

Summer Work Packet for MPH Math Classes

**Students going into
Pre-calculus AC
Sept. 2019**

Name: _____

This packet is designed to help students stay current with their math skills.

Each math class expects a certain level of number sense, algebra sense and graph sense in order to be successful in the course.

These problems need to be completed in the space provided and handed in for a grade by September 6th. Be sure to show all work.

Please email me at dmeehan@mphschool.org with any questions.

**** You will need a TI-84⁺ calculator for this class.****

Linear Functions & Inequalities

Name _____

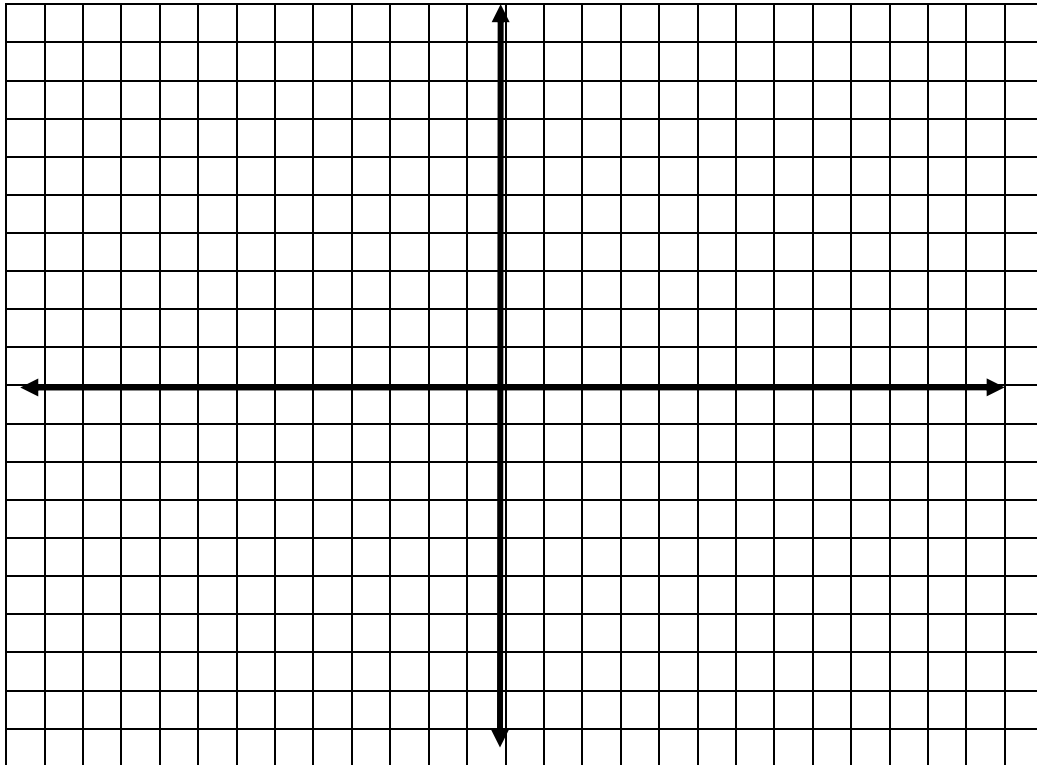
1. Given: $3x - 4y = 12$.

A. Find the coordinates of the x-intercept: _____ and y-intercept: _____ .

B. Use these to calculate the slope. $m =$ _____

C. Write the equation of a line parallel to the given line and going through the point $(0, 2)$.

D. Graph both lines below.



2. Given: $m = -\frac{1}{2}$ and A $(-4, 3)$

Name _____

A. Write the equation of the line in point-slope form: _____

B. Write the equation of the line perpendicular to the given line going through the point $(2, 1)$ in point-slope form. _____

3. Given: $(y - 2) = \frac{3}{4}(x + 4)$

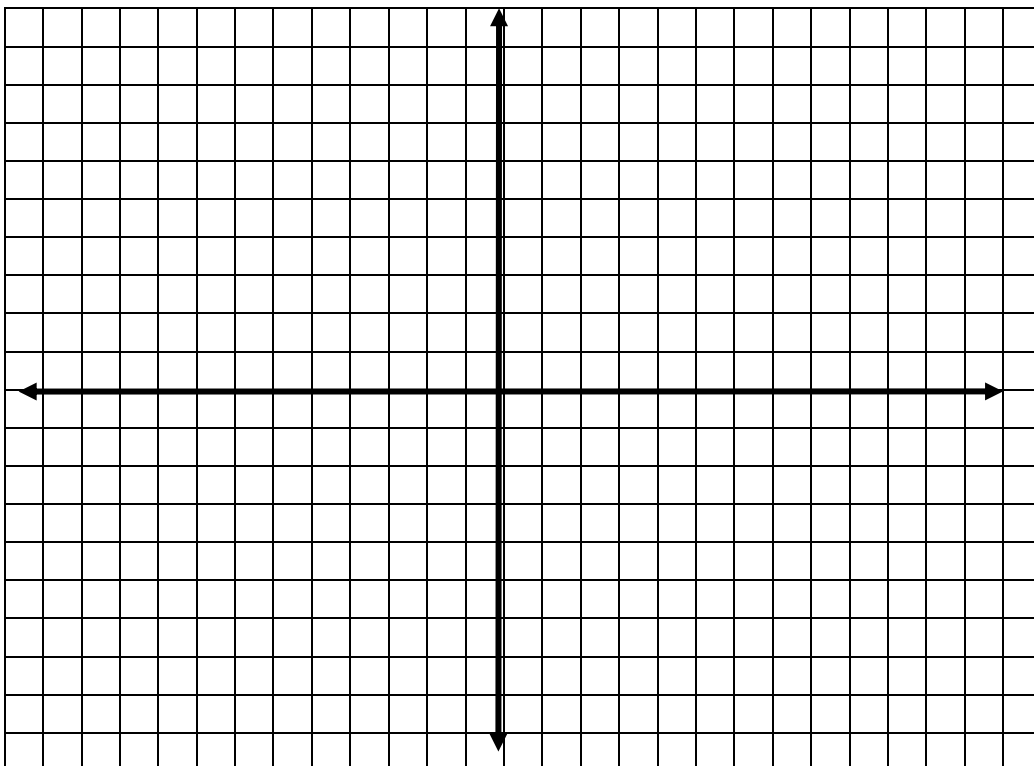
A. Name a point on the line. P (_____, _____)

B. Find the slope. $m =$ _____

C. Find $f(-8)$. $f(-9) =$ _____

4. **Graph** the inequalities. Name the **points of intersection**. **Label** the solution area. **Show your check** to verify the shaded area is correct.

$y > \frac{2}{3}x - 1$ and $y \leq -x - 2$ and $x > -3$



System of Equations

Name _____

Solve for the variables using the elimination method. Check.

1. $5k + 9h = 13$
 $6k + 3h = 13$

2. $a + b + c = 6$
 $2a + b - 2c = -10$
 $a + 4b + c = 2$

Solve for the variables using the substitution method. Check.

3. $y = 3x - 12$
 $3x - 2y = 125$

Algebra Review: Simplify completely.

Name _____

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

2. $\frac{a^{-1} + b^{-1}}{a - b}$

3. $\frac{28x^4y^5 - 16x^4y^3 + 4x^8y}{4x^4y}$

Name _____

4. $\frac{(3y^2 - 108)(y^3 + 2y^2 - 24y)}{y(y^2 + 12y + 36)(3y^2 - 30y + 72)}$ (Leave your answer in factored form.)

5. $\frac{m^4 - 1}{m^3 - m^2 + m - 1}$ (Leave your answer in factored form.)

6. $\frac{ab^2c}{15} \div \frac{abc^3}{12} \cdot \frac{18bc}{2}$

Name _____

7. $\frac{6m-18n}{9m+9n} \cdot \frac{4m-4n}{24n-8m}$ (Leave your answer in factored form.)

8. $\frac{6a^2-11a+3}{8a^2-10a-3} \div \frac{6a^2+7a-3}{8a^2+14a+3}$ (Leave your answer in factored form.)

9. $\frac{a^2b-2ab^2}{a^2+2ab-3b^2} \div \frac{a^2+6ab}{a^2+11ab-12b^2} \div \frac{ab-2b^2}{a^2+9ab+18b^2}$ (Leave your answer in factored form.)

Name _____

$$10. \frac{5}{6x} + \frac{3}{4y}$$

$$11. \frac{x}{x+2} - \frac{1}{x^2-4}$$

$$12. \frac{7}{d^2-100} + \frac{4}{d^2+11d+10}$$

$$13. \frac{7}{4x^2-1} - \frac{2}{1-2x} - \frac{3}{2x-1}$$

Algebra Review: Solve and check.

Name _____

14. $w^2 + 8w + 7 = 0$

15. $3b^3 + 13b = 7b^2$

16. $2p^3 + p^2 - 8p - 4 = 0$

17. $\frac{5}{h} + \frac{1}{2} = -2$

18. $\frac{3}{c} - \frac{2}{c-1} = \frac{1}{c^2 - c}$

19. $\frac{5}{2c+6} - \frac{1-2c}{4c} = 2$

20. $\frac{a}{a-3} + \frac{a^2}{a^2 - 7a + 12} = \frac{2a+1}{a-4}$

Functions

Name _____

Fill in the blanks with a rule to represent 2 different situations. Write one that represent a function and one that does not. Explain why each is or is not a function.

Ex. 1: The number of loads of laundry I do is a function of the number of people at home during the week.

Ex. 2: The age of each person in the class is dependent on the numbers 15, 16 and 17. (More than one person could be each age, or someone could be a different age.)

1. _____ is _____

Function? Yes or No? Why?

2. _____ is _____

Function? Yes or No? Why?

Odd and Even Functions

Name _____

Prove **algebraically** that the function is odd, even or neither. Choosing a numerical value for x does **NOT** prove odd/even. It must be shown true for ALL values of x . Follow the example.

Definition: $f(x)$ is **odd**, if $f(-x) = -f(x)$. $f(x)$ is **even**, if $f(-x) = f(x)$.

Otherwise, the function is **neither** odd nor even.

Example: $f(x) = 4x^3 - 5x$

Find $f(-x)$: $f(-x) = 4(-x)^3 - 5(-x) = -4x^3 + 5x$. Thus, $f(-x) \neq f(x)$.

Find $-f(x)$: $-f(x) = -(4x^3 - 5x) = -4x^3 + 5x$. Thus, $-f(x) = f(-x)$ and the function is ODD.

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

4. $f(x) = \frac{1}{4x}$

2. $f(x) = x^2 + 4$

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

3. $f(x) = (x - 5)^2$

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

Quadratic Inequalities and Sign Patterning

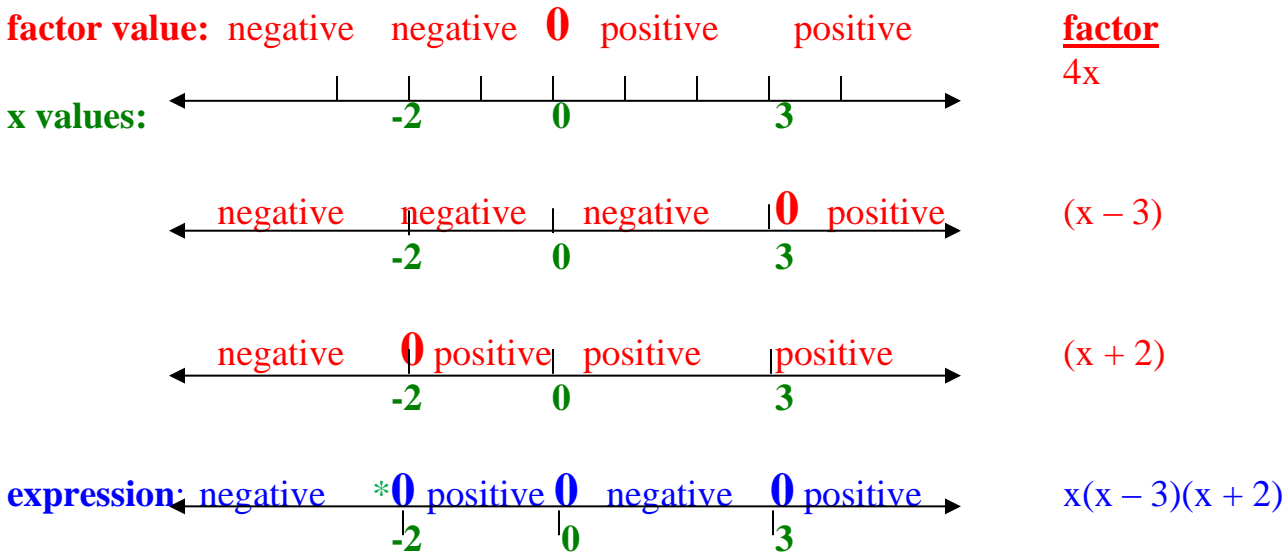
Name _____

Use the number lines to indicate the sign of each factor. From this, determine the intervals of x values which make the inequality true.

EXAMPLE 1: $4x^3 \geq 4x^2 + 24x$
 $4x^3 - 4x^2 - 24x \geq 0$
 $4x(x^2 - x - 6) \geq 0$
 $4x(x - 3)(x + 2) \geq 0$

EXAMPLE 2: $\frac{x(x-3)}{(x+2)} < 0$

Use the same number lines because multiplication and division with negative numbers have the same rules.



Therefore, the solution set for Example 1 is $\{x | -2 \leq x \leq 0 \text{ or } x \geq 3\}$.

Therefore, the solution set for Example 2 is $\{x | x < -2 \text{ or } 0 < x < 3\}$. (Example 2 is undefined at $x = -2$.)

Name _____

Find the solution set using the sign patterning method. Graph the solution on a number line.

1. $w^2 - 7w < 0$

5. $\frac{k}{6-k} < 0$

2. $30 + c - c^2 \leq 0$

6. $\frac{3}{5+x} < 0$

3. $18x^3 \leq 2x$

7. $\frac{g^2 + 3g - 28}{g - 2} < 0$

4. $(2 - p)(4 - p)(7 - p) > 0$

Logarithms-Solve & check. Show work.

Name _____

1. $\log_4(x+1) = 3$

4. $\log_5(x^2 - 4) = \log_5(3x)$

2. $\log_3(x^2) = 5$

5. $\log(x+1) + \log(x-2) = 1$

3. $\log_5(x+2) = \log_5(4x-6)$

Reference Angles & Trig Functions

Name _____

- Using the **unit circle**, give the exact value of each trigonometric expression. Pay attention to the sign of the answer (no calculator).
- On the unit circle mark the letter of each problem in the correct angle position. Letter **a** is done for you.

a) $\sin(\pi)$ **0**

i) $\tan(-19\pi/4)$ _____

b) $\cos(5\pi/4)$ _____

j) $\sec(14\pi)$ _____

c) $\tan(11\pi/6)$ _____

k) $\csc(13\pi/4)$ _____

d) $\cot(22\pi/3)$ _____

l) $\cot(19\pi/3)$ _____

e) $\sec(13\pi/2)$ _____

m) $\tan(-17\pi)$ _____

f) $\csc(28\pi)$ _____

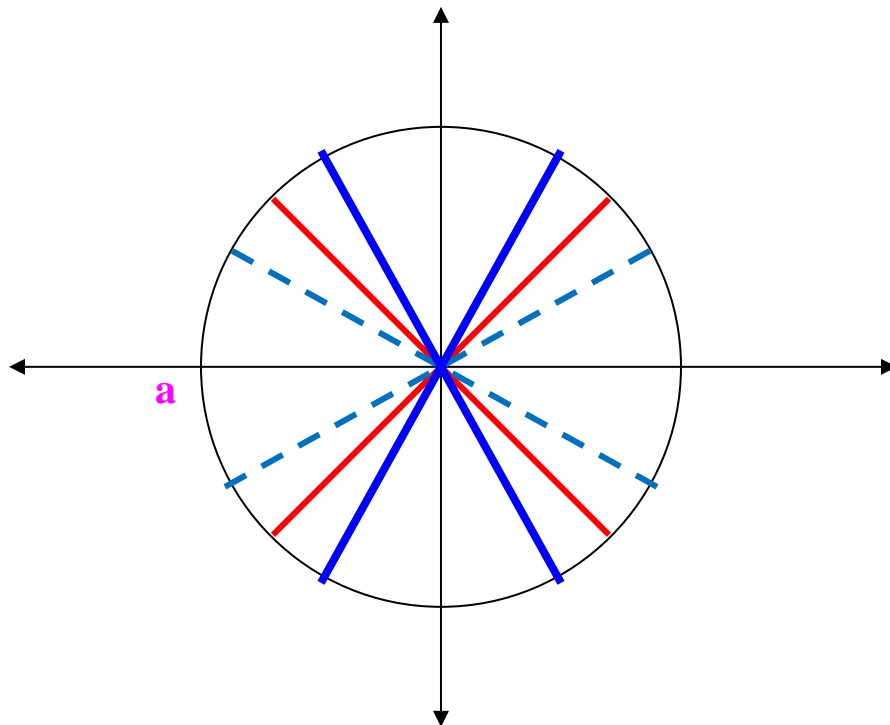
n) $\sin(47\pi/3)$ _____

g) $\sin(41\pi/6)$ _____

o) $\cos(-17\pi/6)$ _____

h) $\cos(-7\pi/3)$ _____

p) $\sin(-29\pi/4)$ _____



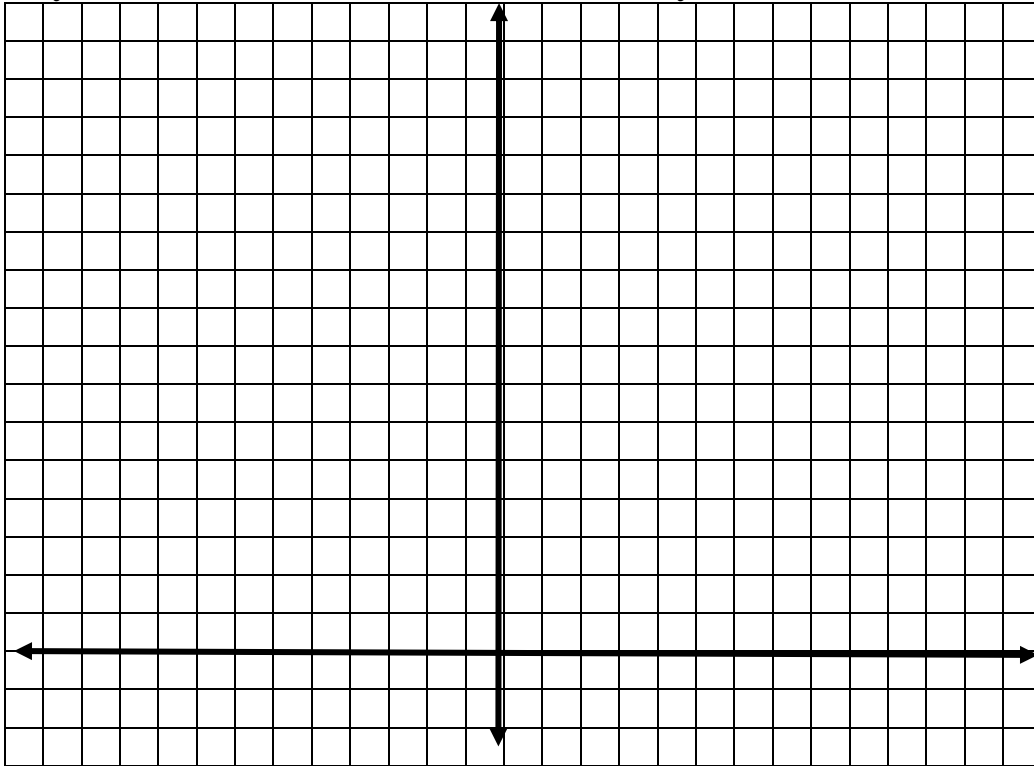
Graphing Functions

Name _____

Graph the following functions on the graph below. Be sure to label your axes and identify the scale on each axis. Do each pair in the question on the same set of axes.

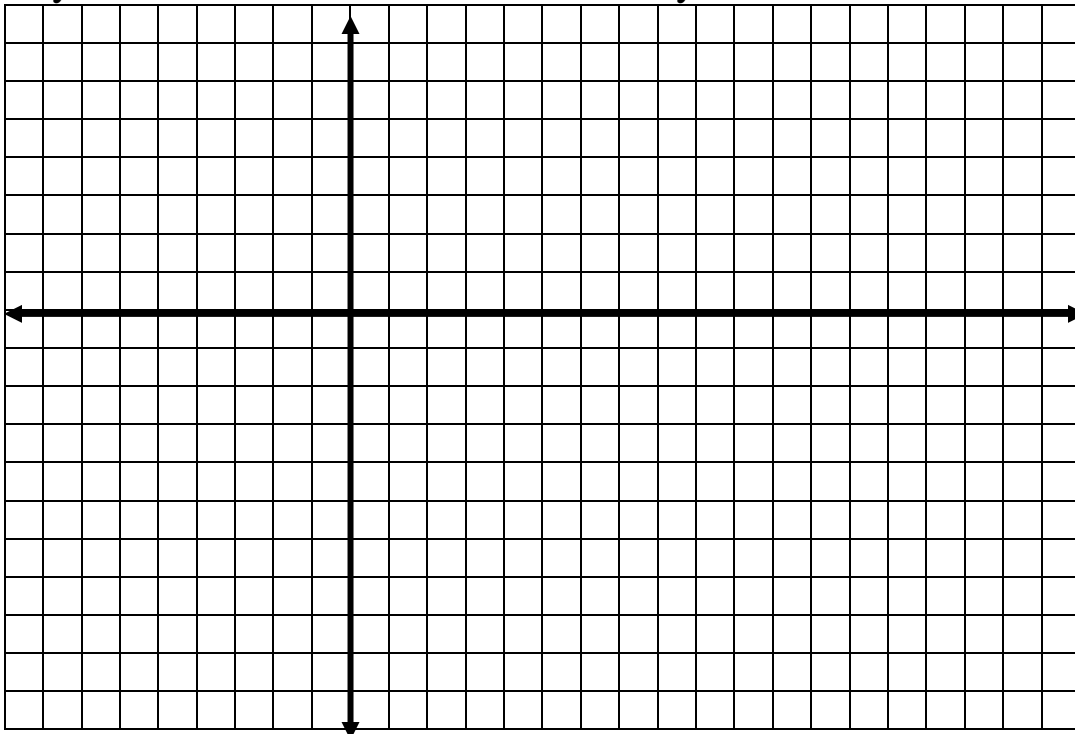
1. $y = x^2$

$y = \frac{1}{2} x^2$



2. $y = \sqrt{x}$

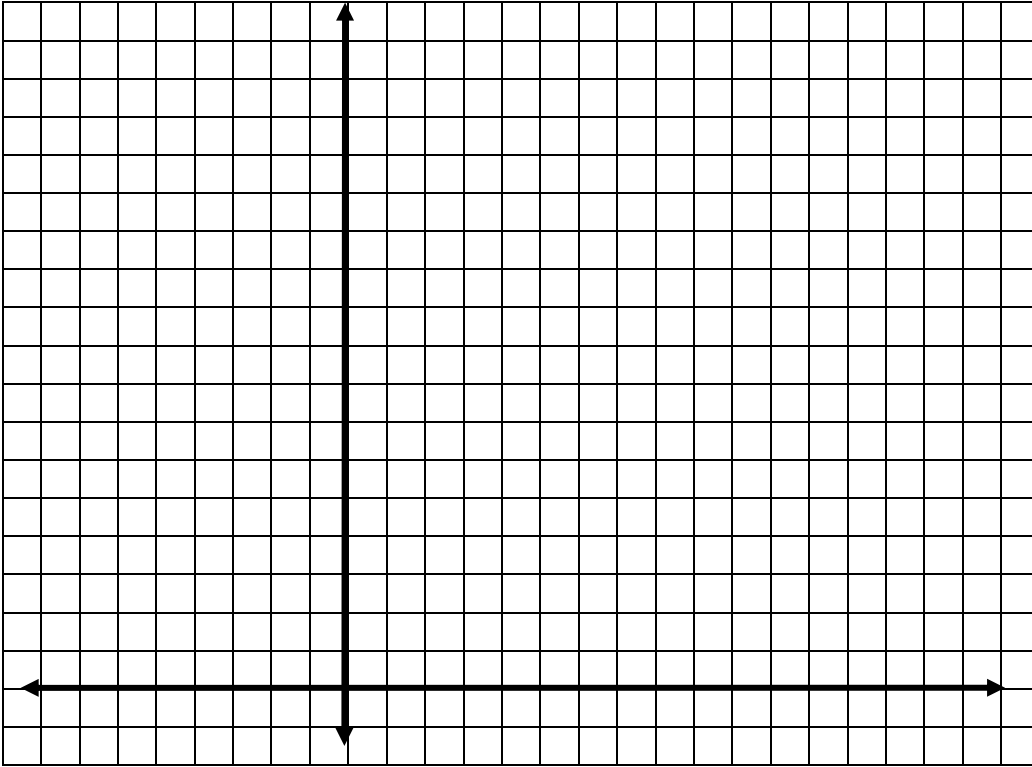
$y = -2\sqrt{x}$



3. $y = 2^x$

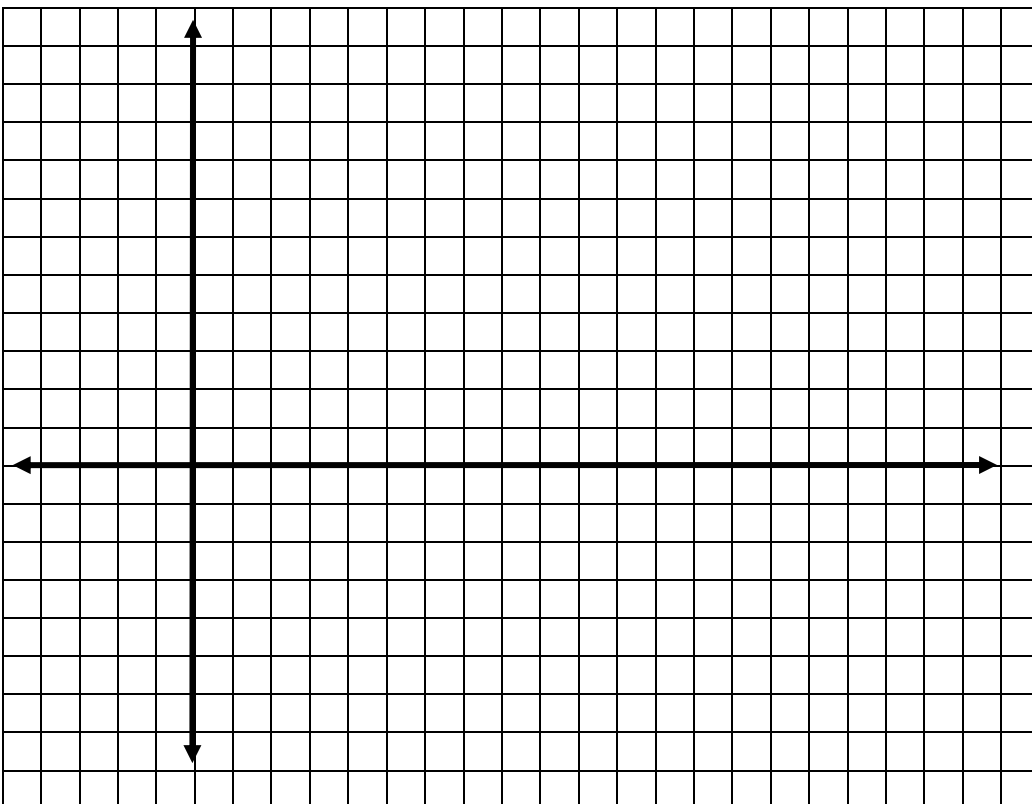
$y = 2^{x-3}$

Name _____



4. $y = \log_3(x)$

$y = \log_3(x) + 2$



Name _____

5. $y = \sin(x)$

$y = \cos(x)$

Graph from -2π to 2π . Use 6 BLOCKS = π on the x-axis and 2 BLOCKS = 1 on the y-axis. (If you use your calculator, be sure to put it in radian mode and use ZOOM TRIG for the window.)

