BelovED
COMMUNITY
CHARTER SCHOOL

AP Calculus
Summer Mathematics Practice

Name _____ Preferred email address: _____

Your Birthday: _____ Cell Phone Number: _____

Parent/Guardian's Name(s): _____ Home Phone Number: _____

Parent(s)' Email Address: _____ Alternate Phone Number: _____

Favorite Motivational/Deep Quote: _____
_____
_____
_____

*Don't forget to use your **notebook as a resource!** | Success is the sum of small efforts repeated day in and day out*

Social Media | Who are the top three people (not friends/family) that you follow on twitter/snapchat, etc. (If you don't follow anyone, who are three celebrities/athletes/historical/etc. people that you keep up to date on)?

_____ / _____ / _____

Relationship | In one paragraph, describe your relationship with mathematics. Be honest, professional and creative in your response below.

College Habits | Some key college habits that we will be building upon this year will be notetaking, homework, studying, and test taking. Complete the following survey questions to give me a sense of where you are at. (5 – Strongly agree / 3 – neutral / 1 strongly disagree)

Notetaking	*I feel confident in taking detailed notes while prioritizing the important information being presented* *1 2 3 4 5* Explain:	Homework	*I am consistently on top of my homework and make sure I give it my best effort every time* *1 2 3 4 5* Explain:
Studying	*I am confident in my study habits that they will lead to positive results on my upcoming exam.* *1 2 3 4 5* Explain:	Test Taking	*I am able to get in the zone during a test and use strategy to maximize my score.* *1 2 3 4 5* Explain:

Close out | Is there anything else you want me to know about you before we start climbing to the top of the mathematical mountain?

Don't forget to use your **notebook as a resource!** *| Success is the sum of small efforts repeated day in and day out*

Name: _____

Essential Knowledge (You will need to know these COLD for CALCULUS) (___ / 31)

Unit Circle

Evaluate the following expressions (without a calculator).

1. * $\sin(90°) =$

2. ** $\cos\left(\frac{\pi}{4}\right) =$

3. ** $\sin\left(\frac{5\pi}{4}\right) =$

4. * $\cos(135°) =$

5. ** $\tan\left(\frac{5\pi}{4}\right) =$

6. $\tan(180°) =$

7. ** $\sin\left(-\frac{\pi}{4}\right) =$

8. * $\cos(-90°) =$

9. ** $\sin(150°) =$

10. ** $\cos\left(\frac{7\pi}{6}\right) =$

11. ** $\sin\left(\frac{5\pi}{6}\right) =$

12. $\cos(-135°) =$

13. ** $\tan\left(\frac{9\pi}{6}\right) =$

14. * $\tan(135°) =$

15. ** $\sin\left(-\frac{\pi}{3}\right) =$

16. $\cos(-120°) =$

The given point P is located on the Unit Circle. State the quadrant, the angle θ(radians) also $\sin\theta$, $\cos\theta$, and $\tan\theta$.

17. ** $P\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ Quad: Angle:

$\sin\theta =$ $\cos\theta =$ $\tan\theta =$

18. * $P(0, -1)$ Quad: Angle:

$\sin\theta =$ $\cos\theta =$ $\tan\theta =$

19. $P\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$ Quad: Angle:
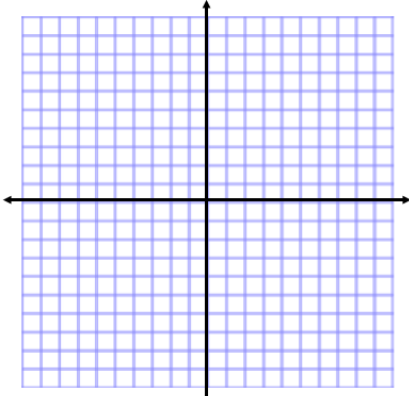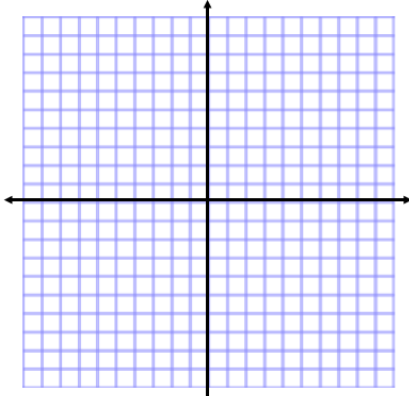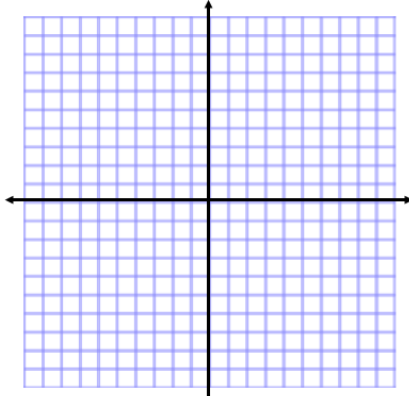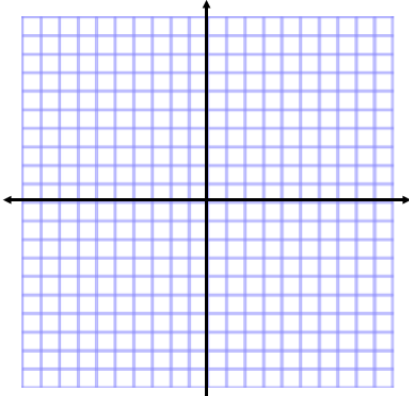
$\sin\theta =$ $\cos\theta =$ $\tan\theta =$

Don't forget to use your notebook as a resource! | Success is the sum of small efforts repeated day in and day out
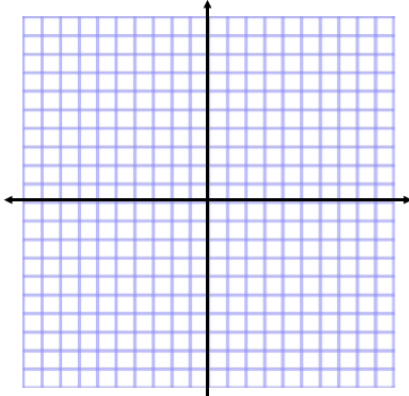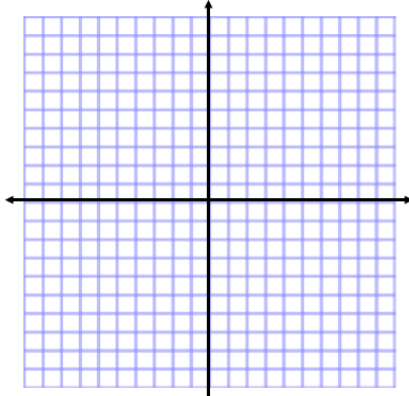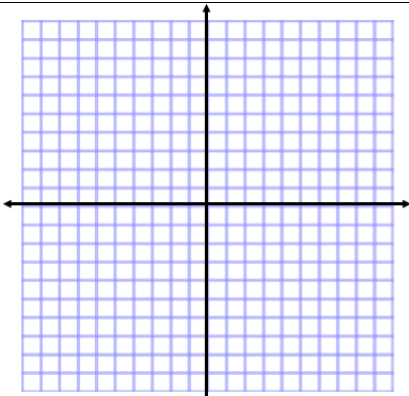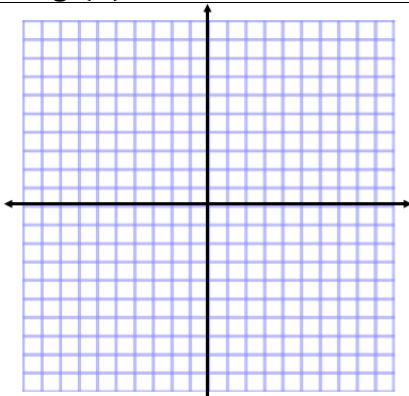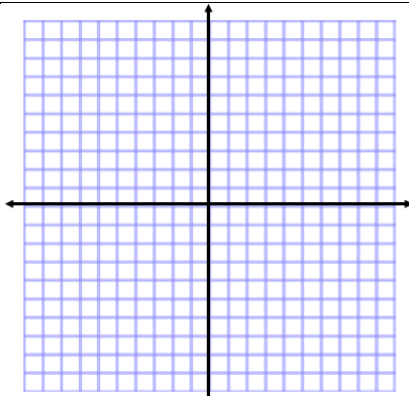
Essential Knowledge (You will need to know these COLD for CALCULUS) (___ /18)

Parent Functions – it is IMPERATIVE that you know your parent functions. These are KEY to accessing the tough calculus that we will do this year.

Graph each of the following parent functions on the axis provided:

**$g(x) = x^2 - 1$	**$f(x) = 2|x - 1|$	**$h(x) = -\sqrt{x} - 2$
**$g(x) = e^{x-1} + 3$	*$g(x) = -3x - 2$	$f(x) = |x + 5| - 2$
*$h(x) = (x - 2)^3 + 4$	$g(x) = \sqrt{x - 3} + 2$	**$f(x) = \ln(x - 1)$

Don't forget to use your **notebook as a resource!** *| Success is the sum of small efforts repeated day in and day out*

Equation Solving (_____ /24)

[Non-calculator] Solve each of the following equations for the unknown variable. Show all your work. For trigonometric functions, the variable is assumed to be on the interval $0 \le x \le 2\pi$.

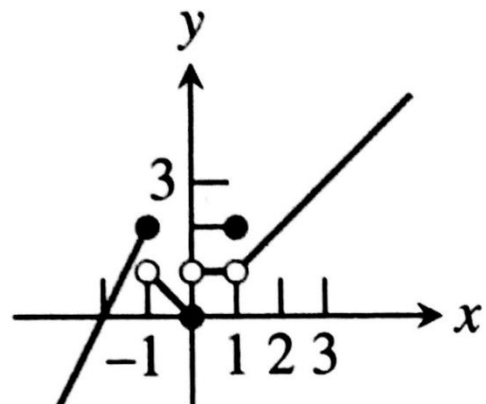|		
1. $**a^2 - 5a + 3 = -3$	2. $* 3a^2 + 7a - 5 = 1$	3. $** 2a^2 - 2 = -7a + 2$
4. $8r^3 - 64r^2 = 8 - r$	5. $**e^{3x} = 15$	6. $*e^{3x} = 7e^x$
7. $**\ln(5x - 4) = 0$	8. $*\ln(2x) - 4 = 3$	9. $** 2\sin x = \sqrt{3}$
10. $\cos(\pi x) = \frac{1}{2}$	11. $** 2\tan x + 6 = 8$	12. $* 2\sec x + 2 = \frac{1}{2}$

Expression Simplifying (____ / 22)
Simplify each of the following expressions – 11 is the tough one!

1. $** \ 3x^2 - 4xy + 4x^2 + 3xy$	2. $** \ 5v^2 - 7u + v^2 - u$	3. $* \ -6x^2yz + 4y^2z + 7y^2z + 11x^2yz$
4. $**7m - 9n^2 - (-3n^2 + 8m + 1) + 15$	5. $a - 2(b - c) + 5(a + b - c) - 14$	6. $*2uv - 3(uv + u^2v^2) + 4(u^2v^2)$
7. $** \left(\dfrac{18m+24}{12m}\right)\left(\dfrac{10m^2}{3m+4}\right)$	8. $** \ e^{2x}(x^2 + e^{3x})$	9. $* \ \ln(3x) - \ln(4y)$
10. $** \left(\dfrac{8x^3}{27y^8}\right)\left(\dfrac{9y^3}{12x^2}\right)$	11. $\dfrac{\dfrac{x-2}{x^2-9}}{\dfrac{x^2-4}{x+3}}$	

*Don't forget to use your **notebook as a resource!** | Success is the sum of small efforts repeated day in and day out*

Limits and Continuity (___ / 34)

1. **The graph of $y = f(x)$ is given below. Identify each of the statements as true or false, explain if requested

   a) ___ $\lim\limits_{x \to -1^+} f(x) = 1$

   b) ___ $\lim\limits_{x \to 0^-} f(x) = 0$

   c) ___ $\lim\limits_{x \to 0^-} f(x) = 1$

   d) ___ $\lim\limits_{x \to 0^-} f(x) = \lim\limits_{x \to 0^+} f(x)$

   e) ___ $\lim\limits_{x \to 0} f(x)$ exists

   f) ___ $\lim\limits_{x \to 0} f(x) = 0$

   g) ___ $\lim\limits_{x \to 0} f(x) = 1$ Explain:

   h) ___ $\lim\limits_{x \to 1} f(x) = 1$

   i) ___ $\lim\limits_{x \to 1} f(x) = 0$ Explain:

   j) ___ $\lim\limits_{x \to 2^-} f(x) = 2$

In exercises 2 – 4 | Determine the value of the following limits.

2. ** $\lim\limits_{x \to -3} \dfrac{x^2+7x+12}{x^2-9} =$

3. * $\lim\limits_{x \to 3} \dfrac{x^2-9}{x^2+2x-15} =$

4. $\lim\limits_{x \to 2} \dfrac{x^3-2x^2+x-2}{x-2} =$

For exercises 5 – 6 | Does $\lim\limits_{x \to a} f(x)$ exist? If it does, give its value. If it does not exist, give an explanation.

5. **$a = 2, f(x) = \begin{cases} 2 - x, & if\ x < 2 \\ 1, & if\ x = 2 \\ x^2 - 4, & if\ x > 2 \end{cases}$

6. * $a = 1, f(x) = \begin{cases} 2 - x, & if\ x < 1 \\ x + 1, & if\ x \geq 1 \end{cases}$

*Don't forget to use your **notebook as a resource!** | Success is the sum of small efforts repeated day in and day out*

7. Determine the following limits at positive and negative infinity.

a) ** $\lim\limits_{x\to\infty} e^{3x} =$

e) * $\lim\limits_{x\to-\infty} \dfrac{-x^3+x}{x^2+5} =$

b) ** $\lim\limits_{x\to\infty} \dfrac{5}{x^4} =$

f) ** $\lim\limits_{x\to-\infty} \dfrac{e^x-3+x^2}{x-4} =$

c) $\lim\limits_{x\to\infty} \dfrac{\sin x}{x^2} =$

g) ** $\lim\limits_{x\to\infty} \dfrac{\ln x}{x^4} =$

d) * $\lim\limits_{x\to\infty} \dfrac{6-x^2+4x}{5x^2-8x+6} =$

h) $\lim\limits_{x\to\infty} \sin x =$

8. **What are the three requirements for a function to be continuous?

9. **Find a value for a so that the function

$$f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 2ax, & x \geq 3 \end{cases}$$

is continuous.

10. Find a value for a so that the function

$$f(x) = \begin{cases} x^2 + x + a, & x < 1 \\ x^3, & x \geq 1 \end{cases}$$

is continuous.

8