

PAINT BRANCH HS

Precalculus and Honors Precalculus

Summer Review 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. 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 of your school or printed from the school's website.

Paint Branch: www.mcps.k12.md.us/schools/paintbranchhs

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: _____

I. **Polynomial and operations on real numbers.**

A. Factor Completely.

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

2. $x^3 - 8$

3. $27x^6 + 125y^3$

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

B. Simplify the following expressions.

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

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

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

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

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

6. $\sqrt[3]{500x^4}$

*7. $\sqrt{(a+2b)^3}$

*8. $(x^m)^n \cdot (x^n)^{n-m}$

*C. Divide and simplify. Express answers in the form $\frac{p(x)}{d(x)} = q(x) + \frac{r(x)}{d(x)}$, where $q(x)$, $r(x)$, and $d(x)$ are the quotient, remainder, and divisor respectively.

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

*2. $\frac{3x^4 - 2x^3 + 16x - 192}{x^2 - 8}$

D. Solve each quadratic equation for x.

1. $2x^2 - 32x = 0$

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

*3. $(x + 2)(x - 3) = 20$

E. 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 of each function.

a) Domain

d) y-intercept

f) Interval(s)

g) Interval(s)

b) Range

e) end behavior

increasing

decreasing

c) zeros

1. $f(x) = x^3 - 3x^2 + x + 1$

2. $f(x) = x^2 + 2x - 6$

$$3. f(x) = -\sqrt{x} + 5$$

I. Function Operations

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

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 a function?

*If problem 9 is No, explain how the domain of f could 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 $g(x)$.

II. Rational Expressions and Rational Functions

A. Graph the following functions using a table of values. Find and Label all intercepts and asymptotes.

1. $j(x) = \frac{3x}{x^2 + 1}$

2. $k(x) = \frac{4x^2}{x^2 - 9}$

B. Simplify. Write your answer as a single fraction.

1. $\frac{3x^2 + 6x^3}{9x}$

2. $\frac{2x}{x+5} \div \frac{6x^2}{2x+10}$

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

C. Solve each equation for y .

1. $7y + 6x = 10$

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

*3. $2x - 3y = xy + 4$

D. Find the solution(s) of the given systems of equations. Write answers in the form (x, y)

1. $-2x - 5y = 7$
 $7x + y = -8$

2. $4x + 6y = 2$
 $2x + 3y = 4$

E. Use matrices to find the solution(s) of the given systems of equations. Write answers in the form (x, y)

1.
$$\begin{bmatrix} 4 & -1 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$$

2.
$$\begin{aligned} x + 9y &= 9 \\ 3x + 6y &= 6 \end{aligned}$$

*F. Find the determinant of the following matrices.

*1.
$$\begin{bmatrix} 2 & 5 \\ -3 & 4 \end{bmatrix}$$

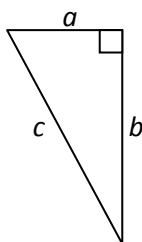
*2.
$$\begin{bmatrix} 2 & 5 & 3 \\ -3 & 4 & 0 \\ -1 & 2 & 0 \end{bmatrix}$$

III. Pythagorean Theorem and Trigonometric Ratios

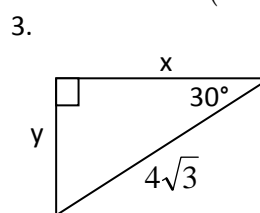
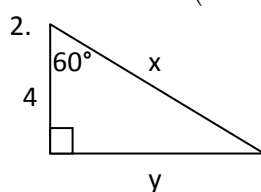
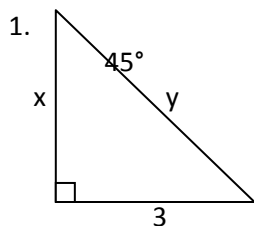
A. Solve for the missing side of the triangle using the Pythagorean Theorem.

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

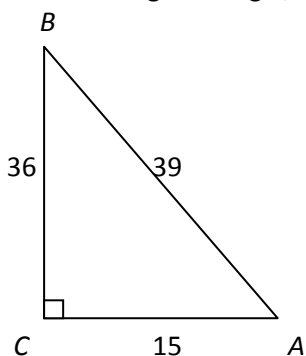
2. $b = 17$ ft.
 $c = 19$ ft.



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



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

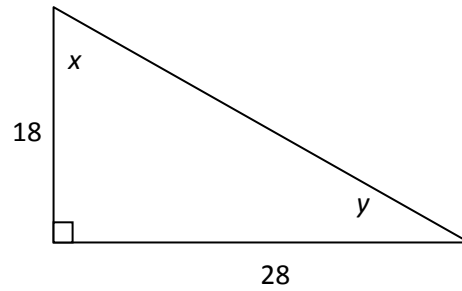
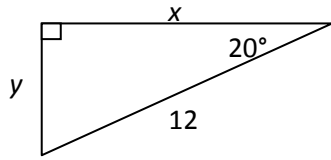


1. $\sin A =$

2. $\cos A =$

3. $\tan A =$

D. Use trig ratios to solve for x and y in each right triangle. Round answer to the nearest thousandth.



IV. Discrete Mathematics

A. Expand and evaluate the following series.

1. $\sum_{k=1}^5 2k$

*2. $\sum_{r=3}^6 (-1)^r \cdot r^2$

B. Express the following series using summation notation.

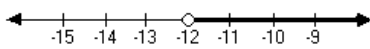
1. $4 + 8 + 12 + 16 + 20 + 24 + 28$

*2. $27 + 9 + 3 + 1 + \frac{1}{3} + \frac{1}{9} + \dots$

V. Set Notation

A. Express the following sets using both interval notation and inequality notation.

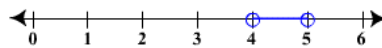
1.



Interval: _____

Inequality: _____

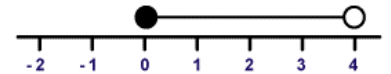
2.



Interval: _____

Inequality: _____

3.



Interval: _____

Inequality: _____

B. Match the sets.

1. Set of Integers _____

2. Set of Natural Numbers _____

3. Set of Rational Numbers _____

4. Set of Whole Numbers _____

[A] $\{0, 1, 2, 3, \dots\}$

[B] $\{1, 2, 3, \dots\}$

[C] $\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$

[D] $\left\{ \frac{a}{b} \mid a, b \text{ are integers and } b \neq 0 \right\}$