

AP Calculus Summer Work

I am so excited to have you in AP Calculus this year! Calculus brings all the math you've learned throughout the years together and allows you to evaluate and justify real world situations mathematically. In the following pages you will find a few review topics we want to discuss in the first few days of the year. We will briefly review the topics you struggled with and will have some time to revise your work before going over the solutions and making corrections. Your goal is to complete each section to the best of your ability, reviewing topics that will be imperative to your success next year. Keep in mind, this should not take over your life this summer. Take the much needed break, have some fun and recharge after last school year. Ideally, you are working on this as the summer is wrapping up and you are preparing to get back in the school mindset.

At the end of this document you will find links for helpful videos if you are struggling with any of the sections in the summer work packet. Use these videos as references to recall material covered in PreCalculus. Some topics may be from courses prior to PreCalculus, so they may be more challenging to recall. Do your best to complete, or at least make a solid attempt in all of the sections. Come ready with questions and we will fill in the gaps together!

Remember, the goal is not to come in with this 100% ready to turn in, but with a solid attempt for each section. If you have any questions, please feel free to email me over the summer break and I will get back to you as quickly as possible!

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Linear - Show all work. No Calculator

1. Write an equation of the (a) vertical line and (b) horizontal line passing through the point $(-7, \pi)$.
2. Write an equation of the line in **slope-intercept form** passing through the points $(-3, 4)$ and $(5, -1)$.
3. Write an equation of the line through the point $(4, \frac{1}{2})$ that is
 - (a) parallel to $4x - 3y = 6$
 - (b) perpendicular to the line $4x - 3y = 6$
 - (c) find both the x - and y - intercepts of the line found in part (b).

4. Find the value of x for which line through $(-8, -3)$ and $(x, 4)$ has a slope of 3. (**Recall/hint:** $m = \frac{y_2 - y_1}{x_2 - x_1}$)

5. Write the equation of the line that is tangent to the circle at the given point. (**Recall/hint:** standard form for a circle $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the center point of the circle and the radius and tangent lines are perpendicular at the point of tangency)

$$(x - 2)^2 + (y - 1)^2 = 25; (6, -2)$$

6. Which of the following is an equation of the line through $(-3, 4)$ with a slope of $\frac{1}{2}$? (show the work/thought process that leads you to your answer choice)

$$\begin{array}{lll} \text{(A) } y - 4 = \frac{1}{2}(x + 3) & \text{(B) } y + 3 = \frac{1}{2}(x - 4) & \text{(C) } y - 4 = -2(x + 3) \\ \text{(D) } y - 4 = 2(x + 3) & \text{(E) } y + 3 = 2(x - 4) & \end{array}$$

7. Which of the following is an equation of the vertical line through $(2, -4)$? (show the work/thought process that leads you to your answer choice)

$$\text{(A) } y = -4 \quad \text{(B) } x = -2 \quad \text{(C) } y = 4 \quad \text{(D) } x = 0 \quad \text{(E) } x = 2$$

Solving Equations – Solve the following equations. Show all work and check your solution.

8. $\frac{4x}{x^2-4} = \frac{1}{x-2}$

9. $\frac{x}{x-1} - \frac{1}{x-2} = \frac{2x-5}{x^2-3x+2}$

10. $\sqrt{x+4} = 3\sqrt{x}$

11. $\sqrt[3]{x-6} = \sqrt[3]{3x+24}$

12. $\sqrt{-14x+2} = x-3$

13. $12^{2x-8} = 15$

14. $25^x = 125^{x-2}$

15. $\log(x+3) + \log x = 1$

$$16. \log_2(x+1) + \log_2(x-1) = 5$$

$$17. \ln 4x^2 - \ln 3x = 2$$

$$18. 2\sin^2 x + 5\sin x = 3, \quad 0 \leq x < 2\pi$$

$$19. \tan^2 x - \tan x - 6 = 0, \quad 0 \leq x \leq 360$$

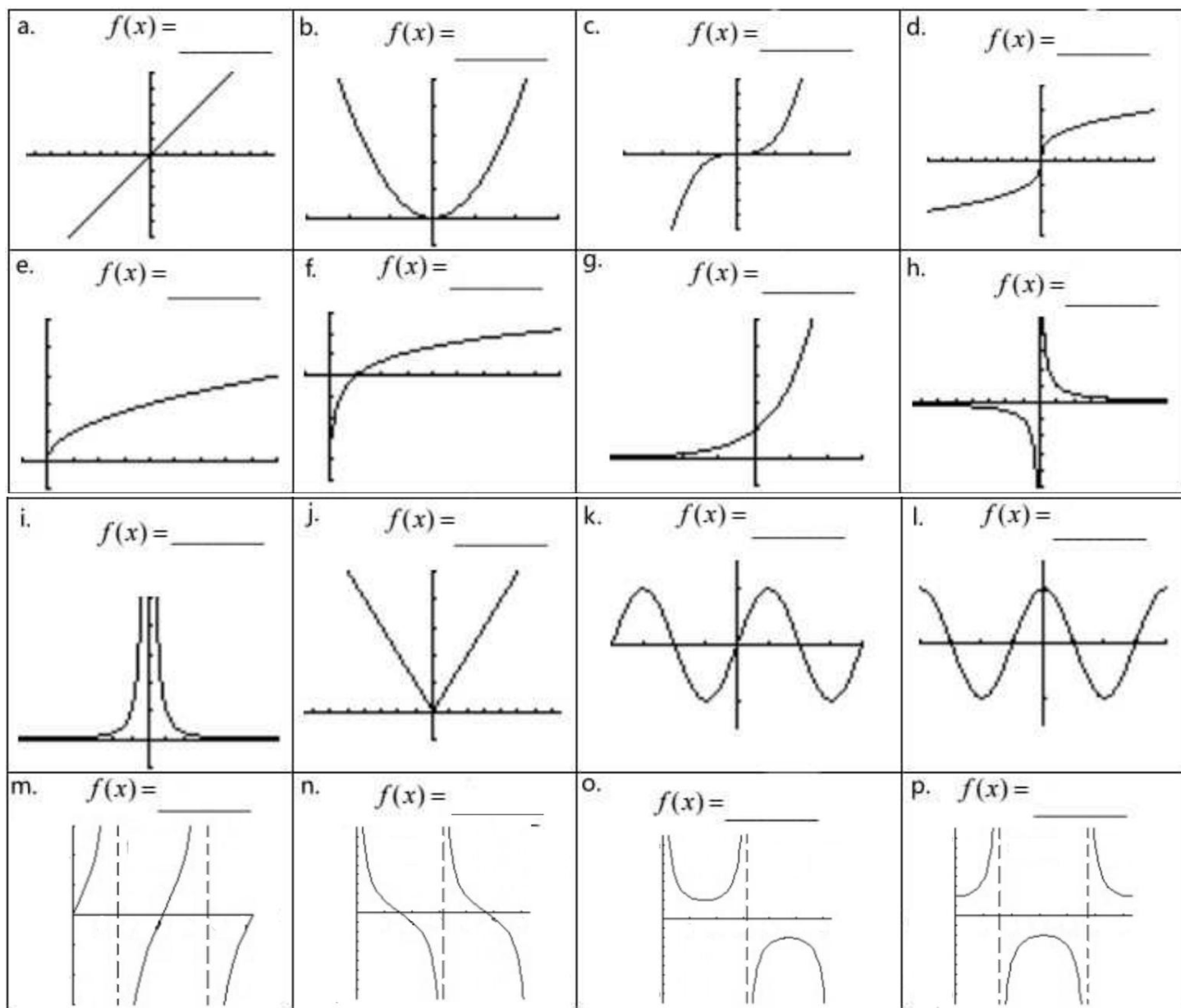
$$20. \sec^2 x - \sec x - 2 = 0, \quad 0 \leq x \leq 2\pi$$

$$21. \sin 2x = \cos x, \quad 0 \leq x \leq 2\pi$$

22. $\sec^2 x - 6 \tan x + 4 = 0, 0 \leq x \leq 360$

23. $\sin \frac{x}{2} + \cos x - 1 = 0, 0 \leq x \leq 2\pi$

24. (part 1) Identify the parent function for a-p



(Part 2) Match the transformed function to the letter of its parent function. Then Identify the transformations. Remember the vocab switches up a little for trig functions!

A. $g(x) = (x + 1)^2 + 4$

Parent function _____

Transformations:

B. $g(x) = -3\cos(2x - \pi)$

Parent function _____

Transformations:

C. $g(x) = -\left|\frac{x}{5}\right|$

Parent function _____

Transformations:

D. $g(x) = (4 - x)^3 + 2$

Parent function _____

Transformations:

E. $g(x) = 2 + \sec 3\left(x - \frac{\pi}{6}\right)$

Parent function _____

Transformations:

F. $g(x) = \frac{e^{x-6}}{2}$

Parent function _____

Transformations:

Video resources - Linear

Horizontal and vertical lines - <https://www.youtube.com/watch?v=2GYbX7PbmzA>

Parallel and perpendicular line - <https://www.youtube.com/watch?v=LTb2-LE7StE>

Line tangent to a circle - https://www.youtube.com/watch?v=ucEghF7_HvU

Video resources - Rational

Simplifying rational expressions - <https://www.youtube.com/watch?v=7Uos1ED3KHI>

Adding and subtracting rational expressions - https://www.youtube.com/watch?v=y_DweTAEYWK

Multiplying and dividing rational expressions - https://www.youtube.com/watch?v=x_5hDLe8UL0

Solving rational expressions - https://www.youtube.com/watch?v=1fR_9ke5-n8

<https://www.youtube.com/watch?v=tynJHA7wFzA>

Solving radical equations - <https://www.youtube.com/watch?v=g3rzugglglw>

Video resources – Logarithms

Log properties – <https://www.youtube.com/watch?v=mQTwzLpCcW0>

<https://www.youtube.com/watch?v=Jtv9Lnf7Zw8>

Expanding logarithms - <https://www.youtube.com/watch?v=Olz-5MyJA3g>

Condensing logarithms - <https://www.youtube.com/watch?v=luRrOlsB4cY>

Solving log equations – <https://www.youtube.com/watch?v=Kv2iHde7Xgw>

<https://www.youtube.com/watch?v=eTWCARmrzJ0>

Solving exponential equations - <https://www.youtube.com/watch?v=9tutJ5xrRwg>

Video resources - Trig

Unit circle – https://www.youtube.com/watch?v=V5ArB_GFGYQ

<https://www.youtube.com/watch?v=wT4xMAssvDk>

Graphing sine and cosine – <https://www.youtube.com/watch?v=bvTR9XbL1co>

<https://www.youtube.com/watch?v=KPvon2ufyNs>

Graphing other trig equations – https://www.youtube.com/watch?v=fo_q9mEAFp4

<https://www.youtube.com/watch?v=sKoR8KHx4uU>

Fundamental trig identities – <https://www.youtube.com/watch?v=ep5vjIY5kqE>

https://www.youtube.com/watch?v=UFb_LQxeGfg

Sum and difference identities – https://www.youtube.com/watch?v=d0iUBZz_WIE

<https://www.youtube.com/watch?v=hdSvvW0hpeE>

Double and half angle identities – <https://youtu.be/-Wu6ekO2Sdw>

<https://youtu.be/bNoJC7R2cOI>

<https://youtu.be/Xlel4XLomn4>

Trig equations - <https://youtu.be/8wa-PysIIDw>

https://youtu.be/gC_pqtQ9z0U

<https://youtu.be/mzJZRInvevc>

https://youtu.be/JioF8Vm_M60

<https://youtu.be/hHUSsGP02Ik>