

# Reading Public Schools

*Instilling a joy of learning and inspiring the innovative leaders of tomorrow*



## Math Curriculum Guide

## AP Calculus BC

### Course Description

As stated by the College Board, Advanced Placement Calculus BC affords students the opportunity to explore the concepts, methods and applications of differential and integral calculus, including topics such as parametric, polar, and vector functions as well as series. Students will perform experiments and investigations and solve problems by applying their knowledge and skills. This course is the equivalent of a first-semester college calculus course devoted to topics in differential and integral calculus plus the subsequent single-variable calculus course. More information about the requirements of the College Board AP Calculus BC course can be found at: <https://apcentral.collegeboard.org/courses/ap-calculus-bc?course=ap-calculus-bc>

### Content Standards

#### BIG IDEA 1—CHANGE

Using derivatives to describe rates of change of one variable with respect to another or using definite integrals to describe the net change in one variable over an interval of another allows students to understand change in a variety of contexts. It is critical that students grasp the relationship between integration and differentiation as expressed in the Fundamental Theorem of Calculus .

#### BIG IDEA 2—LIMITS

Beginning with a discrete model and then considering the consequences of a limiting case allows us to model real-world behavior and to discover and understand important ideas, definitions, formulas, and theorems in calculus: for example, continuity, differentiation, integration, and series.

#### BIG IDEA 3—ANALYSIS OF FUNCTIONS

Calculus allows us to analyze the behaviors of functions by relating limits to differentiation, integration, and infinite series and relating each of these concepts to the others.

### Mathematical Practices

1. **Implementing Mathematical Processes**—Determine expressions and values using mathematical processes.
2. **Connecting Representations**—Translate mathematical information from a single representation.
3. **Justification**—Justify reasoning and solutions.
4. **Communication and Notation**—Use correct notation, language, and mathematical conventions.

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## Math Curriculum Guide Overview

### Curriculum Guide

Curriculum guides are public documents aligned with the Massachusetts Department of Education Curriculum Frameworks. They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Each area of the curriculum is divided into general strands (broad categories) under which the standards fall. When we discuss “standards-based education” we mean that students are measured against their proficiency and growth towards meeting these standards. Curriculum Guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.

### Content Standards

The Content Standards for AP Calculus AB are described at length in the College Board website. It can be found at: <https://apcentral.collegeboard.org/pdf/ap-calculus-ab-bc-course-and-exam-description-0.pdf?course=ap-calculus-bc>

### Mathematical

### Practice Standards

Mathematical Practice Standards are a set of skills/behaviors that are replicated in grades preK-12. These standards describe ways in which students engage with the mathematical content and the level of application grows increasingly complex as students progress vertically throughout their education.

### Essential Questions

Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities for inquiry into the learning and act as an umbrella to anchor the unit/lesson.

### Key Activities

Key Activities identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The activities identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilize in their classrooms.

