

Honors PreCalculus Summer Work

I am so excited to have you in Honors PreCalculus this year! PreCalculus brings a lot of the math you've learned throughout the years together and then moves into new types of functions and equations to help prepare you for the world of Calculus. In the following pages you will find a few review topics we want to discuss in the first few days of the year. We will briefly review the topics you struggled with and will have some time to revise your work before going over the solutions and making corrections. Your goal is to complete each section to the best of your ability, reviewing topics that will be imperative to your success next year. Keep in mind, this should not take over your life this summer. Take the much needed break, have some fun and recharge after last school year. Ideally, you are working on this as the summer is wrapping up and you are preparing to get back in the school mindset.

At the beginning of each section are links for helpful videos to help you with corresponding sections in the summer work packet. Use these videos as references to recall material covered in PreCalculus. Some topics may be from courses prior to PreCalculus, so they may be more challenging to recall. Do your best to complete, or at least make a solid attempt in all of the sections. Come ready with questions and we will fill in the gaps together!

Remember, the goal is not to come in with this 100% ready to turn in, but with a solid attempt for each section. If you have any questions, please feel free to email me over the summer break and I will get back to you as quickly as possible!

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Rational Operations

Operations with Fractions	https://www.youtube.com/watch?v=DP-3VU3LuDg
Order of Operations	https://www.youtube.com/watch?v=AoAiltPsGwM

1. Simplify each expression completely.

a. $12 - \left(\frac{8}{5} + 3 \div \frac{2}{3}\right)$

b. $4 - \frac{4}{3} \cdot \frac{5}{4} + \frac{11}{6}$

c. $\frac{1}{2} \div \frac{9}{4} \cdot \left(11 - \frac{4}{3}\right)$

Linear Functions

Create a line given two points	https://www.youtube.com/watch?v=ddwHeXd40u4
Parallel Lines	https://www.khanacademy.org/math/math1/x89d82521517266d4:analytic-geo/x89d82521517266d4:parallel-perpendicular-eq/v/parallel-lines
Perpendicular Lines	https://www.khanacademy.org/math/math1/x89d82521517266d4:analytic-geo/x89d82521517266d4:parallel-perpendicular-eq/v/perpendicular-lines

2. Find the equation of the line using the given information.

a. Find the equation in point-slope form of a line with a slope of -4 that passes through $(2, -6)$

b. Perpendicular to $6x - 2y = 8$ through the point $(-9, -2)$

c. Parallel to $y = -\frac{2}{3}x + 7$ through the point $(-3, 4)$

d. Through points $(3, 1)$ and $(2, 4)$

Quadratic Equations

Solving by factorinig	https://www.youtube.com/watch?v=qeByhTF8WEw
Sum/Difference of two cubes	https://www.youtube.com/watch?v=ADj8sGSjewg
Factoring by grouping	https://www.youtube.com/watch?v=YaCpeoxGa4E
Quadratic formula	https://www.youtube.com/watch?v=i7idZfS8t8w

3. Solve the following equations for all real solutions using factoring

a. $x^2 - 36 = 0$

b. $7x^2 - 14x = 0$

c. $x^3 - 6x^2 - 7x = 0$

d. $6x^2 + 7x - 3 = 0$

e. $3x^2 + 3x - 36 = 0$

f. $32x^2 - 2 = 0$

4. Solve the following equations for all real solutions using the quadratic formula. Recall: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

a. $4x^2 + 6x + 1 = 0$

b. $x^2 + 2x + 2 = 0$

c. $2x^2 + 3x - 5 = 0$

d. $3x^2 - 2x - 7 = 0$

Powers, Roots, and Radicals

Properties of exponents	https://www.youtube.com/watch?v=Zt2fdy3zrZU
Solving radical equations	https://www.youtube.com/watch?v=0gicD4STzpg https://www.youtube.com/watch?v=g3rzugglglw

5. Simplify the following expressions using the properties of exponents. Final solutions should have positive exponents, simplified coefficients and evaluate where possible.

a. $(-3)^{-4}$

b. $\frac{4}{x^0 + 7}$

c. $3x^3(2x)^2$

d. $\frac{8a^4b^6}{2(a^5b)^2}$

e. $4(x^{-3}y^4)(-3xy^2)^2$

f. $\frac{20(a^{-4}b^{-2})}{8(a^{-2}b^4)^{-2}}$

6. Solve the following radical and rational equations.

a. $x^{\frac{1}{5}} = 2$

b. $2\sqrt{3x-1} + 3 = 11$

c. $\sqrt[3]{x} - 6 = -2$

d. $2(x-2)^{\frac{1}{4}} - 3 = 159$

e. $\sqrt{2x+4} = \sqrt{x+2}$

Rational Expressions and Equations

Simplifying rational expressions	https://www.youtube.com/watch?v=7Uos1ED3KHI https://www.youtube.com/watch?v=y_DweTAEYWk https://www.youtube.com/watch?v=x_5hDLe8UL0
Adding and subtracting rational expressions	https://www.youtube.com/watch?v=y_DweTAEYWk
Solving rational equations	https://www.youtube.com/watch?v=g3rzugglglw

7. Simplify the following rational expressions. State any x values that would be excluded from the simplified version's domain. (For example the answer $\frac{1}{x-2}$, $x \neq 2$)

a. $\frac{x^2-4}{x^2+4} \cdot \frac{x+2}{x-2}$

b. $x^2+x-30 \cdot \frac{x}{x^2+6x}$

c. $\frac{x^2+5x+6}{x+3} \div \frac{x^2-4}{x+1}$

d. $\frac{x^3+3x^2}{2x} \div \frac{x^2+5x+6}{5x^3}$

8. Simplify the following rational expressions using the LCD (least common denominator). State any x values that would be excluded from the simplified version's domain. (For example the answer $\frac{1}{x-2}$, $x \neq 2$)

a. $\frac{3}{2x-2} + \frac{x+1}{4}$

b. $\frac{4}{3x^3} + \frac{x}{6x^3+3x^2}$

c. $\frac{5x-1}{x^2+2x-8} - \frac{6}{x+4}$

d. $\frac{x+1}{x^2+6x+9} - \frac{1}{x^2-9}$

9. Solve the following rational equations using cross multiplication or the LCD.

a. $\frac{3}{x+4} = \frac{9}{x-2}$

b. $\frac{4x}{x-1} = \frac{x}{x^2-1}$

c. $\frac{3x-2}{x-2} = \frac{6}{x^2-4} + 1$

d. $\frac{x}{x+2} = \frac{3x+1}{x-1} + \frac{4}{x^2+x-2}$

Inverses

Finding inverse functions	https://www.youtube.com/watch?v=W84IObmOp8M
	https://www.youtube.com/watch?v=2zeYEx4eTdc
Graphing inverse functions	https://www.youtube.com/watch?v=KzaPBzFFLRM

10. Find the inverse of each function. Final answers should be written as $f^{-1}(x) =$

a. $f(x) = 2x + 5$

b. $f(x) = \sqrt[3]{2x + 4}$

c. $f(x) = 5 - \frac{5}{2}x$

d. $f(x) = \frac{x-2}{4}$

11. Verify that the two functions are inverses of each other by using composite functions ($f(g(x)) = x$ or $g(f(x)) = x$) and the graph (graphs of inverse functions should reflect the original over the $y=x$ line)

a. $f(x) = x + 7$, $g(x) = x - 7$

b. $f(x) = \frac{1}{2}x + 1$, $g(x) = 2x - 2$

