

Summer
Math
Packet

PRECALCULUS

Summer 2018



Precalculus Summer Packet

Your RM math teachers look forward to seeing you in Precalculus next year. The following exercises will give you an opportunity to refresh your prior knowledge and skills from Algebra II in preparation for Precalculus. Several of these prerequisite concepts are listed on a following page with associated internet references. Spending some quality time on this packet over the summer will help you get off to a good start. 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. You will be tested without the calculator, so practice without the calculator.

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 or search online for tutorials on specific topics at websites such as:

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

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. We 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, but don't wait to do them at the very last minute. We want these concepts to be relatively fresh in your mind in the fall. This packet is **due** on the **first day of school**.

Best wishes for an enjoyable AND productive summer break!

- *Your RM Precalculus Teachers*

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+function

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-corealgebra/>

<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/simplifyingradicals>

<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

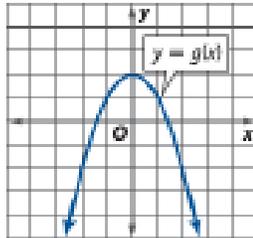
Common Algebra Errors to Avoid

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.
$\frac{x}{a} + \frac{bx}{a}$	$\frac{x}{a} = \left(\frac{x}{a}\right)\left(\frac{1}{b}\right) = \frac{x}{ab}$	Multiply by reciprocal of the denominator.
$\frac{1}{2x} \neq \frac{1}{x}$	$\frac{1}{2x} = \frac{1}{2} \cdot \frac{1}{x}$	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.
$(x^2)^3 \neq x^6$	$(x^2)^3 = x^{2 \cdot 3} = x^6$	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.
$\frac{a + bx}{a} \neq 1 + \frac{bx}{a}$	$\frac{a + bx}{a} = 1 + \frac{bx}{a}$	Cancel common factor, not common terms.
$\frac{a + ax}{a} \neq a + x$	$\frac{a + ax}{a} = 1 + x$	Factor before canceling.

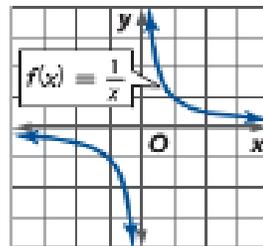
Part 1: Find the Domain and Range of each function below.

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

a.



b.



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. $y = \frac{4}{x-1}$

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

a. $f(0) =$

b. $f(-1) =$

c. $f(-x) =$

d. $-f(x) =$

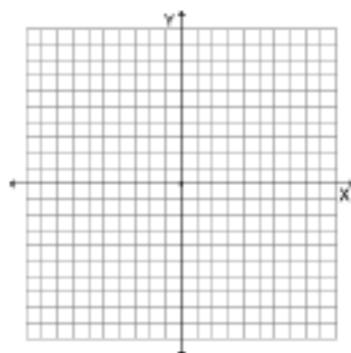
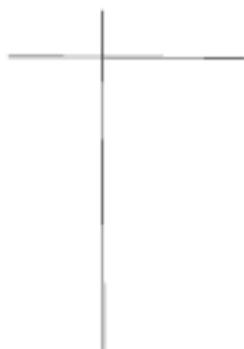
e. $f(x+1) =$

f. $f(2x) =$

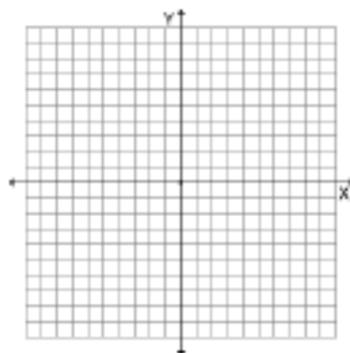
Part 3: Graphing equations using T-chart

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

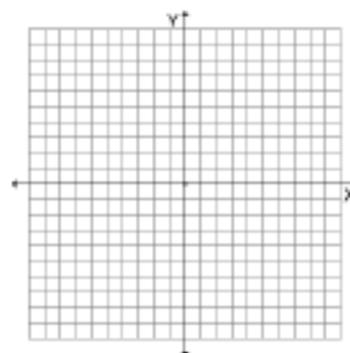
5. $y = -\frac{1}{2}x - 3$



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. $\frac{3}{4} + \frac{2}{3} =$

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

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

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

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

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

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

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

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

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

25. Solve the following equations for the variable.

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

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

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

Part 7: Exponents

26. Simplify each of the following without a calculator.

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

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

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

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

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

Part 8: Radicals

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

a. $\sqrt{32}$

b. $\sqrt{(2x)^4}$

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

d. $\sqrt{80}$

e. $\sqrt[3]{32}$