



*West Potomac High School
6500 Quander Road
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Dear AP Calculus BC Student,

Welcome to AP Calculus! This course is primarily concerned with developing your understanding of the concepts of calculus and providing experience with its methods and applications. The course emphasizes a multi-representational approach to calculus, with concepts, results, and problems being expressed graphically, numerically, analytically, and verbally. In order to be successful in this course you need the proper foundation. (i.e., knowledge of algebra, geometry, trigonometry, analytic geometry, and elementary functions). You will have to be very familiar with the basic families of functions, and all of their representations, in order to be successful in your study of calculus. The concept of functions underlies everything that calculus considers.

You will also need to be able to carry out certain computational tasks (i.e., algebra skills) with efficiency and accuracy if you are going to be successful in calculus. These include manipulations of functional symbolism, solving algebraic equations involving the functions mentioned above, interpreting numerical values given by formulas, graphs, and tables, using and manipulating data, and knowing how, and when to use your calculator.

This is a rigorous college course. The curriculum and pace of the course is intense and all enrolled students are expected to take the AP exam. As this is an **AP high school class**, you should expect to spend approximately 1-2 hours completing homework or studying for every hour that you are in class learning. Therefore, this course will be challenging and demanding.

Please be advised that this review packet will be provided on the first day of class and is to be completed by the **third day** of class. This material will be included on the first quiz of the first chapter in the textbook. Additionally, you will be expected to know this material and will use it throughout the entire year, so it is in your best interest to review the sample questions provided on the subsequent pages, and prepare yourself prior to the first day of school. Although you may not feel confident in answering every single problem, it is important that you attempt the entirety of the assignment. You are encouraged to seek online and text resources, as needed. I am also available after school for help. You may also work in study groups.

Please feel free to contact me with any questions or concerns that you or your parents may have. Have a restful summer. I am looking forward to an exciting time together in AP Calculus BC next year.

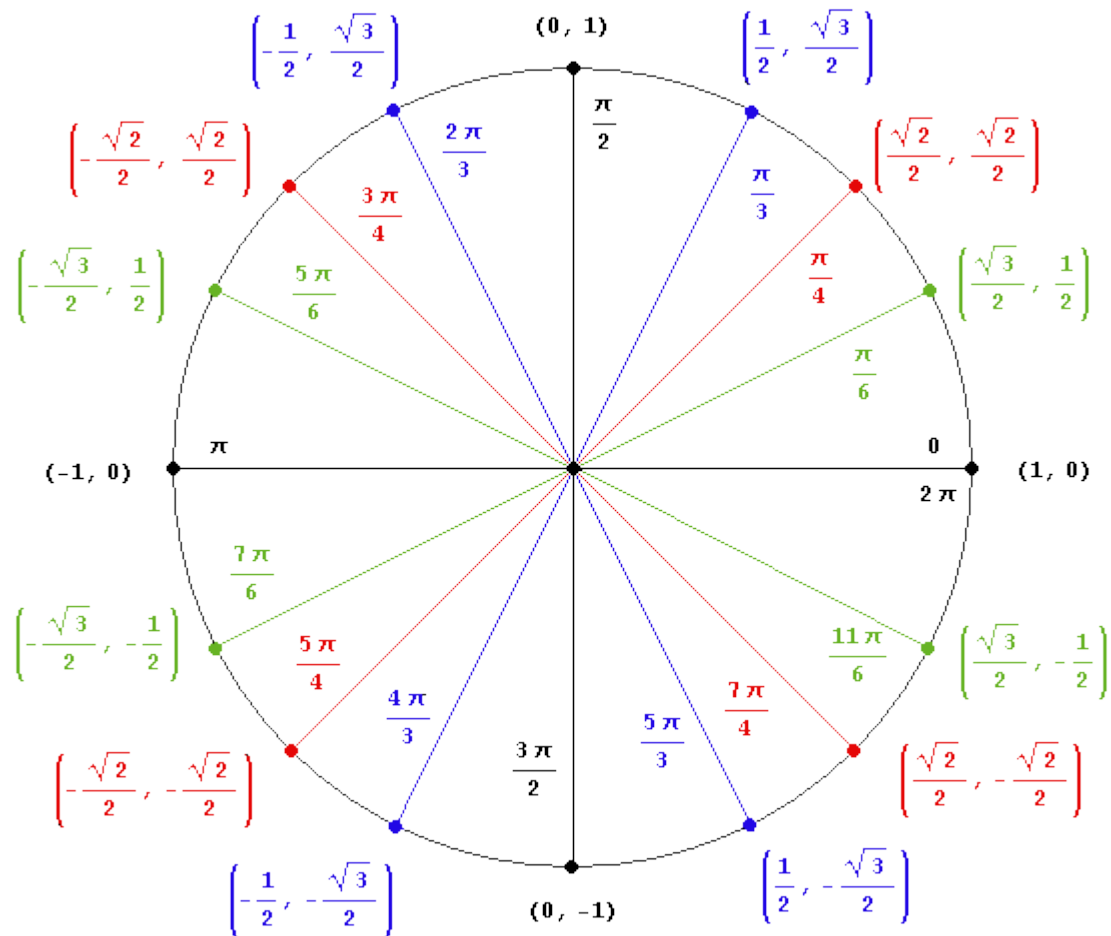
Sincerely,
Linda Graziani
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The following Trigonometric Identities **MUST** be **memorized**

Reciprocal Identities	Quotient Identities	Pythagorean Identities
$\sin x = \frac{1}{\csc x} \quad \csc x = \frac{1}{\sin x}$ $\cos x = \frac{1}{\sec x}$ $\sec x = \frac{1}{\cos x}$ $\tan x = \frac{1}{\cot x} \quad \cot x = \frac{1}{\tan x}$	$\tan x = \frac{\sin x}{\cos x}$ $\cot x = \frac{\cos x}{\sin x}$	$\sin^2 x + \cos^2 x = 1$ $\tan^2 x + 1 = \sec^2 x$ $1 + \cot^2 x = \csc^2 x$
Co-Function Identities	Odd/Even Identities	
$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta \quad \cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$ $\csc\left(\frac{\pi}{2} - \theta\right) = \sec \theta \quad \sec\left(\frac{\pi}{2} - \theta\right) = \csc \theta$ $\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta \quad \cot\left(\frac{\pi}{2} - \theta\right) = \tan \theta$	$\overset{\text{Odd}}{\sin(-\theta)} = -\sin \theta \quad \overset{\text{Even}}{\cos(-\theta)} = \cos \theta$ $\csc(-\theta) = -\csc \theta$ $\sec(-\theta) = \sec \theta$ $\tan(-\theta) = -\tan \theta$ $\cot(-\theta) = -\cot \theta$	
Double Angle Identities	Half Angle Identities	
$\sin 2x = 2 \sin x \cos x$ $\cos 2x = \cos^2 x - \sin^2 x$ $\cos 2x = 2 \cos^2 x - 1$ $\cos 2x = 1 - 2 \sin^2 x$	$\sin^2 x = \frac{1 - \cos 2x}{2}$ $\cos^2 x = \frac{1 + \cos 2x}{2}$	

The Radian Measures and Coordinates **MUST** be memorized

Remember: $\sin \theta = \frac{y}{r} = y - \text{coordinate}$, $\cos \theta = \frac{x}{r} = x - \text{coordinate}$, and $\tan \theta = \frac{y}{x} = \frac{y - \text{coordinate}}{x - \text{coordinate}}$



Fill in the following table of Inverse Trig function values:

Values of inverse sine and inverse cosine (in radians)									
x=	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\sin^{-1}(x)$									
$\cos^{-1}(x)$									

Values of inverse tangent (in radians)							
x=	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$
$\tan^{-1}(x)$							

Here are some sample questions for you to look over and review. You are not required to complete any of these problems before the start of school, but be advised that these are the skills that we expect you to possess prior to the first day of school.

**ALL of these questions are to be completed
without the use of a calculator**

I. Algebraic Manipulation

Simplify the expression

1. $(2 - 3\sin^2\theta)^2$
2. $\frac{\sqrt{x}}{\sqrt{x+3}}$
3. $\frac{3(x+5)(x^2+25)^{\frac{1}{2}}}{9(x^2+25)}$
4. $\frac{(9x^2 + 3x - 2)}{(9x^2 - 1)} \cdot \frac{(3x^2 + 13x + 4)}{(27x^3 + 8)}$
5. $\frac{x + \frac{1}{y}}{y + \frac{1}{x}}$

II. Solving Equations

6. $1 - \frac{3}{x} = \frac{4}{5}$
7. $\frac{x+1}{3x-1} + \frac{2x+1}{3x-2} = -1$
8. $x^4 - 13x^2 + 37 = 7$
9. $x^3 - 4x^2 + x + 6 = 0$

III. Exponents and Logarithms

10. Solve for x : $\log_3(x-1) = 2$

11. Solve for y : $\ln y = 2$

12. Solve for x : $3^x \cdot 3^{x+1} = 9$

13. Solve for x : $e^{\frac{x}{2}} = \frac{3}{2}$

14. Evaluate: $2\log_2 4 + \frac{1}{2}\log_2 5 - \frac{1}{2}\log_2 20$

IV. Functions and Graphs Use a separate sheet of graph paper for graphs.

15. If $f(x) = \frac{x}{1-x}$, find $f\left(\frac{1}{x}\right)$

16. If $f(x) = \frac{x}{1-x}$, find $f(1-x)$

17. Sketch the graph of $y = x^2 - 2x$

18. Sketch the graph of $f(x) = \frac{x^2 + x - 6}{x - 2}$
and state Domain and Range.

19. Sketch the graph of $f(x) = \ln(x-1)$
and state Domain and Range.

20. Sketch the graph of
a) $y = \sqrt{4-x^2}$ b) $2y = \sqrt{36-9x^2}$

21. Sketch the graph of $f(x) = e^x$

22. For $f(x) = \begin{cases} \sqrt{4-x} & x \leq 0 \\ 2-3x & 0 < x \leq 2 \\ x^2 & x > 2 \end{cases}$

Evaluate this function at the following values:

a) $f(-2) =$ _____ b) $f(0) =$ _____

c) $f(2) =$ _____

V. Trigonometry Use a separate sheet of graph paper for graphs.

23. Graph $y = 2 \cos 3\theta - 1$

24. Find $\sin\left(\frac{7\pi}{6}\right)$

25. Evaluate $\tan\left(\frac{-\pi}{4}\right)$

26. Evaluate $\cos^{-1}(-1)$

27. Solve: $\tan x = 2 \sin x$

28. Solve: $2 \sin^2 \theta - \cos \theta = 1$

VI. Limits Find each limit.

29. $\lim_{x \rightarrow 2} \frac{(x-3)}{(x-4)}$

30. $\lim_{x \rightarrow \pi} \frac{\cos 2x}{\cos x}$

31. $\lim_{x \rightarrow \infty} \frac{x^2 + x - 12}{x^2 - 6x + 9}$

32. $\lim_{x \rightarrow -2} \frac{x+2}{x^2 + 5x + 6}$

33. $\lim_{x \rightarrow 3} \frac{x^2 + x - 12}{x^2 - 6x + 9}$

VII. Miscellaneous

34. Evaluate (find root first): a) $16^{\frac{3}{2}}$

b) $32^{\frac{2}{5}}$

c) $8^{\frac{4}{3}}$

35. Rewrite each of the following interval notations as an inequality (use whatever variable you like).

a. $[-5, 2]$ _____

b. $[0, 6)$ _____

c. $(-2, \infty)$ _____

36. Use a “sign graph” to write the solution for each of the following inequalities:

a. $(x+1)(x-7) > 0$

b. $\frac{x(12-4x)(2x+5)}{x-6} \geq 0$

37. Complete the definition for absolute value below:

$$|a| = \begin{cases} \text{_____}, & \text{_____} \\ \text{_____}, & \text{_____} \end{cases}$$

38. Given $g(x) = |6 - 2x|$. Use the definition in #32 to help rewrite $g(x)$ as a piecewise function without absolute value bars.

$$g(x) =$$

39. Use the definition in #32 to help rewrite the following **without** absolute value bars:

$$f(x) = |2x^2 - x - 3| = \begin{cases} \text{_____}, & \text{_____} \\ \text{_____}, & \text{_____} \end{cases}$$

40. Given the two points $P(-2,8)$ and $Q(5,-1)$, calculate the slope of \overline{PQ} . $m =$ _____

41. Given line l contains the point $P(-2, 8)$ and has slope $-3/4$.

c. Write the equation of the line in point-slope form below _____

d. Write the equation of a line m perpendicular to the line l at point P . _____

42. Rewrite each of the following as a compound inequality:

e. $|x| \geq 7$ _____ b. $|x| < 7$ _____

43. Write an expression using absolute value for all the numbers/points, x , on a number line that are:

a. A distance of 5 units from the number 3 _____

b. More than or equal to a distance of 5 units from the number 3 _____

c. Within a distance of 5 units from the number 3 _____

44. Write an example of each type of number:

a) Integer that is **not** a Whole number: _____ c) Algebraic Irrational number: _____

b) Rational number that is **not** an Integer: _____ d) Transcendental Irrational number: _____