangular vs. polar coordinates and their graphs. **N-CN.4**
20. Graph and differentiate between circles, ellipses, hyperbolas, and parabolas. **G-GPE.1, G-GPE.2, G-GPE.3**
21. Define the limit of a function graphically, analytically, numerically, and verbally.
22. Construct and interpret two-way frequency tables. **S-CP.4**
23. Explore the Binomial Expansion Theorem as it applies to probability. **A-APR.5**
24. Expand the exploration of permutations and combinations to include circular permutations. **S-CP.9**
25. Analyze data sets relative to shape, center, and spread. **S-ID.2, S-ID.3**
26. Use the mean and standard deviation of a set of data to fit it to a normal distribution.
S-ID.4
27. Find the probability of independent and dependent events. **S-CP.3, S-CP.5**
28. Explain and apply conditional probability and compare it to experimental data. **S-CP.3**
29. Apply mathematics in practical situations and in other disciplines.
30. Use critical thinking skills to make sense of problems, solve them, and communicate processes. **CRP 2, 4 & 8.**
31. Use technology to gather, analyze, and communicate mathematical information.
8.1.12.A.3, 8.1.12.C.1

Assessment: Evaluation of student achievement in this course will be based on the following:

- A. Tests
 - B. Projects
 - C. Classwork
 - D. Maintaining a folder/notebook
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- A. Tests are usually given at the end of a unit. These generally require a full period to complete.
 - B. During the course, special projects such as research papers, outlines, surveys, and computer-based projects may be assigned to students. These activities are major in scope. The grades on projects will count as major grades when determining the course grade.
 - C. Classwork, evidenced by completed and carefully presented daily work and by the meeting of daily responsibilities, is an essential part of learning. The day-to-day work included as classwork may involve quizzes, the written results of learning activities, graded homework, and assessments of learning observed during class. The more a student is involved, the more learning that takes place.

Math Analysis Proficiencies – *cont'd*.

- D. Folders/Notebooks must be maintained by students. These typically include notes and assignments kept in an organized fashion.

Board Adopted Materials:

Textbook Title: **Glencoe Precalculus**

Author: Carter, Cuevas, Day, Malloy, Bryan, Holliday, & Hovsepian

Publisher: McGraw-Hill

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