Honors Precalculus ***Summer 2025 Homework***

Due no later than the first day of school!

You NEED to READ this PAGE!!

What is Precalculus?

This class builds on your knowledge from Algebra I, Algebra II, and Geometry. You will use symbolic reasoning and analytical methods to represent mathematical situations, to express generalizations, and to study mathematical concepts and the relationships among them. You will use functions, equations, and limits as useful tools for expressing generalizations and as a means for analyzing and understanding a broad variety of mathematical relationships. You will also use functions as symbolic reasoning to represent and connect ideas in geometry, probability, trigonometry, and calculus and to model physical reasoning to represent and connect ideas from the areas mentioned above. This course will focus not only on learning the necessary skills and operations but also on the mathematical theories and implications of the concepts. ***Many of topics you will have seen before…. we are just going to push them a little bit further!***

Honors Precalculus will not be…….

This will NOT be a "watch what I do, do what I do" course. You will be actively involved in creating your own knowledge. **TEST WILL NOT BE CARBON COPIES OF THE REVIEW.** In order to better assess your understanding, you will be required to apply the information you have learned in a new context on the tests. At the end of this course, you will be prepared to take AP Calculus and be able to think at a higher level of mathematical intellect – you will have developed the ability to answer questions that stem from your own curiosity!!!

Summer Homework Expectations …. ….

(1) Complete all questions USING the provided space. Any question without work earns no credit. PENCIL ONLY!!!!
*All work needs to completed on the pages provided!
(2) Check all answers using the provided answers using a **different color pen**. Attempt to make corrections in the different color using the provided answer.
*Asking a friend for help on the corrections is a good thing, copying off a friend to complete the assignment is a bad thing!
(3) Come to school on the first day ready to turn in the summer homework (already stapled and name on it)
(4) Come to school on the second day ready to ask a ton of questions!

Summer Homework Grading!

- Collected on the first day of school
- Checked in for completeness and to see if you checked your answers using a different color. Pencil for you doing the assignment, pen for checking! No Exception! I do not expect you to get them all right!
  - The purpose of the summer homework is to refresh your memory on important skills learned in Algebra! It does none of us any good to copy or look up all the work to these problems!
- Quiz on the material covered in the summer homework will be early the second week of school!

Honors Precalculus *Summer Homework*

Name: _____ *Due on the First Day of School*

The Best Time to Complete this is during the Month of August

The first part of the summer homework is to read through the different sections on various notes and examples that I believe will be helpful as you complete the homework. Correct mathematical notation IS IMPORTANT in this math course!

Section 1: Notation

In precalculus and beyond, when giving answers to inequalities we always write our answers in interval notation. The ability to switch from inequalities to intervals and back is super important.

- We use a square bracket whenever the number is included; otherwise we use round.
  - Example: $2 \leq x < 9$ $[2, 9)$
- Infinity (regardless if it is negative or positive) always gets a round.
  - Example: $x > 7$ $(7, +\infty)$
  - Example: $x \leq -2$ $(-\infty, -2]$

The form of your answer is just as important as the numerical value of your answer. No mixed numbers should be used. We will either be using reduced improper fractions, reduced radicals or decimals rounded to three places. Your final answer should be accurate to three places (if you are using a decimal) which means throughout the problem you should use 4 to 5 decimals. Most assessments in this class will have both a calculator and non-calculator section. This means you should be prepared to reduce answers without the aid of you calculator.

Section 2: Writing an Equation of a Linear Function

- Point-slope Form: $y - y_1 = m(x - x_1)$
- Slope-intercept form: $y = mx + b$
- General Form: Everything on one-side of the equal sign and the x must be positive.
  - The easiest way to do this is start with your favorite form a line (mine is point-slope form) and then move stuff around!

Example: $y - 6 = -3(x + 3)$ Point-slope form to start

$y - 6 = -3x - 9$ need to move to the left so x is +

$3x + y - 6 + 9 = 0$

$3x + y + 3 = 0$ General Form

- Parallel lines have the same slope. Perpendicular lines have the opposite reciprocal slope.

Section 3: Solving Quadratics

You have learned numerous ways to solve quadratics. Please be ready to do all of them!

- Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$
- Factoring:
  - Difference of Perfect Squares — $x^2 - 4 = (x - 2)(x + 2)$; $9x^2 - 16 = (3x - 4)(3x + 4)$
  - Sum or Difference of Perfect Cubes — $x^3 + 27 = (x + 3)(x^2 - 3x + 9)$; $8x^3 - 27 = (2x - 3)(4x^2 + 6x + 9)$
  - Perfect Square Trinomials — $x^2 + 6x + 9 = (x + 3)^2$
  - Trinomial with leading term not one — $12x^2 - 5x - 2 = (3x - 2)(4x + 1)$
- Completing the Square

  $4x^2 - 8x + 3 = 0$
  $x^2 - 2x = -\frac{3}{4}$
  $x^2 - 2x + (-1)^2 = -\frac{3}{4} + (-1)^2$
  $(x - 1)^2 = \frac{1}{4}$
  $X - 1 = \pm\frac{1}{2}$
  $x = 1 \pm\frac{1}{2} = \frac{3}{2}, \frac{1}{2}$
- Graphing is always an option as well, but we will not be using it that much this year!

Section 4: Absolute Value Inequalities

Anytime you have an absolute value in problem, you need to get the absolute alone before you start making choices.

Example: $2|x - 5| - 5 > 9$
$|x - 5| > 7$

How we deal with solve absolute values is different based on if it is a less than or a greater than, which is why the absolute value must be isolated first!

- Greater than = More Values ($\geq$ or $>$)

  $|x - 5| > 7$
  $x - 5 > 7$ or $x - 5 < -7$
  $x > 12$ or $x < -2$
  Answer: $(-\infty, -2) \cup (12, +\infty)$ More numbers because infinities are included.

- Less than = Less Values ($\leq$ or $<$)

  $|x - 5| < 7$
  $-7 < x - 5 < 7$ create an AND statement
  $-2 < x < 12$
  Answer: $(-2, 12)$ Less numbers because no infinities!

As you work through these problems WATCH your step-up and follow the steps above!

Section 5: Quadratic Inequalities

These can be viewed just like absolute value inequalities as long as your squared term is positive!

Example: $x^2 - 5x + 6 > 0$	*Looking at the problem, since the square term is positive and it is a greater than….I know it will have an answer with the infinities! (-∞, #) u (#, +∞)
$(x - 3)(x - 2) = 0$	*You need to change it to =0 so that the problem will make sense mathematically!
$x = 3, 2$	*Now use the set-up you decided on when you look at the equation.
Answer: (-∞, 2) u (3, +∞)	

Directions: Time to work through the problems! Please complete all the problems in the space provided using a PENCIL! Once you have completed the problems use a colored pen to check your answers. You are not graded on correctness so it makes sense to try all the problems before looking at the answers or getting help from a friend. Once you have checked it you can get help from a friend to correct it. This will act as your primary study guide for the test we will have the first week of school.

1. Write the following in interval notation:
   a. x is greater than or equal to 2 but less than or equal to 6.

   b. x is negative

   c. $-4 < x \leq 1$

2. Write the following in inequality notation:
   a. (-7, -2)

   b. x is great than 11

3. Simplify the expressions. Assume that variables in the denominators are nonzero.

a. $\dfrac{\left(x^{-3}y^{2}\right)^{-4}}{\left(x^{-4}y^{6}\right)^{-2}}$

b. $\dfrac{\left(3x^{2}\right)^{2}y^{4}}{3y^{2}}$

c. $\left(\dfrac{4x^{3}y}{x^{2}y^{3}}\right)\left(\dfrac{3y^{2}}{2x^{2}y^{4}}\right)$

4. Find the midpoint of the segment with points (5, -2) and (-1, -4)

5. Find the center and the radius of the circle with the equation $(x + 5)^2 + (y - 3)^2 = 121$

6. Solve the equations given below. Please write all answers as REDUCED IMPROPER fractions. NO decimals or mixed numbers!!

a. $2x - 9 = 3$

b. $\frac{x-1}{3} + \frac{x+5}{4} = \frac{1}{2}$

c. $3(5x - 3) - 4(2x + 1) = 5x - 2$

d. $\frac{x+5}{8} - \frac{x-2}{2} = \frac{1}{3}$

7. Solve the inequality. Represent your final answer in INTERVAL NOTATION. Only use improper fractions, no decimals!!

a. $3x - 1 > 6x + 8$

b. $4(1 - x) + 5(1 + x) > 3x - 1$

c. $-1 \leq 3x - 2 < 7$

d. $\frac{3-4x}{6} - \frac{2x-3}{8} \geq 2 - x$

8. Find the slope of the line through the pair of points (5, -3) and (-4, 12).

9. A line contains points (-3, -5) and (4, y). Find the value of y given the slope of this line is 3

10. Find the point-slope form of the line that contains points (-3, -8) and (4, -1).

11. Find the general form of the line that contains (-1, -5) and (-4, -2).

12. Find the (a) parallel line and (b) perpendicular line to the given line $3x - 5y = 15$ that goes through the point (6, 1).

13. Solve the equations without a calculator:
    a. $4(x + 1)^2 = 18$
    b. $(2x + 3)^2 = 169$

14. Solve the given equation using completing the square, give reduced radicals or fractions no decimals:

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

15. Solve the given equations using the quadratic formula. Give answer as reduced radicals, no decimals.

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

16. Solve the following problem algebraically: $x + 2 - 2\sqrt{x+3} = 0$

*No decimals please!

17. Solve the following inequalities algebraically. Write the final answer in INTERVAL notation with reduced fractions (no decimals or mixed numbers accepted for credit).

a. $|x + 3| \leq 3$

c. $|3 - 2x| + 2 > 5$

b. $4x^2 + 2 < 9x$

d. $21 + 4x - x^2 > 0$

18. Factor each of the following expressions as much as possible, DO NOT SOLVE!!

a. $5x^3 - 20x$

b. $4x^2 - 4x + 1$

c. $x^3 + 64$

d. $9x^2 - 16$

e. $9x^2 - 24x + 16$

f. $27x^3 - 8$

g. $64 - 25x^2$

h. $64x^3 + 27y^3$

i. $x^2 + 9x + 14$

<u>Just a reminder this is due on the first day of school and will be collected!</u> All work should be done in pencil! You should then check your solutions using a colored pen and the answers that have been provided on the next page. We will be going over questions on this material during the first few days before you take the quiz on this material!

Answer to Honors Precalculus Summer Homework!

1. (a) [2, 6] (b) (-∞, 0) (c) (-4, 1]
2. (a) -7 < x < -2 (b) x > 11
3. (a) x^4y^4 (b)$3x^4y^2$ (c) $\frac{6}{xy^4}$
4. (2, -3)
5. Center (-5, 3) Radius 11
6. (a) x = 6 (b) x = -5/7 (c) x = 11/2 (d) x = 31/9
7. (a) (-∞, -3) (b) (-∞, 5) (c) $[\frac{1}{3}, 3)$ (d) $[\frac{27}{2}, +\infty)$
8. m = -5/3
9. y = 16
10. y + 8 = 1(x + 3) or y + 1 = 1(x – 4)
11. x + y + 6 = 0
12. (a) $y = \frac{3}{5}x - \frac{13}{5}$ (b) $y = \frac{-5}{3}x + 11$
13. (a) $x = -1 \pm \frac{3\sqrt{2}}{2}$ (b) x = 5, -8
14. $x = 1 \pm \frac{\sqrt{30}}{3}$
15. $x = 1, \frac{1}{2}$
16. $x = 2\sqrt{2}, -2\sqrt{2} extraneous$
17. (a) [-6, 0] (b)$\left(\frac{1}{4}, 2\right)$ (c) (-∞, 0) u (3, +∞) (d) (-3, 7)
18. Factoring was a large part of Algebra II. Make sure you know all of the rules for factoring!
    a. 5x(x – 2)(x + 2)
    b. $(2x - 1)^2$
    c. $(x + 4)(x^2 - 4x + 16)$
    d. (3x – 4)(3x + 4)
    e. $(3x - 4)^2$
    f. $(3x - 2)(9x^2 + 6x + 4)$
    g. (8 – 5x)(8 + 5x)
    h. $(4x + 3y)(16x^2 - 12xy + 9y^2)$
    i. (x + 7)(x + 2)