

AP CALCULUS AB SUMMER ASSIGNMENT

Edmodo.com: AP Calculus AB 2017-2018 Group Code: rkffj9

Attached is an assignment for students entering AP Calculus AB in the fall. Next year we will focus more on concepts and thinking outside of the box. We will not have time to review basic concepts from Alg I, Geometry, Alg II or Pre-Calculus that you **should** already know. Therefore it is imperative that you have mastered the basic skills needed for success in this course. Many students struggle with the Algebra component of Calculus and neglect the concepts and theorems. It is a shame when a student understands the calculus but can't simplify or factor, thus getting the problem incorrect. Thus the purpose of this worksheet is to help you be better prepared for next year.

Also included are basic concepts you must know. You may want to use your notes from Pre-Calculus as well. Although the assignment says AB, the introductory concepts are the same.

YOU MUST COMPLETE THE FOLLOWING PROBLEMS ON A SEPARATE SHEET OF PAPER. WORK SHOULD BE NEAT AND EASILY FOLLOWED.

This will be checked on the first day of school and will be collected on the second. I will be checking for completeness and correctness. There should be evidence that you have checked your work. A key will be provided (posted on Edmodo.com) August 1st. Put an **X** by the problems that you got wrong but corrected. Put a **?** by the problems you got wrong but had difficulty correcting. There will be a **TEST** on this material **on the 2nd day of school (Friday - August 18th)!** There will be a Q & A session in the afternoon of Wednesday (August 16th) and in class Thursday (August 17th). Details and times will be sent out on Edmodo.com.

You should wait till mid-summer to begin this packet. This will give you a better indication of what you know and what you've forgotten. If you have any questions, contact me at apugeda@psd202.org or on Edmodo.com (Edmodo.com is a little better because I will receive notifications on my phone and I rarely check my work email during the summer). Keep in mind that this packet is not to "torture" you or "punish" you for taking AP Calculus AB. This will better prepare you and allow us more time to review before the exam.

Enjoy your summer,

P

DO I BELONG IN AP CALCULUS AB??

HERE ARE MR P'S RECOMMENDATIONS

1. 85% or higher in Honors Pre-Calculus – Definitely.
2. 80%-84% in Honors Pre-Calculus – Should be ok.
3. 70%-79% in Honors Pre-Calculus – Not recommended...but if decided to take the class, be ready to work! Be ready to put time in after school!
4. 69% or lower in Honors Pre-Calculus – Not recommended.
5. Took Regular Pre-Calculus – Not recommended. You WILL be playing catch up.

Complete the following. Show and attach all work in a clear manner. Do NOT do any work on this sheet – all work must be separate. Have this assignment completed and ready to turn in on the first day of school. No calculators are allowed except where noted.

ALGEBRA

1. Evaluate each expression without using a calculator.

(a) $(-3)^4$ (b) -3^4 (c) 3^{-4}
 (d) $\frac{5^{23}}{5^{21}}$ (e) $\left(\frac{2}{3}\right)^{-2}$ (f) $16^{-3/4}$

2. Simplify each expression. Write your answer without negative exponents.

(a) $\sqrt{200} - \sqrt{32}$
 (b) $(3a^3b^3)(4ab^2)^2$
 (c) $\left(\frac{3x^{3/2}y^3}{x^2y^{-1/2}}\right)^{-2}$

3. Expand and simplify.

(a) $3(x + 6) + 4(2x - 5)$ (b) $(x + 3)(4x - 5)$
 (c) $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$ (d) $(2x + 3)^2$
 (e) $(x + 2)^3$

4. Factor each expression.

(a) $4x^2 - 25$ (b) $2x^2 + 5x - 12$
 (c) $x^3 - 3x^2 - 4x + 12$ (d) $x^4 + 27x$
 (e) $3x^{3/2} - 9x^{1/2} + 6x^{-1/2}$ (f) $x^3y - 4xy$

5. Simplify the rational expression.

(a) $\frac{x^2 + 3x + 2}{x^2 - x - 2}$ (b) $\frac{2x^2 - x - 1}{x^2 - 9} \cdot \frac{x + 3}{2x + 1}$
 (c) $\frac{x^2}{x^2 - 4} - \frac{x + 1}{x + 2}$ (d) $\frac{\frac{y}{1} - \frac{x}{1}}{\frac{1}{y} - \frac{1}{x}}$

6. Rationalize the expression and simplify.

(a) $\frac{\sqrt{10}}{\sqrt{5} - 2}$ (b) $\frac{\sqrt{4 + h} - 2}{h}$

7. Rewrite by completing the square.

(a) $x^2 + x + 1$ (b) $2x^2 - 12x + 11$

8. Solve the equation. (Find only the real solutions.)

(a) $x + 5 = 14 - \frac{1}{2}x$ (b) $\frac{2x}{x + 1} = \frac{2x - 1}{x}$
 (c) $x^2 - x - 12 = 0$ (d) $2x^2 + 4x + 1 = 0$
 (e) $x^4 - 3x^2 + 2 = 0$ (f) $3|x - 4| = 10$
 (g) $2x(4 - x)^{-1/2} - 3\sqrt{4 - x} = 0$

9. Solve each inequality. Write your answer using interval notation.

(a) $-4 < 5 - 3x \leq 17$ (b) $x^2 < 2x + 8$
 (c) $x(x - 1)(x + 2) > 0$ (d) $|x - 4| < 3$
 (e) $\frac{2x - 3}{x + 1} \leq 1$

10. State whether each equation is true or false.

(a) $(p + q)^2 = p^2 + q^2$ (b) $\sqrt{ab} = \sqrt{a}\sqrt{b}$
 (c) $\sqrt{a^2 + b^2} = a + b$ (d) $\frac{1 + TC}{C} = 1 + T$

Complete the following. Show and attach all work in a clear manner. Do NOT do any work on this sheet – all work must be separate. Have this assignment completed and ready to turn in on the first day of school. No calculators are allowed except where noted.

ANALYTIC GEOMETRY

1. Find an equation for the line that passes through the point $(2, -5)$ and
 - (a) has slope -3
 - (b) is parallel to the x -axis
 - (c) is parallel to the y -axis
 - (d) is parallel to the line $2x - 4y = 3$
2. Find an equation for the circle that has center $(-1, 4)$ and passes through the point $(3, -2)$.
3. Find the center and radius of the circle with equation $x^2 + y^2 - 6x + 10y + 9 = 0$.
4. Let $A(-7, 4)$ and $B(5, -12)$ be points in the plane.
 - (a) Find the slope of the line that contains A and B .
 - (b) Find an equation of the line that passes through A and B . What are the intercepts?
 - (c) Find the midpoint of the segment AB .
 - (d) Find the length of the segment AB .
 - (e) Find an equation of the perpendicular bisector of AB .
 - (f) Find an equation of the circle for which AB is a diameter.
5. Sketch the region in the xy -plane defined by the equation or inequalities.

(a) $-1 \leq y \leq 3$	(b) $ x < 4$ and $ y < 2$
(c) $y < 1 - \frac{1}{2}x$	(d) $y \geq x^2 - 1$
(e) $x^2 + y^2 < 4$	(f) $9x^2 + 16y^2 = 144$

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FUNCTIONS

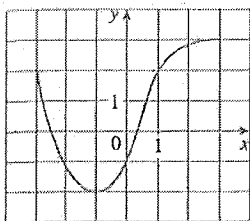


FIGURE FOR PROBLEM 1

1. The graph of a function f is given at the left.
 - (a) State the value of $f(-1)$.
 - (b) Estimate the value of $f(2)$.
 - (c) For what values of x is $f(x) = 2$?
 - (d) Estimate the values of x such that $f(x) = 0$.
 - (e) State the domain and range of f .
2. If $f(x) = x^3$, evaluate the difference quotient $\frac{f(2+h) - f(2)}{h}$ and simplify your answer.
3. Find the domain of the function.
 - (a) $f(x) = \frac{2x+1}{x^2+x-2}$
 - (b) $g(x) = \frac{\sqrt[3]{x}}{x^2+1}$
 - (c) $h(x) = \sqrt{4-x} + \sqrt{x^2-1}$
4. How are graphs of the functions obtained from the graph of f ?
 - (a) $y = -f(x)$
 - (b) $y = 2f(x) - 1$
 - (c) $y = f(x-3) + 2$
5. Without using a calculator, make a rough sketch of the graph.
 - (a) $y = x^3$
 - (b) $y = (x+1)^3$
 - (c) $y = (x-2)^3 + 3$
 - (d) $y = 4 - x^2$
 - (e) $y = \sqrt{x}$
 - (f) $y = 2\sqrt{x}$
 - (g) $y = -2^x$
 - (h) $y = 1 + x^{-1}$
6. Let $f(x) = \begin{cases} 1 - x^2 & \text{if } x \leq 0 \\ 2x + 1 & \text{if } x > 0 \end{cases}$
 - (a) Evaluate $f(-2)$ and $f(1)$.
 - (b) Sketch the graph of f .
7. If $f(x) = x^2 + 2x - 1$ and $g(x) = 2x - 3$, find each of the following functions.
 - (a) $f \circ g$
 - (b) $g \circ f$
 - (c) $g \circ g \circ g$

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TRIGONOMETRY

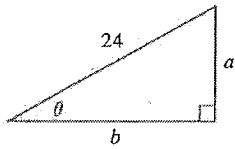


FIGURE FOR PROBLEM 5

- Convert from degrees to radians.
 - 300°
 - -18°
- Convert from radians to degrees.
 - $5\pi/6$
 - 2
- Find the length of an arc of a circle with radius 12 cm if the arc subtends a central angle of 30° .
- Find the exact values.
 - $\tan(\pi/3)$
 - $\sin(7\pi/6)$
 - $\sec(5\pi/3)$
- Express the lengths a and b in the figure in terms of θ .
- If $\sin x = \frac{1}{3}$ and $\sec y = \frac{5}{4}$, where x and y lie between 0 and $\pi/2$, evaluate $\sin(x + y)$.
- Prove the identities.
 - $\tan \theta \sin \theta + \cos \theta = \sec \theta$
 - $\frac{2 \tan x}{1 + \tan^2 x} = \sin 2x$
- Find all values of x such that $\sin 2x = \sin x$ and $0 \leq x \leq 2\pi$.
- Sketch the graph of the function $y = 1 + \sin 2x$ without using a calculator.