



**A Planned Course of Study
for
Honors Calculus A**

Abington School District

Abington, Pennsylvania

September, 2016

Honors Calculus-A

I. Objectives

Students will demonstrate the appropriate level of proficiency in each of the following areas of mathematics:

A. Numbers and Operations
1. Numbers and Quantity

B. Algebraic Concepts
1. Functions
2. Algebra

C. Geometry
1. Geometry

D. Measurement, Data and Probability
1. Statistics and Probability

E. Calculus
1. Calculus

F. Mathematical Practice
1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and make sense of regularity in repeated reasoning

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II. Major Concepts

Students will demonstrate the appropriate level of proficiency in each of the following areas of mathematics:

A. Number and Operations

1. Numbers and Quantity

- a. Apply and extend the properties of exponents to solve problems with rational exponents.
- b. Apply quantitative reasoning to choose and interpret units and scales in formulas and graphs.
- c. Use units as a way to understand problems and to guide the solution of multi-step problems.
- d. Extend the knowledge of arithmetic operations and apply to complex numbers.
- e. Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.

B. Algebraic Concepts

1. Functions

- a. Write expressions in equivalent forms to solve problems.
- b. Extend the knowledge of arithmetic operations and apply to polynomials.
- c. Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.
- d. Extend the knowledge of rational functions to rewrite in equivalent forms.
- e. Create and graph equations or inequalities to describe numbers or relationships.
- f. Apply inverse operations to solve equations or formulas for a given variable.
- g. Use reasoning to solve equations and justify the solution method.
- h. Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

2. Algebra

- a. Use the concept and notation of functions to interpret and apply them in terms of their context.
- b. Graph and analyze functions and use their properties to make connections between the different representations.
- c. Write functions or sequences that model relationships between two quantities.
- d. Interpret the effects transformations have on functions and find the inverses of functions.
- e. Construct and compare linear, quadratic, and exponential models to solve problems.

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- f. Interpret functions in terms of the situations they model.
- g. Apply radian measure of an angle and the unit circle to analyze the trigonometric functions.
- h. Choose trigonometric functions to model periodic phenomena and describe the properties of the graphs.
- i. Prove the Pythagorean identity and use it to calculate trigonometric ratios.
- j. Use matrices to organize and manipulate data.
- k. Formulate systems of equations using matrices to model routine and non-routine problem situations.

C. Geometry

1. Geometry

- a. Apply trigonometric ratios to solve problems involving right triangles.
- b. Translate between the geometric description and the equation for a conic section.

D. Measurement, Data and Probability

1. Statistics and Probability

- a. Analyze linear models to make interpretations based on the data.
- b. Determine the regression equation of best fit (e.g., quadratic, exponential).

E. Calculus

1. Calculus

- a. Evaluate limits algebraically and graphically.
- b. Find the derivative using differentiation rules.
- c. Apply the concepts of differential Calculus.

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F. Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics and use appropriate tools strategically.
5. Attend to precision and make use of structure.
6. Look for and make sense of regularity in repeated reasoning.

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Instruction

- A. Course Schedule
 - 1. 5 days a week
 - 2. 48 minute classes
- B. Pacing
 - 1. Marking Period 1
 - a. Linear Equations, Inequalities, and Applications
 - b. Graphs, Linear Equations, and Functions
 - c. Polynomial and Rational Functions
 - d. Quadratic Regression
 - 2. Marking Period 2
 - a. Limits and Their Properties
 - b. Differentiation
 - c. Applications of Differentiation
 - 3. Marking Period 3
 - a. Systems of Equations and Matrices
 - b. Exponential and Logarithmic Functions
 - c. Exponential and Logarithmic Functions and Calculus
 - d. Trigonometric Functions
 - e. Exponential Regression
 - 4. Marking Period 4
 - a. Analytic Trigonometry
 - b. Trigonometric Functions and Calculus
 - c. Topics in Analytic Geometry

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C. Methods

1. Lecture.
2. Scientific and Graphing Calculators will be used when appropriate.
3. Computers and mathematics software such as TI-Smartview, internet resources such as applets, Advanced Placement Questions from APCentral.com, and the textbook website will be incorporated into the course.
4. Cooperative learning activities will be employed.
5. Data analysis of student results.
6. Writing experiences will be used throughout the course to justify calculus conclusions.
7. Students should read the text for further understanding.
8. Supplementary Advanced Placement materials will be used.
9. Formative assessments and differentiation.
10. Summative assessments.

D. Resources

1. Larson, R., Hostetler, R., Edwards, B.H. *Calculus I with Precalculus*: Boston, MA. New York, NY. 2006.
2. Teacher made presentations, handouts, activities, practice, quizzes.
3. Other reference books available in the mathematics office or the school library will be used if necessary.
4. Ancillary materials such as worksheets, quizzes, computer activities, and enrichment activities will be used.
5. Supplemental Advanced Placement style Multiple Choice practice tests from: Larson, R., Hostetler, R., Edwards, B.H. *Fast Track to a 5*: Boston, MA. New York, NY. 2006.
6. Websites such as Study Island, Khan Academy, Wolfram Alpha, Desmos, etc.
7. Google Classroom and Skyward.
8. Apperson scan sheets and software for test analysis
9. The *Mathematics Teacher* and other journals of the National Council of Teachers of Mathematics may be used.

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IV. Assessment

A. Procedures for Evaluation

1. Summative Assessments

- i. A departmental common assessment will be administered at the end of each unit.
- ii. A departmental common assessment will be administered at the end of the course.

2. Formative assessments will be administered in a variety of formats.

3. Accommodations aligned with those permitted for the PSSA/Keystone Exams and included in IEP's will be provided for Special Education students who are enrolled in this course.

B. Expected Levels of Achievement

Students are expected to achieve at least a minimum level of proficiency. Proficiency and related grades are defined as follows:

A.....	90 - 100%
B.....	80 - 89%
C.....	70 - 79%
D.....	60 - 69%

The final grade will be calculated as follows:

Marking Period I.....	20%
Marking Period II.....	20%
Midterm Exam.....	10%
Marking Period III.....	20%
Marking Period IV.....	20%
Final Exam.....	10%