

## PREREQUISITES: CALCULUS

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Mathematics builds! To be successful in Calculus, there are certain skills that you are expected to already have mastered. These prerequisites are summarized on this sheet. Although some of the topics listed here may be reviewed in Calculus, you are expected to already have some familiarity with them, so that we can quickly move beyond the basics to higher-level discussions. ALGEBRA I, GEOMETRY, ALGEBRA II, and PRECALCULUS are all prerequisites to CALCULUS.

There will be a quiz over this prerequisite material, which will count as part of your grade. "Sample Prerequisite Problems" (with solutions) are available on the web. The Prerequisite Quiz will consist of problems that have a similar format to the Sample Prerequisite Problems.

DON'T PANIC if you're rusty on (or just haven't ever seen!) some of the topics listed on this sheet: math courses at different schools sometimes cover different material. The first few days of class will be devoted to review, and filling in gaps. Also, the Math Department teachers are all available to help you. It's important, however, that you get this material at your fingertips right away, because we'll be drawing on these skills frequently.

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Both **Calculus Honors** and **AP Calculus AB** have the same prerequisites, and cover the same material. Students enrolled in AP Calculus AB have the following additional requirements:

- actual AP problems will be a regular part of homework, quizzes, and tests
- students are required to take the Advanced Placement Test
- there is extra class time each week to allow for the exploration of ideas in greater depth than the normal class schedule provides

The **Advanced Placement Program Course Description** for MAY 2002–MAY 2003 gives a concise summary of the prerequisites for Calculus:

Before studying calculus, all students should complete four years of secondary mathematics designed for college-bound students: courses in which they study algebra, geometry, trigonometry, analytic geometry, and elementary functions. These functions include those that are linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise defined. In particular, before studying calculus, students must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. Students must also understand the language of functions (domain and range, odd and even, periodic, symmetry, zeros, intercepts, and so on) and know the values of the trigonometric functions of numbers such as  $0$ ,  $\frac{\pi}{6}$ ,  $\frac{\pi}{4}$ ,  $\frac{\pi}{3}$ , and  $\frac{\pi}{2}$ .

In particular, the following are prerequisites for Calculus:

1. **RENAMING EXPRESSIONS:** set notation (interval, set-builder, union, intersection); factoring; laws of exponents and logarithms; complex numbers; completing the square technique; long division of polynomials; relationship between zeros and factors of polynomials
2. **SOLVING EQUATIONS AND INEQUALITIES IN ONE VARIABLE:** linear; quadratic; absolute value; exponential; logarithmic; radical; systems; rational; trigonometric; compound inequalities; the zero factor law. Understand extraneous solutions, and when they can arise. Be sure that you can distinguish between *exact* and *approximate* solutions. You should understand the relationship between the algebraic and graphical solutions of sentences.
3. **GRAPHING SENTENCES IN TWO VARIABLES:** familiarity with these "basic models":  $y = x$ ,  $y = x^2$ ,  $y = x^3$ ,  $y = |x|$ ,  $y = \sqrt{x}$ ,  $y = \frac{1}{x}$ ,  $y = k$ ,  $y = \ln x$  (and other bases),  $y = e^x$  (and other bases),  $y = \sin x$ ,  $y = \cos x$ ,  $y = \tan x$ ,  $y = \sec x$ . Be able to graph circles, lines, piecewise-defined functions, and transformations of the "basic models" involving: horizontal and vertical translations; horizontal and vertical scaling; reflection about the  $x$ -axis and  $y$ -axis; absolute value transformation.
4. **BASIC GEOMETRY FORMULAS:** perimeters of common figures, including the circumference of a circle. Know AREA formulas for: rectangle, triangle, circle, trapezoid. Know VOLUME formulas for: sphere, right cylinder (familiar base).