Name_____

Mr. Peacock

Precalculus Course – Algebra II Review Packet

This packet is to help you review various topics that are considered to be prerequisite knowledge upon entering PreCalculus.

- *Show all of your work NEATLY and organized!*
- *You may check solutions on your calculator, but be sure to show all work for credit.*
- *Questions with NO work will receive NO credit!!*
- *Box your answers!*
- *NO CALCULATOR UNLESS OTHERWISE STATED!*

I. Geometry Topics

- Midpoint formula: $\left(\frac{(x_1 + x_2)}{2}, \frac{(y_1 + y_2)}{2}\right)$

- Median of a Δ: A segment from a vertex to the midpoint of the opposite side.

- Angle Bisector of a Δ: A segment from a vertex which bisects the angle.

- Perpendicular Bisector: A line passing through the midpoint of and perpendicular to a segment.

- Altitude of a Δ: A segment from a vertex perpendicular to the opposite side.

- Equations of a line:
  1. Slope intercept: $y = mx + b$, where slope $= \frac{y_1 - y_2}{x_1 - x_2}$
  2. Point slope: $y - y_1 = m(x - x_1)$
  3. Standard: $Ax + By = C$

- Distance formula: $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Directions - State all linear equations in Standard Form unless otherwise stated.

1. Given ΔABC with A(-5, 4), B(1, 6) and C(3, 8), write the equation of the median from point C.

2. Write the equation of the line parallel to the line $4x - 6y = -1$ and contains the x-intercept of $3x - 2y = 12$.

3. Write the equation of the line, in slope intercept form, through (2, -4) and perpendicular to $x - 2y = 7$.

4. Find the value of "a" if a line containing the point (a, -3a) has a y-intercept of 7 and a slope of $-\frac{2}{3}$.

5. Given the distance between (x, 1) and (-2, 5) is $2\sqrt{7}$. Find the value(s) of x. Leave your answer in simplest form.

6. Write the equation of the perpendicular bisector of the segment joining A(-5, 4) and B(3, -6).

II. Quadratics

A. Factoring - Strategies to try when Factoring:

- GCF
- Difference of two squares
- Sum/Difference of cubes

$$a^3 + b^3 = (a + b)(a^2 \square ab + b^2)$$
$$a^3 \square b^3 = (a \square b)(a^2 + ab + b^2)$$

- Guess and Check
- Grouping

1. *Directions - Factor completely each of the following:*

a. $4x^2 + 27x + 35$

b. $-28y^2 + 7t^2$

c. $x^3 - 2x^2 - 9x + 18$

d. $8a^4 + 27ab^3$

B. Equations - Since the following are equations, we can now go a step further and solve for x by factoring or using the quadratic formula.

2. *Directions - Solve each of the following:*

a. $-3x^2 - 5x + 12 = 0$

b. $3x^2 + 5x = 6$

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

C. Graphing - To graph a quadratic equation in standard form, $y = ax^2 + bx + c$, find the important points of the graph by following the steps:

Y-intercept: If a point is the y-intercept of the curve, then that is the point at which the graph crosses the y-axis. Since this point is on the y-axis, then the x-coordinate must be 0. Substitute zero in for x and solve for y.

Vertex: x-coordinate of the vertex: $x = \frac{-b}{2a}$.

y-coordinate of the vertex: substitute the value found for the x-coor. into the original equation and solve for y.

X-intercepts: If a point is an x-intercept of the curve, then it is a point at which the graph crosses the x-axis. Since these points are on the x-axis, then the y-coordinates must be 0. Substitute zero in for y and solve for x by factoring or using the quadratic formula.

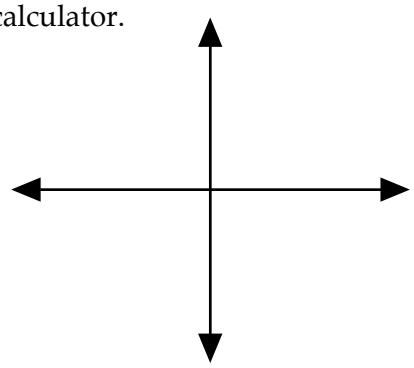
*No calculator, but you should also be able to graph with the use of your calculator.

3. *Directions - Given* $y = -3x^2 - 6x + 2$*, find and graph.*

a. y-intercept

b. vertex

c. x-intercepts



III. Systems

Substitution or Linear Combination (Elimination) can be used to solve systems of equations.

- If there is a solution to the system, then the equations are representing intersecting lines.
- If both variables cancel out and an equation is formed that is never true, then there is no solution and the lines never intersect. Lines that never intersect are parallel lines.
- If both variables cancel out and an equation is formed that is always true, then there are infinitely many solutions and the equations must represent the same line.

Directions - Solve each of the following.

- Explain what the solution tells us about the lines represented by the equations.

- No calculator, but you need to be able to solve with the use of a calculator as well.

1. $\begin{cases} 3x - 4y = 2 \\ -x + 3y = 1 \end{cases}$

2. $\begin{cases} -x + y = 3 \\ 2x - 2y = -6 \end{cases}$

Solution:_____

Explanation:

Solution:_____

Explanation:

IV. Exponents

Directions - Simplify using only positive exponents and no calculator!!!

Properties: $a^m \cdot a^n = a^{m+n}$ $\quad (a^m)^n = a^{m \cdot n}$ $\quad a^{\frac{p}{r}} = \sqrt[r]{a^p}$

$a^{-n} = \frac{1}{a^n}$ $\quad \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$ $\quad \frac{a^m}{a^n} = a^{m-n}$

1. $\left(\frac{81}{64}\right)^{-\frac{1}{2}}$

2. $\left(27^{-2}\right)^{-\frac{1}{3}}$

3. $\frac{\left(3x^2\right)^{-1}}{6x^{-3}}$

4. a. -2^4

   b. $(-2)^4$

5. $\frac{3^{-5} \cdot 3^{10}}{3^2}$

6. $\left(4^{-1} + 2^{-1}\right)^2$ - hint 1: $\left(a^{-m} + a^{-n}\right)^p \neq a^{-mp} + a^{-np}$

   - hint 2: Apply the neg. exponent property to each term. Then get a common denom. and add

V. Logarithms

Given $\log_b a = x$, then $b^x = a$ where $b > 0$ but $b \neq 1$, and $a > 0$.

Directions: - Solve for x.

1. $3\log_2 x = 12$

2. $\log_5 125 = x$

3. $3 + 4\log_x 4 = 5$

4. $\frac{3}{2}\log_{27}(x+5) = 1$

5. $1 + \frac{4}{3}\log_{(x-3)} 4 = \frac{11}{3}$

6. $\log_{\sqrt{5}} 25^{4x-1} = 3$

VI. Rational Expressions

Directions - Simplify to a single fraction:

1. Hint: get a common denominator!

$$\frac{1}{ab} - \frac{2}{b^2}$$

2. Hint: factor and cancel!

$$\frac{x^2 + 6x + 8}{x^2 - 4}$$

3. Hint: get a common denominator in the numerator and multiply by the reciprocal

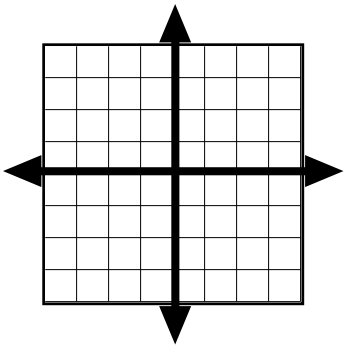
$$\frac{\frac{x}{x-1} + 1}{\frac{x+2}{x}}$$

VII. Quick Graphs:

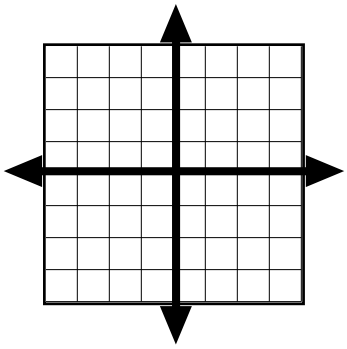
Directions - Graph each of the following.

- If you don't remember, use your graphing calculator to help you determine the patterns. But you need to be able to do these graphs without your calculator!

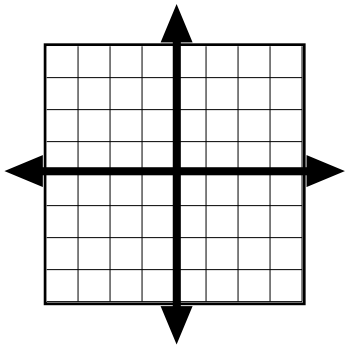
1. $y = \sqrt{x - 2} - 3$



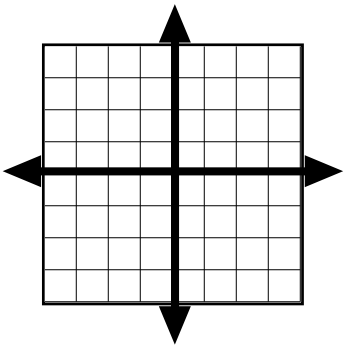
2. $y = (x + 2)^2 + 1$



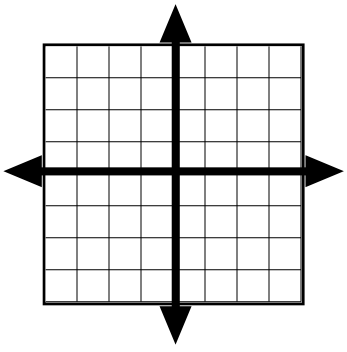
3. $y = |x| - 1$



4. $y = \sqrt[3]{x + 1} - 2$



5. $y = (x - 3)^3 + 2$



6. $y = x + 3$