COURSE PROFICIENCY OUTLINE

ELEMENTARY FUNCTIONS AND ANALYSIS- 2322

College Prep 5 Credits

Purpose

This course is designed for the student who has successfully completed Algebra II with a C, and desires a fourth year of mathematics. Its purpose is to unify the previous mathematics courses and give some introduction to Pre-Calculus. Trigonometry is taught for half the course and the other half is used to extend the Algebra concepts previously taught.

I. Student Outcomes 4.2, 4.3, 4.4, 4.5

A. The student will develop and work with properties of coordinate geometry.
B. The student will reinforce concepts of function notation and graphs of functions.
C. The student will develop an understanding of the trigonometric functions and their applications to triangles.
D. The student will extend knowledge of exponents and logarithms.
E. The student will develop an understanding of vectors, complex numbers and probability.

II. Content 4.2, 4.3, 4.4, 4.5

A. Coordinate Geometry
1. Distance and midpoint
2. Slope
3. Parallel and perpendicular lines
4. Equation of line
5. Geometric proofs with coordinates

B. Coordinate Geometry of Conic Sections
1. Quadratic factoring
2. Parabolas
3. Circles
4. Ellipse
5. Hyperbola
6. Intersection of lines and conic sections
7. Intersection of two circles

C. Inequalities and their Graphs
1. Linear inequalities in one variable
2. Absolute value
3. Quadratic inequalities in one variable
4. Linear and quadratic inequalities in two variables
5. Using discriminants in graphing

D. Functions
1. Function notation
2. Composite functions
3. Inverse functions

E. Circle Trigonometry
1. Measurement of angles
2. Sectors
3. Polar coordinates
4. Sine and cosine
5. Other trigonometry functions
6. Trigonometry relationships
7. Trigonometry equations

F. Triangle Trigonometry
   1. Right triangle trigonometry
   2. Area of triangles
   3. Law of Sines
   4. Law of Cosines
   5. Inverse trigonometry functions

G. Exponents
   1. Properties of exponents
   2. Logarithms
   3. Properties of logs
   4. Logs as a computational tool

H. Graphs of Functions
   1. Graphing: $y=f(x) \pm g(x)$
   2. Graphing: $y-K = f(x-h)$
   3. Graphing: $y=cf(x)$ and $y=f(cx)$
   4. Graphing: $y=f(x)$ and $y=f(-x)$ and $y=[f(x)]$
   5. Symmetry
   6. Graphs of $y = \frac{1}{f(x)}$ and asymptotes

I. Techniques of Equation Solving
   1. Solving: $af(x)=6$ (linear)
   2. Solving: $a[f(x)]^2 + bf(x) + c = 0$ (quadratic)
   3. Simultaneous linear equations
   4. Graphic solutions

J. Trigonometric Addition Formulas
   1. $\sin (A \pm B)$; $\cos (A \pm B)$
   2. $\tan (A + B)$
   3. Equation solving with trigonometry formulas

K. Complex Numbers
   1. Complex number arithmetic
   2. Roots of quadratic equations with complex coefficients
   3. Argand diagrams
   4. Power of complex numbers
   5. Roots of complex numbers

L. Sequences and Series
   1. Arithmetic and geometric series
   2. Sums of arithmetic and geometric series
   3. Limits of infinite sequences
   4. Sums of infinite series
   5. Sigma notation

M. Probability
   1. Counting permutations
   2. Combinations
   3. Probability
   4. Binomial theorem
   5. Binomial series to probability

N. Polynomials
   1. Solving polynomials by factoring
   2. Graphing polynomials
   3. Remainder and factor theorems
   4. Synthetic division
   5. Rational roots
   6. Approximating roots
   7. General results for polynomial equations

O. Curve Sketching
   1. Parametric equations of curves
   2. Polar equations and graphs
   3. Limits
   4. Slope of curves

III. Materials

A. Text: Holt Algebra 2 With Trigonometry, Holt, Rinehart & Winston Company
B. Notebook and pencil must be provided by the student.
C. Calculators will be provided when necessary.

IV. Evaluation

A. The student will be expected to complete classwork, homework, keep a notebook and take tests and quizzes. These will be checked and reviewed by the teacher.
B. The student will be expected to demonstrate an acceptable level of proficiency in the objectives and content of this course.
C. The student will be expected to demonstrate at all times appropriate classroom behavior such as self-control, respect for others, respect for property and a mature attitude.
D. The student will be expected to adhere to the school rules and regulations for behavior and the district policy for attendance.
E. Students will be required to successfully pass the High School Proficiency Assessment as mandated in the graduation law (N.J.S.A. 6:8-4.2).
F. Students who fail the HSPA examination will be placed in a Basic Skills Math class as required by N.J.S.A. 6:8-4.2. There will be no exceptions to this requirement.
G. The student will be expected to take a comprehensive final exam covering the entire school year's work. This exam will count at 1/5 of the final grade.
H. The final grade represents the teacher's professional judgment of the student's performance and all of the aforementioned activities and/or requirements are included in the evaluative process.

Reviewed and Revised August 2008