NORTHEAST CONSORTIUM

Precalculus and Honors Precalculus

Summer Pre-View Packet

DUE THE FIRST DAY OF SCHOOL

The problems in this packet are designed to help you review topics from previous mathematics courses that are important to your success in

Precalculus and Honors PreCalculus

DO ALL PROBLEMS WITHOUT A CALCULATOR; unless indicated otherwise. Show all work that leads you to each solution on separate sheets of paper. You may use your notes from previous mathematics courses to help you. You must do all work without any help from another person. Additional copies of this packet may be obtained from the Main Office in your school or printed from the school's website.

Springbrook: www.springbrookmath.org
Paintbranch: www.mcps.k12.md.us/schools/paintbranchhs
Blake: www.mcps.k12.md.us/schools/blakehs

ALL work should be completed and ready to turn in on the FIRST DAY of school. This packet will count as part of your first quarter grade.

ENJOY YOUR SUMMER!! WE ARE LOOKING FORWARD TO SEEING YOU IN THE FALL.

Student Name: ____

School: ____

Date: _____ ________________________________

NEC Precalculus and Honors Precalculus Summer Review

Name ______________________________

USE A SEPARATE SHEET OF PAPER AND SHOW ALL WORK.

Problems with an asterix (*) are for Honors Precalculus

I. Polynomials and operations on real and imaginary numbers.

A. Simplify these expressions

1. $\sqrt{-100}$

2. $\sqrt{-4 \cdot -9}$

3. $(i\sqrt{7})^2$

4. $\sqrt[3]{2x} \bullet \sqrt[3]{4x^2y^2} \bullet \sqrt[3]{2y^4}$

5. (3 + 2i) + (5 + 7i)

6. 2i (3 - i)

7. (3 + 2i) (3 - 2i)

8. $\sqrt{\frac{-r}{5}} \cdot \sqrt{\frac{-20}{r}}$

9. $\frac{8}{2i}$

10. $(3 + i\sqrt{5})^2$

11. $-\sqrt{-9}$

12. $\frac{5i}{6-2i}$ (Hint: use the conjugate of the denominator)

B. Factor completely

1. $t^2 - 4t - 21$

2. $x^3 - 8$

3. $27x^3 + 125$

*4. $x^3 - 2x^2 - 4x + 8$

C. Simplify the following expressions

1. $5x^2 \bullet 2x^5$

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

3. $\frac{4^{h-k}}{4^{h+k}}$

4. $\frac{10 \cdot 2^6}{8 \cdot 2^{-2}}$

5. $t^3 \bullet t^{n-3}$

*6. $(x^m)^n \bullet (x^n)^{n-m}$

D. Divide and simplify the expression.

*1. $\frac{x^2+2x-1}{x+3}$

E. Solve each quadratic equation for x

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

3. $2x^2 + 4x = -3$ 4. $2x^2 - 32x = 0$

F. Graph the functions using a table of values, symmetry, rational zero theorem, or other properties of polynomials to plot points. Verify the graph with the calculator. Describe the following characteristics for each function:

a. domain and range **b. zeros** **c. y-intercept** **d. end behavior**

e. intervals where the function is increasing and decreasing

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

II. Function Operations

A. If $f(x) = x^2 - 4$ and $g(x) = \sqrt{2x + 4}$ determine the following

1. f(3) 2. f(x) = 0 when x = ?

3. f(g(4)) 4. f(g(x))

5. Domain of f(g(x)) 6. g(f(0))

7. g(f(a + 2)) 8. $f^{-1}(x)$

9. Is the inverse of f(x) a function?
*If not, how could the domain of f be restricted to make its inverse a function?

***B.** Write the function **$h(x) = (x + 4)^3 - 2$** as the composition of two functions f and g so that f(g(x)) = h(x). Identify the functions f(x) and g(x).

III. Rational Expressions and Rational Functions

A. Graph the following functions. Identify all a) asymptotes and b)intercepts

1. $f(x) = \frac{2x}{x+4}$ 2. $f(x) = \frac{3x}{x^2+1}$ *3. $f(x) = \frac{4x^2}{x^2-9}$

B. Simplify. Write each expression as a single fraction.

1. $\frac{3x^2 + 6x^3}{9x}$ 2. $\frac{x^2-25}{x^2+7x+10}$ 3. $\frac{2x}{x+5} \div \frac{6x^2}{2x+10}$

4. $\frac{\frac{3}{x+2}}{\frac{6}{x}}$ 5. $\frac{x-2}{x} + \frac{x+4}{2x}$ 6. $\frac{4x}{x+6} + 2$

7. $\frac{2x}{x-3} - \frac{x}{x+3}$

IV. Rewriting and Solving Equations

A. Solve each equation for y

1. 7y + 6x = 10 2. $\frac{1}{4}y - 7x = \frac{15}{2}$

B. Find the solution(s) of the following systems of equations. Write your answer as (x,y).

1. $\begin{matrix} -2x - 5y = 7 \\ 7x + y = -8 \end{matrix}$ 2. $\begin{matrix} 4x + 9y = 2 \\ 2x + 6y = 1 \end{matrix}$

C. Solve for x and y.

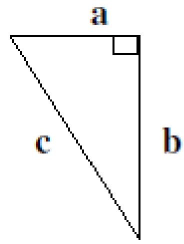
1. $\begin{bmatrix} 4 & -1 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ 2. $\begin{matrix} x + 9y = 9 \\ 3x + 6y = 6 \end{matrix}$

V. Pythagorean Theorem and Trigonometric Ratios

A. Solve for the missing side of the triangle using the Pythagorean Theorem:

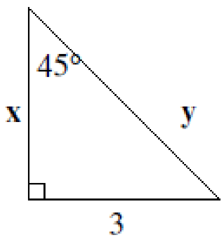
1. a = 6 ft. b = 8 ft.

2. b = 17 ft. c = 19 ft.



B. Solve for x and y
using a 45-45-90 (ratio of sides 1:1:$\sqrt{2}$) or a 30-60-90 triangle (ratio of sides 1: $\sqrt{3}$: 2).

1.



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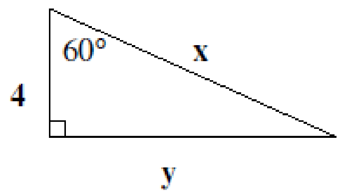

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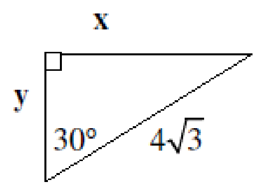
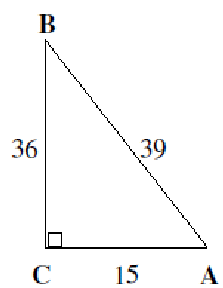


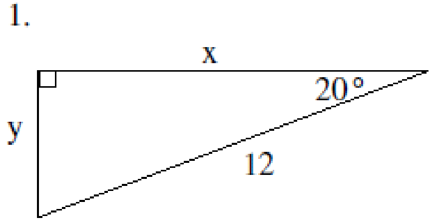
C. Given the right triangle, determine the trigonometric ratios.

1. sinA 2. cosA 3. tanA



D. Use trig ratios to solve for x and y in each right triangle.
Round answers to three places after the decimal point.

1.



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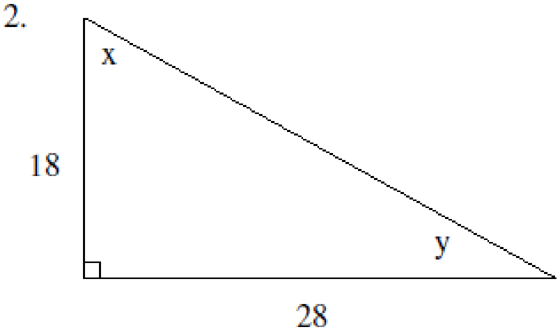

***VI. Conic Sections (for Honors PreCalculus only)**

***A. Complete the square to write each equation in standard form. Then identify the type of conic figure represented by each equation.**

* 1. $9x^2 + 25y^2 = 225$

*2. $y^2 - 6y + 16x + 25 = 0$

***B Write an equation in standard form for the following conic figures.**

*1. A parabola with vertex (1,2) and directrix $y = -2$

*2. A circle with center (2, 3) passing through (- 3, 5)

*3. A parabola with focus (-1, 0) and directrix $x = 1$

***C. Solve the system of equations. Write your solution(s) in the form (x, y)**

*1.
$x + 3y = 5$
$x^2 + y^2 = 25$

* 2.
$y = x^2$
$x^2 + y^2 = 20$