



THE MASTER'S SCHOOL

AP Calculus AB

Mrs. Jones

Students who will be taking AP Calculus AB in the upcoming school year are required to complete the attached summer work before the first day of school.

Students are to bring their completed answer sheet to school with them on the second day of school.

This work serves two purposes: it helps students to remember the concepts that they have learned in the past and allows an assessment of topics that need focused review.

This work is necessary to assess the ability of incoming students and to guide the instruction in the first few weeks of classes.

This work should be done during the two weeks before school begins.

Supply List

Large binder (1-1/2 in. at least) for keeping class notes together. This class has a LOT of paper!

Graphing calculator- must be TI-83 or TI-84

Pencils, red and black pens

Any questions - contact Mrs. Jones at cjones@masterschool.org.

Instructions:

- a) This summer review packet is meant for the calculus student to be responsible for the review of prerequisite skills. This will allow us to get further and faster through the calculus material.
- b) Please allow several hours to complete this packet, and it is best to spread this over several days in August (and not before).
- c) Answer the problems below neatly on separate sheets of paper, circling the answers. Please staple these sheets together, with your name on it, to hand in.
- d) This packet will be collected at the beginning of the first day of school and will count as a major grade.
- e) No credit will be given unless **ALL** work is shown.
- f) Unlike almost all the other quizzes and tests you will have the coming year, no partial credit will be given on this packet. Therefore, please check your work.
- g) Give exact, simplified solutions when possible; otherwise, round to 2 decimal places.
- h) Unless otherwise instructed, perform all the problems ALGEBRAICALLY.
- i) You may use any notes you have and/or any source you wish, including fellow students. In addition, I have provided some notes that you may find useful.

Part A – NO Calculator (problems 1-14)

1. Write the equation of the line described below in slope-intercept form ($y = mx + b$).
 - a. passes through $(1, -3)$ and $(-5, 2)$
 - b. slope 0 and passes through $(4, 2)$
 - c. passes through $(5, 1)$ and parallel to $2x - 3y = 7$.
 - d. passes through $(3, 4)$ and perpendicular to the line $4x + 2y = 7$.
2. Find the intersection of the graphs of the following equations.
 - a. $4x - 6y = -6$
 $10x + 7y = -4$
 - b. $y = x^2 + 3x - 4$
 $y = 5x + 11$
3. Sketch the graphs of the following, labeling at least 3 points:
 - a. $3x - 2y > 12$
 - b. $y = 3x^2 - 2$

4. Let $f(x) = 3x + 5$, $g(x) = \sqrt{3x + 4}$, and $h(x) = 2x^2 - 3$. Find the following:
- $g(20)$
 - $f(7x + 1)$
 - $(f + h)(6)$
 - $\left(\frac{g}{h}\right)(4)$
 - $f(g(4))$
 - $h(f(x))$
 - the inverse of $f(x)$
 - the inverse of $h(x)$
 - the domain and range of $g(x)$
 - the domain and range of $h(x)$
 - the zeros (x-intercepts) of $f(x)$
 - the zeros (x-intercepts) of $h(x)$
5. Simplify the following:
- $(4x^6)^{3/2}$
 - $x^3(x + x^{5/3} - x^2)$
 - $\frac{x - 4}{x^2 - 3x - 4}$
 - $\frac{5 - x}{x^2 - 25}$
6. Factor each of the following polynomials, if possible:
- $x^2 + 5x - 24$
 - $x^7y^5 + x^4y^8$
7. Solve $3x^2 - 4x - 7 = 0$ by factoring.
8. Solve $5x^2 + 2x = 1$ by using the quadratic formula.
9. Find the quotient of the following:
- $\frac{x^3 - 8}{x - 2}$
 - $\frac{x^4 - 8x^2 + 5x - 1}{x + 3}$
10. Evaluate the following:
- $\log_2 32$
 - $\log_5 \frac{1}{125}$
 - $\log_{64} 4$

11. Solve each equation or inequality below.
- $-7x + 4 < 18$
 - $\frac{5}{x} = \frac{7}{x+2}$
 - $|6 - 3x| < 18$
 - $9^x = 3^5$
 - $(3x + 5)^{2/3} - 2 = 2$
 - $\log_4(x + 8) + \log_4(x + 2) = 2$
 - $\cos x = \sin x$, for $0 \leq x \leq 2\pi$
12. Determine the exact value (no rounding) of the following:
- $\sin 0$
 - $\sin \frac{\pi}{2}$
 - $\cos \pi$
 - $\cos \frac{\pi}{3}$
 - $\cos \frac{7\pi}{6}$
 - $\tan \frac{7\pi}{4}$
 - $\sin^{-1} \frac{\sqrt{3}}{2}$ (alternative notation: $\arcsin \frac{\sqrt{3}}{2}$)
 - $\sec^{-1} \sqrt{2}$ (alternative notation: $\operatorname{arcsec} \sqrt{2}$)
13. If $\sin \theta = \frac{\sqrt{3}}{2}$ and $\tan \theta < 0$, find $\tan \theta$ (exact value).
14. Graph the following piecewise function.
- $$f(x) = \begin{cases} -3 - x, & x < 1 \\ -2, & x \geq 1 \end{cases}$$

Part B – Calculator allowed (problems 15-21)

15. Find the distance between point $A(-8, -3)$ and point $B(7, 5)$.
16. Solve the following:
 - a. $4x^2 - 191 = 5$
 - b. $4^x = 81$
17. Evaluate $\log_3 41$
18. Andrea is investing \$15,000 in a CD account that offers 6% annual interest.
 - a. How much money will Andrea have in her CD after 4 years if the rate is compounded monthly?
 - b. How much money will Andrea have in her CD after 15 years if the rate is compounded continuously?
 - c. How long will it take for the account to grow to \$100,000 if the rate is compounded quarterly?
19. You are given the function $f(x) = x^4 - 3x^3 + 2x - 5$. Round all answers to 3 decimal places.
 - a. Find all the zeros (x-intercepts) using your calculator
 - b. Find all relative minimums using your calculator
 - c. Find all relative maximums using your calculator
20. There are 2500 grams of a compound that has a half-life of 120 years. How many years, to the nearest year, before only 1000 grams of the compound remains?
21. In order for a company to realize a profit in the manufacture and sale of a certain item, the revenue, R , for selling x items must be greater than the cost, C , of producing those x items. If $R = 79.99x$ and $C = 61x + 1050$, find all values of x that will return a profit.
22. An open box is to be made from a rectangular piece of material 9 inches by 12 inches by cutting equal squares from each corner and turning up the sides. Let x be the length of each side of the square cut out of each corner. Write the volume V of the box as a function of x .