Hi incoming Calculus students!

This is the Summer Review Math Packet to review Precalculus concepts to help you get ready for the fall. I will collect your solutions during the first week of classes in September. This math packet is for students registered for the Calculus class, **not** the Calculus AP class.

Use your brain and some resources to do these problems to the best of your ability. As you work through this review packet, maintain your growth mindset. Chip away at these problems over the next few weeks. Take a break and come back. Check out the sites below. **Our message to you is - put in the work and just do your best!**

Here is our pacing recommendation. There are about 20 problems and 7 weeks of summer left, so if you tackle about 3 problems a week, then you will be all done before pre-season! We so appreciate your willingness to spend some time doing math this summer! You got this!

If you need a little extra help with review or the vocabulary you read here, I offer these online resources, all searchable by topic

http://www.coolmath.com/algebra (review of the basics)
https://www.coolmath.com/precalculus-review-calculus-intro (more recent material)
https://www.mathsisfun.com/algebra/index.html (great visuals for math vocabulary)
https://www.khanacademy.org/math/algebra2 (if you want video lessons)

If you have ANY questions or problems or just need a bit of help, please feel free to email me at jsullivan@waringschool.org. I may be slow to respond but I'll get a reply to you as soon as I am able.

Happy summering!!!

Joan

Name _____

Directions: (read carefully) Unless otherwise noted, all problems in this packet should be solved algebraically without a calculator. All solutions should be written on separate sheets of paper. Make sure all solutions are numbered and easy to find. Important vocabulary has been written in **bold**.

1. Let's open with a quick Algebra "correct the mistake" activity.

True or false. If false, change what is underlined to make the statement true.

a. $(x^3)^4 = x^{\underline{12}}$ T F

b. $x^{\frac{1}{2}}x^3 = x^{\underline{\frac{3}{2}}}$ T F

c. $(x+3)^2 = \underline{x^2+9}$ T F

d. $\dfrac{x^2-1}{x-1} = \underline{x}$ T F

e. $(4x+12)^2 = \underline{16}(x+3)^2$ T F

f. $\underline{3}+2\sqrt{x-3} = 5\sqrt{x-3}$ T F

2. Find the **x and y-intercepts** for each of the following:

$a)\ y = x - 1$
$b)\ y = x^2 + x - 1$
$c)\ y = (x-1)\sqrt{9-x^2}$
$d)\ y = \dfrac{x-3}{(3x+1)^2}$

3. Find all **points of intersection** of each of the following:

$a)\ 2x - 3y = 13$
$\quad 5x + 3y = 1$

$b)\ y = x^3 - 4$
$\quad y = -x$

4. SImplify the following **algebraic expressions** and rewrite without negative powers.

a) $\frac{2x^2y^{-3}}{x^3y}$

b) $-5\left(\frac{3}{2}\right)(4-9x)^{-1/2}(-9)$

c) $\frac{\frac{1}{2}(2x+5)^{-3/2}}{\frac{3}{2}}$

d) $\frac{1}{x^2} + 4x^{-2}$

5. Factor the following algebraic expressions completely. Recall: "**Factor**" means to rewrite the expression as a product. This is an important skill for Calculus, so if you are feeling rusty please check this resource: Factoring Toolkit

a) $x^2 - 4x - 5$

b) $16x^2 - 9$

c) $12x^4 + 6x^3 + 3x^2$

6. Given the **functions** $f(x) = x^2 - 4x \ \ and \ \ g(x) = 5 - x$, find each of the following:

a) $f(g(x))$

b) $g(f(x))$

c) $f(x - 2)$

d) $g(2 - x)$

e) $\frac{f(x)-f(3)}{x-3}$

f) $g^{-1}(x)$

7. State the **domain** and **range** of the following:

a) $f(x) = \sqrt{(x+2)}$

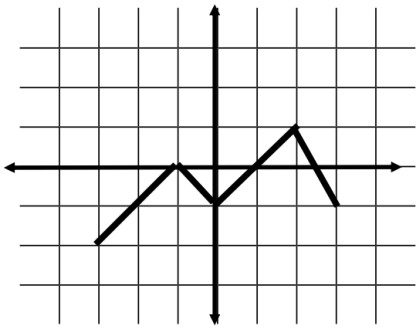
b) $g(x) = \frac{x+2}{x^2-4}$

8. Solve this **quadratic equation** using the strategy called "completing the square."

$$2x^2 + 3x = 4$$

9. Given $f(x) = \frac{x^2-4}{x^2-4x^4}$, for what values of x is… ?
   a) $f(x) = 0$ b) $f(x)$ **undefined**

10. The graph of function, f, is given. Graph each **transformation**.



a) $f(-x)$ b) $f(x+2)$

c) $-f(x)$ d) $f(x)+2$

11. Sketch $\frac{11\pi}{6}$ in a **Unit Circle** and state the value of all 6 trig functions.

12. State the **amplitude, period, phase shift** and **vertical shift** for the sinusoidal function $y = \cos\left(x - \frac{\pi}{3}\right) + 1$ .Then sketch one period of the function using an appropriate scale.

13. Solve the following equations. Write your answers exactly, without decimal approximations. No Calculator necessary.

a) $\sin x = \frac{1}{2},\ for\, 0 \le x \le 2\pi$

b) $x^2 - 3x - 4 = 0$

c) $\log_3 81 = x$

d) $\log_3 \sqrt{3} = x$

e) $4 = \frac{x-1}{x}$

f) $25e^{-x} = 50$

14. ***Piecewise defined functions*** occur often in Calculus. These are functions with different rules for different pieces of their domains. Click here for more information.

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

a) $f(1)$ b) $f(0)$ c) $f(-1)$ d) Make a sketch of f.

15. ***Trigonometry Facts Review***

Take time this summer to review the values of sine, cosine, and tangent in the unit circle of the "cardinal angles" in radians. You may use whatever method helps you. All the information you are expected to know is in this unit circle. Having these committed to memory will help calculus run much smoother for you.

Here is what you are expected to know by heart.