MATH SUMMER ASSIGNMENT
HONORS-FUNDAMENTALS of CALCULUS

Mathematics is foundational and it is crucial that students maintain certain skills and conceptual understandings to be able to succeed in future mathematics courses. It is for this reason that we have developed numerous summer assignments that are designed to help students review, refresh, and improve upon **prerequisite skills** to prepare for future courses.

This year, we are requiring students to complete summer assignments to ensure that they are prepared for the year. The assignments were designed by content teachers to help students be better prepared for math work in the fall. Students will be given time in class to clarify questions, practice concepts and will be assessed during the first week of school.

For Honors Calculus, the summer assignment is due the first day of class and graded as a formative assessment.

Name: ____________________________________

Period: ___________________

Directions:

1. This packet is due at the start of class on **the first day** of the school year.
2. All work ***must*** be shown ***on the packet***. Do not attach additional sheets.
3. The packet will be graded for completion and accuracy and is worth one quiz grade.
4. Do not wait until the last minute. The packet will require a couple of hours to complete, so you should plan accordingly.
5. If you are unable to do any of these problems, you may use the site of KHAN ACADEMY or OTHER ONLINE RESOURCES.

Complex Fractions

1. Simplify each of the following.

a. $\dfrac{\dfrac{25}{a} - a}{5 + a}$

b. $\dfrac{\dfrac{x}{x+1} - \dfrac{1}{x}}{\dfrac{x}{x+1} + \dfrac{1}{x}}$

Difference Quotient

2. Find $\dfrac{f(x+h) - f(x)}{h}$ **for the given function *f*.** $f(x) = 5 - 2x$

Interval Notation

3. Solve and graph the inequality. State your final answer in **interval notation**.

$\dfrac{x}{2} - \dfrac{x}{3} > 5$

Domain and Range

4. Find the domain and range of each function. Write your answer in INTERVAL notation.

a. $f(x) = \dfrac{2}{x-1}$

b. $f(x) = \dfrac{4}{\sqrt{2x-5}}$

Inverses

5. Find the inverse for the function.

$f(x) = \dfrac{x^2}{3}$

Equation of a line

6. Find the equation of a line passing through the point (2, 8) and parallel to the line $y = \dfrac{5}{6}x - 1$.

7. Find the equation of a line with an x-intercept (2, 0) and a y-intercept (0, 3).

Unit Circle

8. Without a calculator, determine the exact value of each expression.

a) $\sin 135°$

b) $\cos\frac{\pi}{3}$

c) $\tan\frac{\pi}{6}$

d) $\sec\frac{\pi}{3}$

e) $\csc\frac{5\pi}{4}$

f) $\cot\frac{\pi}{2}$

Trigonometric Equations:

Solve each of the equations for $0 \le x < 2\pi$. Isolate the variable, sketch a reference triangle, find all the solutions within the given domain, $0 \le x < 2\pi$.

9. $\sin x = -\frac{1}{2}$

10. $2\cos x = \sqrt{3}$

11. $\sin^2 x = \frac{1}{2}$

12. $2\cos^2 x - 1 - \cos x = 0$

Rational Functions:

A. Vertical Asymptotes and Holes

To determine the vertical asymptotes and/or holes of the function, set the denominator equal to zero and find the x-value(s) for which the function is undefined (called "zeros" of denominator). Reduce any common factors of the numerator and denominator to simplify the function. Any zeros remaining in the reduced denominator will result in a vertical asymptote at those x-value(s).

Recall: It will be a hole at any x-value(s) that were zeros of the original denominator AND are not zeros of the reduced denominator.

B. Horizontal Asymptotes

Determine the horizontal asymptotes using the three cases below.

Case I. Degree of the numerator is less than the degree of the denominator. The asymptote is y = 0.

Case II. Degree of the numerator is the same as the degree of the denominator. The asymptote is the ratio of the leading coefficients.

Case III. Degree of the numerator is greater than the degree of the denominator. There is no horizontal asymptote. The function increases without bound. (If the degree of the numerator is exactly 1 more than the degree of the denominator, then there exists a slant asymptote, which is determined by long division.)

13. Determine all Vertical Asymptotes, Horizontal Asymptotes, and Holes.

a. $f(x)=\dfrac{1}{x}$

b. $f(x)=\dfrac{x-2}{x^2-4}$

c. $f(x)=\dfrac{2+3x^5}{x^2(1-x)}$

d. $f(x)=\dfrac{5x^3-2x^2+8}{5-4x^3}$

14. Solve for x. Show the work that leads to your solution.

a) $\dfrac{x^4 - 1}{x^3} = 0$

b) $2x + 1 = \dfrac{5}{x+2}$

15. Factor completely:

$x^2(x-1) - \dfrac{4}{9}(x-1)$