

Summer Packet - AP Calculus AB

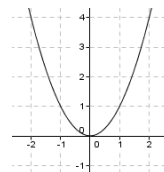
Welcome to AP Calculus AB! Below is your summer assignment that will be DUE the first day of class. It is a review of topics learned in previous courses that are crucial to your success in this class. In order to not fall behind in this class, it is important that you FULLY complete this packet prior to your first math class. There will be an assessment over this material at the beginning of the school year. You may get help from a friend, tutor, the Internet (possible online resources are Kahn Academy, Purple Math, and School Tube), etc, but it is important that you understand how to do each problem and that you show all of your work. I look forward to working with you next year!

Mrs. Berggren
jberggren@dcsdk12.org

The graph of each parent function is given. Draw a sketch of each additional equation in the family. You may check your sketch with a graphing calculator.

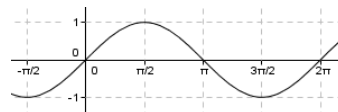
1. Parent Function: $y = x^2$

a) $y = x^2 - 5$ b) $y = (x - 3)^2$ c) $y = -x^2$



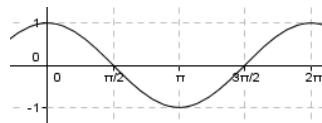
2. Parent Function: $y = \sin x$

a) $y = \sin(2x)$ b) $y = 2\sin x$ c) $y = 2 + \sin(x)$



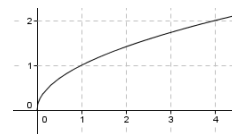
3. Parent Function: $y = \cos x$

a) $y = \cos\left(\frac{x}{2}\right)$ b) $y = 3\cos x + 2$



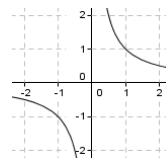
4. Parent Function: $y = \sqrt{x}$

a) $y = \sqrt{x} - 2$ b) $y = \sqrt{x + 2}$ c) $y = -\sqrt{x}$



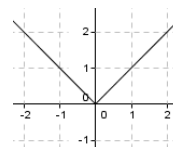
5. Parent Function: $y = \frac{1}{x}$

a) $y = \frac{1}{x-2}$ b) $y = \frac{-1}{x}$ c) $y = \frac{1}{x} - 2$



6. Parent Function: $y = |x|$

a) $y = -|x|$ b) $y = |x - 3|$ c) $y = |x| + 2$ d) $y = 2|x|$



7. Simplify; don't use your calculator:

a) $\frac{x^3 - 9x}{x^2 - 7x + 12}$ b) $2x^{-3}$ c) $2\ln 4 - \ln 8$ d) $\ln 3 + \ln 8$ e) $\frac{9 - x^{-2}}{3 + x^{-1}}$

f) $\frac{x^2 + 2x - 3}{x^2 - 9}$ g) $\frac{(x+h)^2 - x^2}{h}$

8. Using your calculator, find all real roots to the nearest thousandth.

a) $f(x) = x^4 - 3x^3 + 2x^2 - 7x - 11$ b) $f(x) = 3\sin(2x) - 4x + 1$ on $[-2\pi, 2\pi]$ c) $f(x) = 0.7x^2 + 3.2x + 1.5$

9. Using your calculator, find all points of intersection to the nearest thousandth. Do not use "trace."

a) $f(x) = 3x + 2$
 $g(x) = -4x - 2$ b) $f(x) = x^2 - 5x + 2$
 $g(x) = 3 - 2x$ c) $f(x) = \sqrt{25 - x^2}$
 $g(x) = |x|$

10. Using your calculator, find the coordinates of all local minimums and maximums to the nearest thousandth. Do not use "trace."
Hint: Minimums and Maximums occur where the graph "turns" back on itself.

a) $f(x) = 0.5x^4 - 4.5x^2 - 2x + 6$ b) $f(x) = x^3 - 2x + 3$

11. Solve the following equations.

a) $3x^2 - 11x = 4$ b) $2x + 1 = \frac{-1}{x+2}$ c) $\frac{x+1}{x} - \frac{x}{x+1} = 3$ d) $5^x = 3$ e) $4^{2x+1} = 20$
f) $\log_2 x = 3$ g) $\ln x = 8$

12. Solve or evaluate the following trig. problems without using your calculator. For the equations, solve on the interval $[0, 2\pi)$.

a) $\sin\left(\frac{\pi}{6}\right)$ b) $\cos\left(\frac{\pi}{3}\right)$ c) $\cos\left(\frac{5\pi}{6}\right)$ d) $\tan(x) = -1$
e) $\sin(x) = \frac{\sqrt{3}}{2}$ f) $\sin\left(\frac{x}{2}\right) = \frac{1}{2}$ g) $\sin^2(x) = \frac{1}{2}$ h) $\sec^2(x) = 4$

13. Solve for the indicated variable.

a) $A = 2\pi r^2 + 2\pi rh$; solve for h . b) $2x - 2yd = y + xd$; solve for d . c) $A = P + nrP$; solve for P .

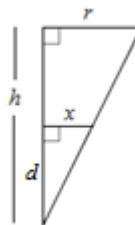
14. Determine the equations of the following lines. (Write the equation in point-slope form).

- a) The line that has a slope of 3 and goes through the point (4, -1).
b) The line that goes through the points (-1, 3) and (2, -4).

15. Write the equation of the function in vertex form. Hint: Complete the square so the function looks like $y = a(x - h)^2 + k$

a) $y = x^2 + 4x + 3$ b) $y = x^2 - 6x + 11$ c) $y = 3x^2 + 6x - 2$

16. Using similar triangles, express x in terms of the other variables.



17. A water tank has the shape of a cone. The tank is 10m high and has a radius of 3m at the top. If the water is 5m deep (in the middle), what is the surface area of the top of the water?

18. Two cars start moving from the same point. One travels south at 100km/hr, the other travels west at 50 km/hr. How far apart are the cars after two hours?

19. A kite is 100m above the ground. If there is 200m of string out, what is the angle between the string and the ground? Assume the string is perfectly straight.