

Precalculus Readiness Summer Packet 2022



This packet is designed for students who are preparing for success in Precalculus in the upcoming school year.

Name: _____

INTRODUCTION

This summer packet answers the questions:

How can I set myself up for success in precalculus this year?

How can I avoid feeling lost in class?

What do you expect me to know already?

I have come up with a list of **eight** topics that will help you prepare for success in precalculus in the upcoming school year. You can think of each topic as completing the sentence, “**I expect you to already know how to _____.**” If you can do these things no-sweat, you will be ready for precalculus.

Precalculus can basically be broken up into two parts: algebraic functions and trigonometric functions. The first part, algebraic functions, will basically be a review of algebra with a lot of graphing. Precalculus adds a visual component to algebra. We will start the second part of the class, on trigonometric functions, by discussing right triangle geometry (note: “trigonometry” means *study of triangles*) and things like sine, cosine, and tangent, which should be familiar from Geometry (think SOH, CAH, TOA). Each topic includes a list of online resources if you need some help and 3-10 problems to complete.

While the packet is *optional* (unless you were otherwise instructed by either Ms. Leece), I recommend working on one topic a week this summer to make sure you are prepared for success in math class next year.

Extra credit will be available for turning this packet in during the first week of school.

PART I: ALGEBRA TOPICS

1. Exponents and Radicals
2. Basic Algebra with Fractions
3. Factoring
4. Coordinate Geometry
5. Solving Equations for a Given Variable
6. Writing an Equation for a Straight Line

PART II: TRIGONOMETRY TOPICS

7. Special Right Triangles
8. Sine, Cosine, Tangent - SOH CAH TOA

PART I: ALGEBRA REVIEW



1. Exponents and Radicals

a. Helpful resources if you feel like you need a review on how to do this:

(1) **Formulas for Exponent and Radicals Cheat Sheet with Examples**

<https://web.northeastern.edu/seigen/1250DIR/Handout-ExponentsandRadicals1.pdf>

(2) Video: *Exponent Rules with Examples* <https://youtu.be/b4mSqcJND3I>

(3) *cSimplifying Radicals* <https://www.geogebra.org/m/nufHUrek>

(4) **Online Practice: Simplify Expressions, More Complicated-Section**

<https://www.geogebra.org/m/YjhAuyu4>

b. Complete these practice problems.

Evaluate the following expressions without a calculator:

(1) $(-3)^4$

(2) $8^{2/3}$

(3) $4^{-1/2}$

(4) $\frac{5^{23}}{5^{21}}$

(5) $(\sqrt[4]{16})^2$

(6) $(\frac{2}{3})^{-2}$

Simplify the following expressions.

(7) $\sqrt[3]{a} \cdot \sqrt{a}$

(8) $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$

(9) $(3a^3b^3)(4ab^2)^2$

(10) $(\frac{3x^{3/2}y^3}{x^2y^{-1/2}})^{-2}$

2. Basic Algebra with Fractions

a. Helpful resources if you feel like you need a review on how to do this:

(1) **Fractions Cheat Sheet with Examples**

https://fsd.learning.powerschool.com/heidi_cockerill/cockerill/cms_file/show/44602396.pdf?t=1417617084

(2) Video: Fraction Review | How to Add, Subtract, Multiply, and Divide Fractions

<https://youtu.be/rl7e0djo9Go>

(3) **Video: *Dividing Fractions - Why invert and multiply?*** 🙌🙌🙌🙌

<https://youtu.be/-sHrrChSRq0>

(4) An *awesome* visual for multiplying fractions:

<https://www.geogebra.org/m/AZnX7deX>

(5) An interesting visual for dividing fractions:

<https://www.geogebra.org/m/k5X8GnJa>

b. Complete these practice problems.

Evaluate the following expressions.

(1) $\frac{1}{3} + \frac{2}{5}$

(2) $\frac{9}{10} - \frac{4}{5}$

(3) $\frac{3}{12} \times \frac{12}{15}$

(4) $\frac{4}{20} \times \frac{6}{10}$

(5) $\frac{7}{10} \div \frac{14}{17}$

(6) $\frac{18}{2/3}$

(7) $\frac{9/12}{15}$

(8) $\frac{1/4}{2/3}$

3. Factoring

a. Helpful resources if you feel like you need a review on how to do this:

(1) Video: *Simplifying by Factoring* <https://youtu.be/SRudSszA110>

(2) **Online practice with several levels of difficulty: *Endless Factoring Practice***
<https://www.geogebra.org/m/MzaJ3Tvg>

b. Complete these practice problems.

Factor completely.

(1) $x^2 + 2x - 3$

(2) $x^6 - 16x^4$

(3) $18x^3y^5 - 12x^4y^2$

Simplify the following expressions by factoring the numerator and denominator .

(4) $\frac{ab-a}{b^2-b}$

(5) $\frac{x^3-9x}{x^2-7x+12}$

(6) $\frac{x^2-2x-8}{x^3+x^2-2x}$

4. Coordinate Geometry

a. Helpful resources if you feel like you need a review on how to do this:

(1) The Distance Formula explained

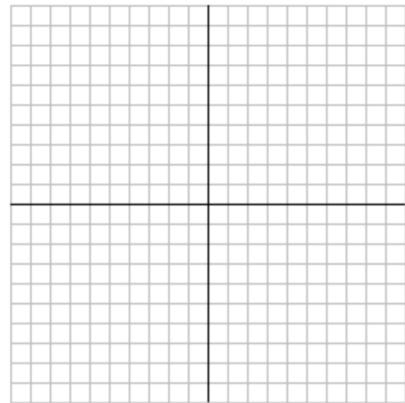
<https://www.chilimath.com/lessons/intermediate-algebra/distance-formula/>

(2) Khan Academy: Intercepts of an Equations

<https://www.khanacademy.org/math/cc-eighth-grade-math/cc-8th-linear-equation-s-functions/8th-x-and-y-intercepts/v/x-and-y-intercepts-2>

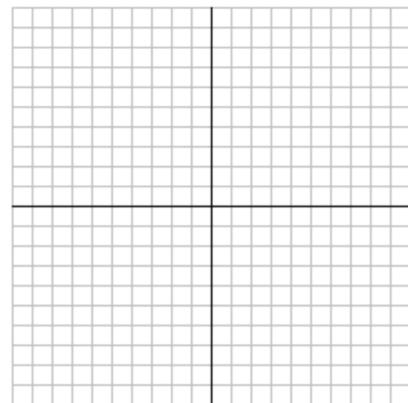
b. Complete these practice problems.

(1) Plot the points $(0, 8)$ and $(6, 16)$ on the coordinate plane below and find the distance between them.



(2) Sketch the graph of the equation $y = x^2 - 2$ by completing the table and plotting points

x	$y = x^2 - 2$
-3	
-2	
-1	
0	
1	
2	
3	



(3) Find the x - and y -intercepts of the graph of the equation $y = x^2 - 2$.

5. Solving Equations for a Given Variable

a. Helpful resources if you feel like you need a review on how to do this:

(1) Video: *The Quadratic Formula Song* <https://youtu.be/VOXYMRcWbF8>

(2) **Video: *Algebra Changing the Subject of an Equation (rearranging formulae)***

 <https://youtu.be/4rBR6DUpOkQ>

(3) Video: *Solving variables on both sides - advanced*

<https://youtu.be/FUeuPC0ONC8>

b. Complete these practice problems.

Solve for x:

(1) $x^2 + 5x + 6 = 0$

(2) $x^6 - 16x^4 = 0$

(3) $8x^2 - 6x - 5 = 0$

(4) $\frac{2x+1}{5} = \frac{3x+1}{2}$

(5) $\frac{3}{2x} - \frac{9}{2} = 6x$

(6) $2x - 2yd = y + xd$

(7) $V = 2(xb + bc + cx)$

(8) $\frac{a}{x} + \frac{b}{y} + \frac{c}{d} = 1$

6. Write an Equation for a Straight Line

a. Helpful resources if you feel like you need a review on how to do this:

(1) Video: *How to find the equation of a line given two points*

<https://youtu.be/4vXqMsvPSv4>

(2) A site where you can practice writing the equation for a line in standard form and point-slope form and then check your work: *Geogebra*

<https://www.geogebra.org/m/Gs8JFJKH>

(3) Video: *Equations of parallel and perpendicular lines*

<https://youtu.be/9hryH94KFJA>

(4) A visual for parallel and perpendicular lines

<https://www.geogebra.org/m/n6NA6f9J>

b. Complete these practice problems.

Find the equation of the line that has the given characteristics. Leave your answer in the form.

(1) $\text{slope} = \frac{3}{4}$; $y\text{-int: } \frac{-2}{3}$ in slope-intercept form

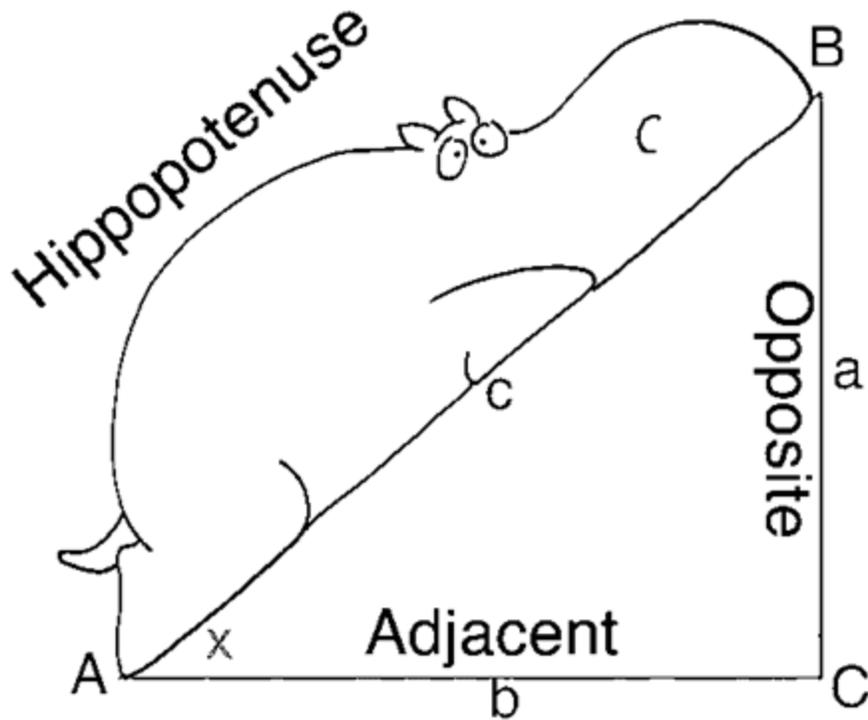
(2) Through $(-1, 3)$ and $(2, -4)$ in point-slope form

(3) Through $(-1, 4)$ and $(3, 2)$ in slope-intercept form

(4) Parallel to the line $2x + 3y = 4$ through $(-3, 6)$ in slope-intercept form

(5) Perpendicular to the line $4x - 7y = 23$ through $(\frac{2}{3}, -\frac{4}{5})$ in point-slope form

PART II: TRIGONOMETRY



7. Special Right Triangles

a. Helpful resources if you feel like you need a review on how to do this:

(1) Special Right Triangles tutorial

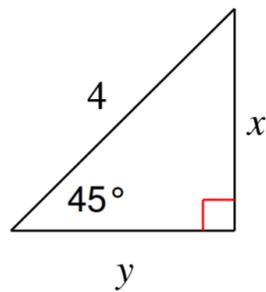
<http://www.moomoomath.com/special-right-triangles.html>

(2) Online Practice: Exploring Special Right Triangles (45-45-90 and 30-60-90 right triangles) <https://www.geogebra.org/m/tuwt7T35>

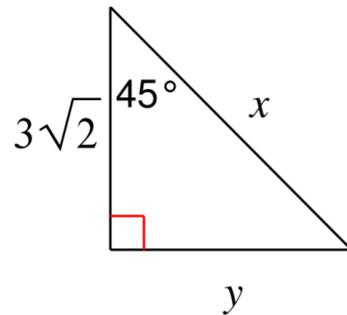
b. Complete these practice problems.

Find the missing side lengths. Leave your answers as radicals in simplest form.

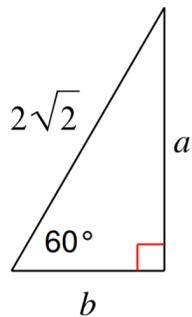
(1)



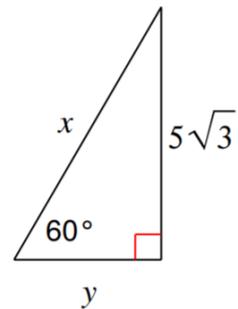
(2)



(3)



(4)



8. Sine, Cosine, and Tangent

a. Helpful resources if you feel like you need a review on how to do this:

(1) Sine, Cosine and Tangent tutorial

<https://www.mathwarehouse.com/trigonometry/sine-cosine-tangent.php>

(2) Solving for a side in right triangles with trigonometry

<https://www.khanacademy.org/math/geometry/hs-geo-trig/hs-geo-solve-for-a-side/a/unknown-side-in-right-triangle-w-trig>

b. Complete these practice problems.

Write the sine, cosine, and tangent of each angle for the triangle below as a fraction in simplest form.

(1) $\sin(A)$

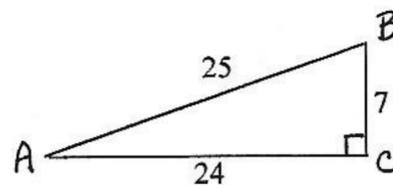
(4) $\sin(B)$

(2) $\cos(A)$

(5) $\cos(B)$

(3) $\tan(A)$

(6) $\tan(B)$



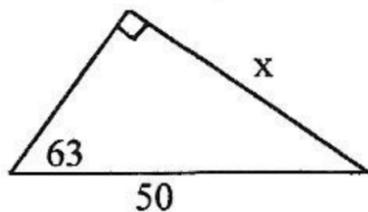
Find the trig value using a calculator. Round to 4 decimal places.

(7) $\sin(32^\circ)$

(8) $\cos(49^\circ)$

Find the value of x . Show the equation (which will include \sin , \cos , or \tan) used to find your answer. Round your answers to the nearest tenth.

(9)



(10)

