Welcome to AP Pre-Calculus!

This assignment is designed to help you prepare for your upcoming AP Pre-Calculus class. All of the topics explored in this assignment should be a review of material you learned in your Algebra 2 course; however, there may be a few topics that you may not have spent much time practicing in your prior math classes.

I strongly encourage you try your best to work through this assignment: take note of the questions you may have had a difficult time completing and return to school ready to review! We will spend the first week of school reviewing this content, but we will not have enough time to do ALL of the questions so please come prepared with SPECIFIC questions.

I'm looking forward to exploring AP Pre-Calculus with you! This course can be challenging, but I have full confidence in you: YOU CAN DO IT! ☺

There will be a test over the content explored in this packet
THE FIRST WEEK OF SCHOOL!

If you have any questions or concerns, please feel free to contact at jobesem@lc-ps.org

Good luck! ☺
Mrs. Jobes

Prerequisites for Pre-Calculus:

The following is a list of concepts that you have learned in one (or more) of your math classes throughout your school career. The summer assignment will not review ALL of these topics, but you will be expected to know ALL of them. Please be sure to review and practice these topics until you are confidently comfortable with all of them. You are permitted to use any resources you wish – previous class notes, online resources, textbooks, etc. – ***but please be aware that you are NOT to use a calculator to complete this summer assignment.***

Prior Mathematical Knowledge:

Linear Equations, Factoring (GCF, difference of two squares, trinomials, sums and difference of cubes, and factoring by grouping), Functions, (linear, quadratic, cubic, square root, cube root, greatest integer, absolute value, and reciprocal functions), Circles, and Graphing Exponential Functions.

Summer Packet

AP Pre-Calculus Summer Assignment Name: _____

Section 1: Factoring (this is the most important skill to have coming into AP PC!!)

Factoring thought process:

1. Is there a GREATEST COMMON FACTOR? – find it!
2. Are the A-term and C-term PERFECT SQUARES? – use the "special cases" short-cut!

When is doubt – AC Method! – see song lyrics below! 😊

Factoring Song for the AC METHOD:

Steps to Perform the AC Method:	Example:
(To the tune of Twinkle, Twinkle, Little Star)	$6x^2 - 11x - 10$
Drop A, Drop C, Multiply!	$(6x^2 \quad)(\quad -10)$
Find the factors that add to B.	AC: $6x^2 * -10 = -60x^2$ 1 and 60 2 and 30 3 and 20 4 and 15 → $4x - 15x = -11x$ 5 and 12 6 and 10
GCF and GCF	$(6x^2 + 4x)(-15x - 10)$ $2x(3x + 2) - 5(3x + 2)$
Write the match, and combine the rest.	$(3x + 2)(2x - 5)$
Now I know how to FACTOR! Never forget our Factoring Rules! ☺	

Factor each completely. Show all work where necessary.

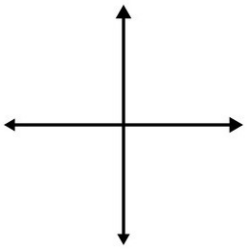
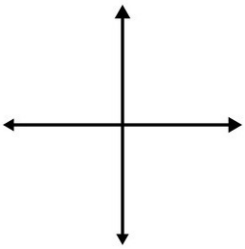
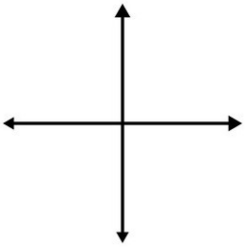
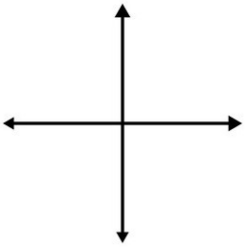
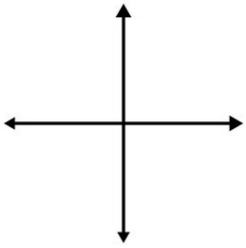
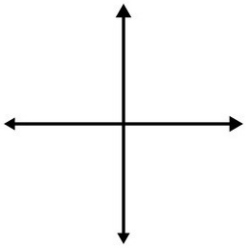
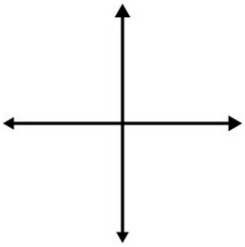
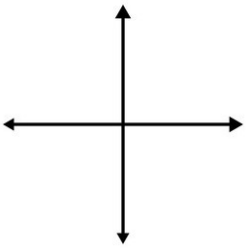
1. $x^2 + 5x + 6$	**2.** $y^2 + 15y + 36$	**3.** $p^2 - 12p + 27$
4. $a^2 + 10a - 75$	**5.** $-x^2 - x + 20$	**6.** $x^2 - 16$

7. $2x^2 - 8$	**8.** $25x^2 - 1$	**9.** $81x^2 - 1$
10. $2x^2 - 27x + 36$	**11.** $3x^2 + 7x - 20$	**12.** $16x^2 - 48x$
13. $2y^2 - 16y + 32$	**14.** $-6a^2 - 600$	**15.** $x^2 - y^2$
16. $2p^2 - 11p + 5$	**17.** $4y^2 + 15y - 4$	**18.** $x^4 - y^4$
19. $x^3 + 2x^2 + 5x + 10$	**20.** $x^3 + 2x^2 - 3x - 6$	**21.** $3x^3 + 2x^2 + 12x + 8$

Section 2: Graphs of Parent Functions

"Parent Functions" are basic functions that you should be able to RECOGNIZE in equation form, and VISUALIZE as a graph. You should also be aware of how these parent functions can be translated/shifted around the coordinate plane. Sketch each of the functions below and identify their domains using appropriate interval notation. (If you don't know what the graph looks like, use your calculator or look it up online.)

You will need to have this memorized!!! ☺

1. $y = c$ and $x = c$  Domain:	**2.** $y = x$  Domain:	**3.** $y = x^2$  Domain:	**4.** $y = x^3$  Domain:
5. $y = \|x\|$  Domain:	**6.** $y = \sqrt{x}$  Domain:	**7.** $y = \sqrt[3]{x}$  Domain:	**8.** $y = \frac{1}{x}$  Domain:

Section 3: Transformations

Transformation Rules		
Function Notation	**Type of Transformation**	**Change to Coordinate Point**
f(x) + d	Vertical translation up d units	$(x, y) \to (x, y+d)$
f(x) - d	Vertical translation down d units	$(x, y) \to (x, y-d)$
f(x + c)	Horizontal translation left c units	$(x, y) \to (x-c, y)$
f(x - c)	Horizontal translation right c units	$(x, y) \to (x+c, y)$
-f(x)	Reflection over x-axis	$(x, y) \to (x, -y)$
f(-x)	Reflection over y-axis	$(x, y) \to (-x, y)$
af(x)	Vertical stretch for $\|a\| > 0$	$(x, y) \to (x, ay)$
af(x)	Vertical compression for $0 < \|a\| < 1$	$(x, y) \to (x, ay)$
f(bx)	Horizontal compression for $\|b\| > 0$	$(x, y) \to \left(\frac{x}{b}, y\right)$
f(bx)	Horizontal stretch for $0 < \|b\| < 1$	$(x, y) \to \left(\frac{x}{b}, y\right)$

List the transformations of the equation $g(x)$ from the parent function $f(x)$.

1. $f(x) = x^2, \quad g(x) = (7x-3)^2 + 5$

2. $f(x) = |x|, \quad g(x) = -2|x| - 7$

3. $f(x) = \sqrt{x}, \quad g(x) = -\frac{1}{2}\sqrt{-x} - 8$

4. $f(x) = \frac{1}{x}, \quad g(x) = \frac{1}{x-3} + 6$

Create a transformed equation, $g(x)$, from the descriptions on the parent function $f(x)$.

5. $f(x) = x^2$

Shift left 2
Shift down 1
Reflect over x-axis

6. $f(x) = |x|$

Reflect over y-axis
Horizontal shrink by $\frac{1}{3}$
Shift up 5

7. $f(x) = \sqrt{x}$

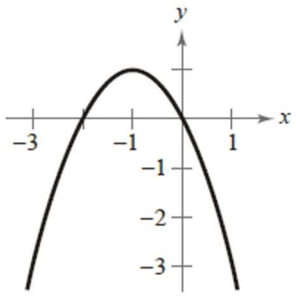
Vertical shrink by $\frac{1}{2}$
Horizontal stretch by 5
Shift right 7

8. $f(x) = \frac{1}{x}$

Reflect over x-axis
Vertical shrink by $\frac{1}{4}$
Shift up 4

Given the graphs, create an equation.

9.



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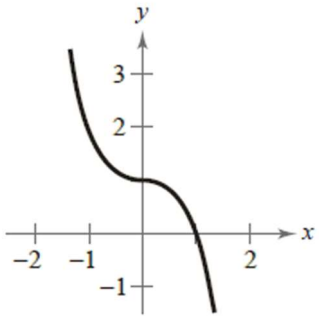

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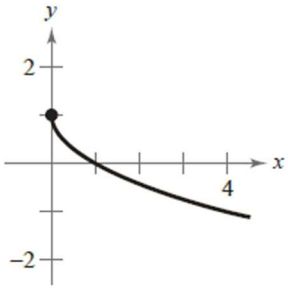

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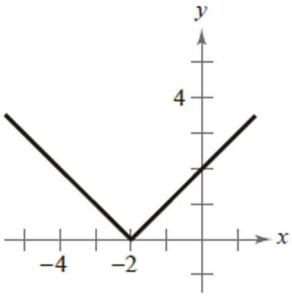
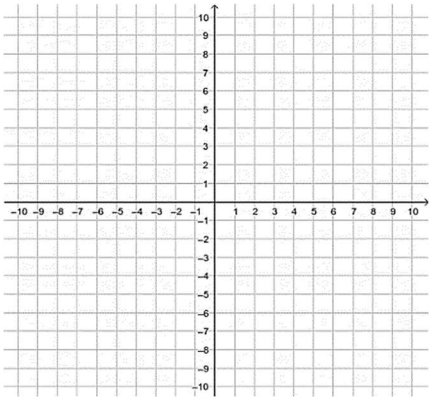
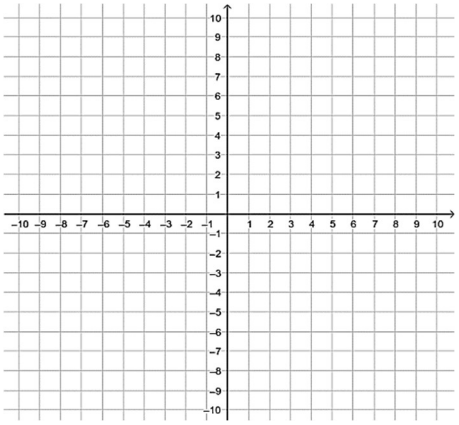


Given the equation, create a graph.

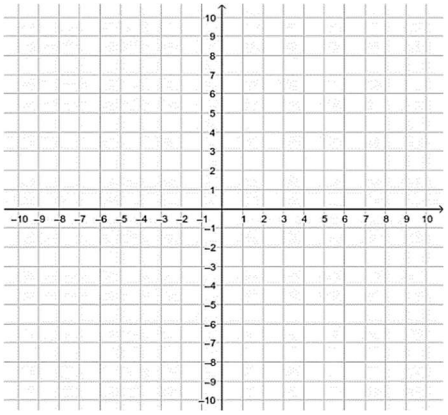
13. $y = |x - 1| + 2$



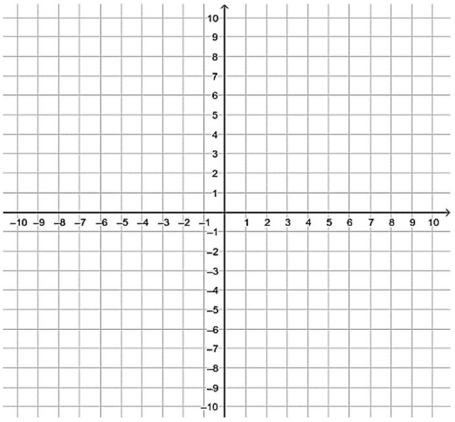
14. $y = \sqrt{x} - 5$



15. $y = (x + 2)^2 - 1$



16. $y = (x - 4)^3$



Section 4: Solving and simplifying rational functions.

Simplify the rational function.

1. $\frac{45}{10a-10}$	**2.** $\frac{2r-4}{r-2}$	**3.** $-\frac{36x^3}{42x^2}$

Combine the fractions into one fraction by creating a LCD. *Hint you might need to factor! *

4. $\frac{6}{x-1}-\frac{5x}{4}$	**5.** $\frac{3}{x+7}+\frac{4}{x-8}$	**6.** $\frac{r+6}{3(r-2)}+\frac{r+1}{3r-6}$
7. $\frac{7x}{2x}-\frac{x-2}{20x+16}$	**8.** $\frac{6}{x+5}+\frac{x+2}{x^2-3x-10}$	**9.** $\frac{2x}{x^2}-\frac{x-3}{7x}$

Solve the proportions by cross multiplication.

10. $\frac{10}{8}=\frac{n}{10}$	**11.** $\frac{4}{n+2}=\frac{7}{n}$	**12.** $\frac{5}{r-9}=\frac{8}{r+5}$