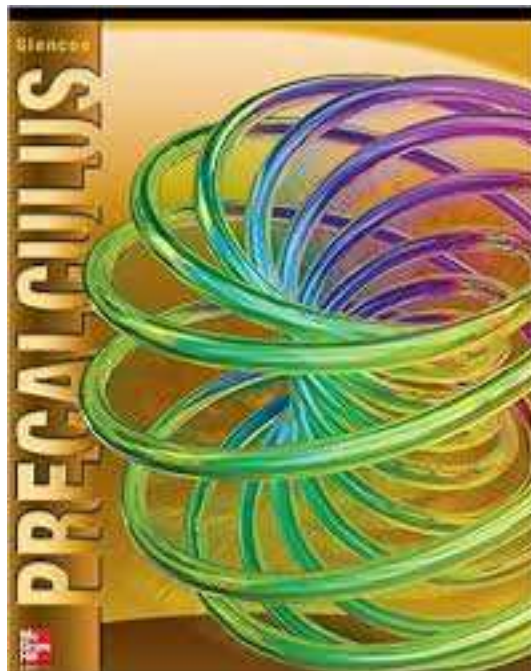# Precalculus ADV Summer Packet

Name_____

Due Date: FIRST DAY OF SCHOOL

Precalculus ADV Summer Packet

Next year you will be taking Precalculus ADV. Within Precalculus, you are expected to know a number of concepts that will be used throughout the year. Several of these concepts are listed on a following page with associated internet references.

You need to get off to a good start, so spend some quality time on this packet this summer. The following exercises will give you an opportunity to refresh your prior knowledge and skills from Algebra II in preparation for Precalculus ADV. When completing the problems, be sure to show all steps in solving each problem. All work can be done on this packet or on a separate sheet of paper. Also, do not rely on the calculator to work through these problems.

Prerequisite Skills:
1. Finding domain and range of graphs, a given relation, and given functions.
2. Evaluating functions at given points or expressions.
3. Graphing equations using a T-chart of x and y values.
4. Factoring – GCF, monomial, difference of squares, and trinomials.
5. Solving simple quadratics.
6. Working with fractions and rational expressions.
7. Simplify exponents, including fractional and negative exponents.
8. Simplifying and solving expression and equations involving radicals.

If you have difficulty with any of these topics, review your notes from a prior class. You can also look on the internet for tutorials on specific topics on websites such as (some sites are suggested in the "Topics to be Covered" following these instructions):

> www.purplemath.com ,   www.khanacademy.org ,   www.regentsprep.org , www.mathisfun.com , www.wtamu.edu/academic/anns/mps/math/mathlab

or any other websites from your preferred search engine. Be persistent and resourceful until you find a tutorial that is helpful, understandable, and provides good examples with answers for you to follow. Don't accept just "getting an answer" as it is important that you understand _how_ to successfully complete these types of review problems. If you still have questions about any of the above topics, please ask your teacher for assistance when the school year begins. Your Precalculus Teacher will not spend a large amount of time reviewing these topics in class.

It is a mistake to decide to do this now. Let it go until mid-summer. We want these concepts to be relatively fresh in your mind in the fall. But, do not wait to do them at the very last minute. These take time. If you do a few concepts a day, the whole packet will take you about a week to complete. This packet is **due** on the **first day of school.** If you are unsure of how to answer some of the questions in the packet, please see your Precalculus ADV teacher for extra help during the first week of school.

We hope you take this seriously as we sincerely wish for you to be successful throughout this next year. Your preparation over the summer will be rewarded in unexpected ways during the year.

Good Luck!

Topics to be Covered with internet references for the Precalculus Summer Packet

1. Domain/Range
http://www.purplemath.com/modules/fcns2.htm
https://www.youtube.com/results?search_query=domain+and+range+of+functions

2. Evaluating functions
http://www.mathsisfun.com/algebra/functions-evaluating.html
https://www.khanacademy.org/math/algebra/algebra-functions

3. Graphing equations using T-chart
http://www.purplemath.com/modules/graphlin.htm
http://www.youtube.com/results?search_query=slopes+of+linear+equations

4. Factoring
http://www.purplemath.com/modules/simpfact.htm
https://www.khanacademy.org/math/algebra-basics/quadratics-polynomials-topic/factoring-special-products-core-algebra/v/factoring-special-products
http://www.regentsprep.org/regents/math/algtrig/atv1/revfactorgrouping.htm
http://www.regentsprep.org/regents/math/algtrig/ate3/quadlesson2.htm
http://www.youtube.com/results?search_query=factoring+greatest+common+term
http://www.youtube.com/results?search_query=factoring+difference+of+squares
http://www.youtube.com/results?search_query=factoring+trinomials

5. Solving Simple Quadratics
https://www.khanacademy.org/math/algebra/quadratics/quadratics-square-root/v/simple-quadratic-equation

6. Working with Fractions and Rational Expressions
http://www.purplemath.com/modules/rtnldefs2.htm
http://www.purplemath.com/modules/rtnladd.htm
http://www.purplemath.com/modules/rtnlmult.htm

7. Exponents
http://www.purplemath.com/modules/exponent.htm
http://www.purplemath.com/modules/simpexpo.htm

8. Radicals
https://www.khanacademy.org/math/algebra-basics/core-algebra-foundations/square-roots-for-college/v/simplifying-radicals
https://www.khanacademy.org/math/algebra/rational-exponents-and-radicals/rational-exponents-and-the-properties-of-exponents/v/multiply-and-simplify-a-radical-expression-1
http://www.youtube.com/results?search_query=Simplifying+Radicals

Common Algebraic Errors to Avoid:

| Error	Correct form	Comments
$a - (x - b) \neq a - x - b$	$a - (x - b) = a - x + b$	Change all signs when distribution negative through parentheses.
$(a + b)^2 \neq a^2 + b^2$	$(a + b)^2 = a^2 + 2ab + b^2$	Don't forget middle term when squaring binomials.
$\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right) \neq \frac{1}{2}ab$	$\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right) = \frac{1}{4}(ab)$	1/2 occurs twice as a factor.
$\frac{a}{x + b} \neq \frac{a}{x} + \frac{a}{b}$	Leave as $\frac{a}{x + b}$	Don't add denominators when adding fractions.
$\frac{1}{a} + \frac{1}{b} \neq \frac{1}{a + b}$	$\frac{1}{a} + \frac{1}{b} = \frac{a + b}{ab}$	Use definition for adding fractions.
$\frac{\frac{x}{a}}{b} \neq \frac{bx}{a}$	$\frac{\frac{x}{a}}{b} = \left(\frac{x}{a}\right)\left(\frac{1}{b}\right) = \frac{x}{ab}$	Multiply by reciprocal of the denominator.
$\frac{1}{3x} \neq \frac{1}{3}x$	$\frac{1}{3x} = \frac{1}{3} \cdot \frac{1}{x}$	Use definition for multiplying fractions.
$1/x + 2 \neq \frac{1}{x + 2}$	$1/x + 2 = \frac{1}{x} + 2$	Be careful when using a slash to denote division.
$(x^2)^3 \neq x^5$	$(x^2)^3 = x^{2 \cdot 3} = x^6$	Multiply exponents when an exponential form is raised to a power.
$2x^3 \neq (2x)^3$	$2x^3 = 2(x^3)$	Exponents have priority over coefficients.
$\frac{1}{x^2 + x^3} \neq x^{-2} + x^{-3}$	Leave as $\frac{1}{x^2 + x^3}$	Don't shift term-by-term from denominator to numerator.
$\sqrt{5x} \neq 5\sqrt{x}$	$\sqrt{5x} = \sqrt{5}\sqrt{x}$	Radicals apply to every factor inside radical.
$\sqrt{x^2 + a^2} \neq x + a$	Leave as $\sqrt{x^2 + a^2}$	Don't apply radicals term-by-term.
$\frac{a + bx}{a} \neq 1 + bx$	$\frac{a + bx}{a} = 1 + \frac{b}{a}x$	Cancel common factor, *not* common terms.
$\frac{a + ax}{a} \neq a + x$	$\frac{a + ax}{a} = 1 + x$	Factor *before* canceling.

Part 1: Find the Domain and Range of each function below.

1. Given the following graphs or set of points, identify the Domain and Range of each function using interval or set notation.

a.

$y = g(x)$

b.

$f(x) = \dfrac{1}{x}$
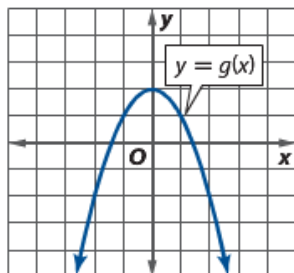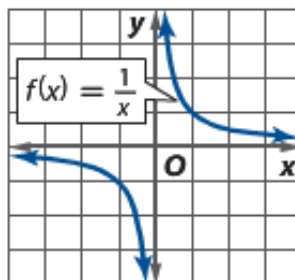
c. $\{(6,-4),(3,-3),(2,1),(1,5),(-2,-7),(5,-4),\}$

d. $\{(8,-4),(-2,-3),(5,-1),(7,-5),(2,-6),(9,-2),\}$

2. Given the function, determine the Domain and Range of each over the set of real numbers using interval or set notation.

a. $y = \dfrac{4}{x-1}$

b. $y = \sqrt{x^2 - 9}$

Part 2: Evaluating functions

Find the following values for each given function.

3. $f(x) = -2x^2 + x - 1$

a. $f(0) =$

b. $f(-1) =$

c. $f(-x) =$

d. $-f(x) =$

e. $f(x+1) =$

f. $f(2x) =$

4. $f(x) = \dfrac{x^2 - 1}{x + 4}$
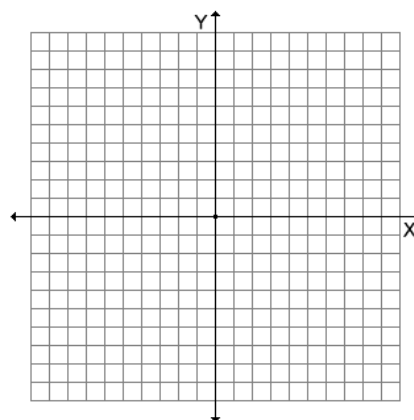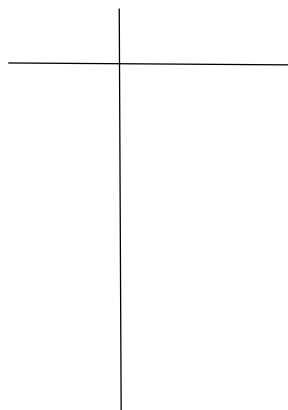
a. $f(0) =$

b. $f(-1) =$

c. $f(-x) =$

d. $-f(x) =$
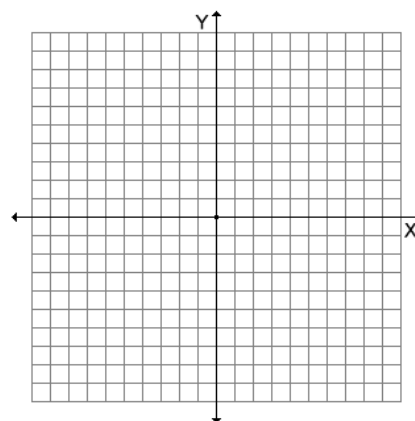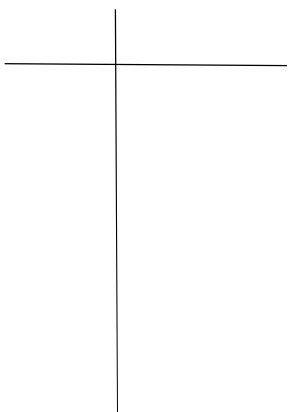
e. $f(x+1) =$

f. $f(2x) =$

Part 3:   Graphing equations using T-chart

Graph each function without using a calculator. Create a T chart, select 5-10 x-values and determine the y-value. Use these coordinates to plot the graphs
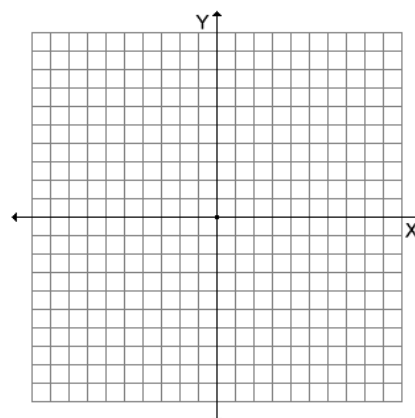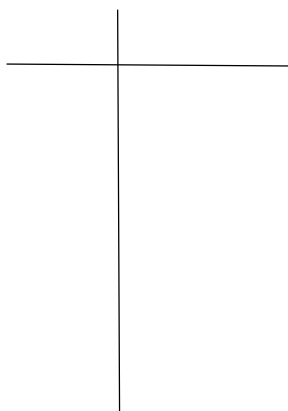
5. $y = -\dfrac{1}{2}x - 3$

6. $3xy = 1$

7. $y = x^2 - x - 6$

Part 4: Factoring

Use a method to factor the expressions below completely over the set of real numbers. If it is not factorable, write "prime." Methods for factoring include AC Method (breaking up the middle term), Factor by grouping, Difference of Squares, Perfect Square Trinomials, and Greatest Common Factor.

8) $3p^6 - 7p^3 - 6$

9) $12m^2 - 6m$

10) $12a^2b + 18ab^3 - 24a^3b^2$

11) $x^2 + 10xy + 16y^2$

12) $4x + 4y + mx + my$

13) $x^4 + 13x^2 + 42$

14) $9p^2 - 49$

15) $16z^2 - 121$

16) $25x^2 + 1$

17) $16v^4 - 81$

18) $r^2 + 15r + 54$

19) $36r^2 - 6r - 20$

Part 5: Solving simple quadratics

20. Solve for x in each question – find exact values (no decimals).

a. $2x^2 - 18 = 0$

b. $x^2 - x + 38 = 45 - x$

c. $27 - x^2 = 54$

21. Solve for the variable.

a. $x^2 + 5x + 6 = 0$

b. $x^2 = 2x + 15$

22. Solve for the variable.

a. $8x^2 - 6x = 5$

b. $x^2 + 49 = -14x$

Part 6: Working with fractions and Rational Expressions (Throughout the year, you will be working with fractions. These are concepts you need to be able to work with easily.)   Do the following without a calculator. Leave answers in fraction form.

23. Adding and Subtracting Fractions – Simplify each of the following:

a. $\dfrac{3}{4}+\dfrac{2}{3}=$

b. $\dfrac{2}{a}+\dfrac{13}{a}=$

c. $\dfrac{10}{x}-\dfrac{3}{x^2}=$

d. $\dfrac{x}{2}+\dfrac{5x}{6}=$

24. Multiplying and Dividing Fractions – Simplify each of the following:

a. $\left(\dfrac{3}{5}\right)\left(\dfrac{15}{27}\right)\left(\dfrac{21}{18}\right)$

b. $\left(\dfrac{3x^2}{y}\right)\left(\dfrac{2y^3}{9x^5}\right)$

c. $\dfrac{\dfrac{x}{4}}{\dfrac{3x}{16}}$

d. $\dfrac{\dfrac{x+1}{5y}}{\dfrac{x+1}{35y^4}}$

e. $12\cdot\dfrac{4x}{3}$

25. Solve the following equations for the variable.

a. $\dfrac{3}{2x}-\dfrac{9}{2}=6$

b. $\dfrac{4}{5y}+\dfrac{y-2}{y}=-\dfrac{1}{5}$

c. $\dfrac{x-2}{x}=\dfrac{4}{5}$

Part 7: Exponents

26. Simplify each of the following without a calculator.

a. $(-2^2)^3$

b. $-\left(\dfrac{2}{5}\right)^{-2}$

c. $(3x^2y)^{-3}$

d. $\dfrac{y^{-4}}{5x^{-2}}$

e. $\left(\dfrac{356x^4y^{-3}z}{34x^{-14}y^4}\right)^0$

Part 8: Radicals

27. Simplify each of the following without a calculator. Express your answer in lowest terms.

a. $\sqrt{32}$

b. $\sqrt{(2x)^8}$

c. $\sqrt[3]{-64}$

d. $\sqrt{80}$

e. $\sqrt[4]{32}$

f. $\sqrt{2x^2}$ g. $\sqrt{16x^3 y^4}$ h. $\sqrt{20x^4 y}$ i. $\sqrt{128x^6 y^8 z}$

28. Simplify and rationalize any denominators.

a. $\dfrac{4}{\sqrt{3}}$ b. $\dfrac{\sqrt{3}+x}{x-\sqrt{3}}$ c. $\dfrac{5x}{\sqrt{3x-2}}$

29. Solve the following equations for the variable.

a. $\sqrt{15-2x} = x$ b. $x-4 = \sqrt{2x}$