Regents Review Packet #2

Algebra 1

Name KEY

Period _____

1. Consider the inequality shown below.

A. Write the inequality that is shown on the coordinate plane.

$y = 3$

B. Graph the inequality $x \geq -1$ shade right, solid line

C. Graph the inequality $y > 2x - 3$ shade up, dashed line

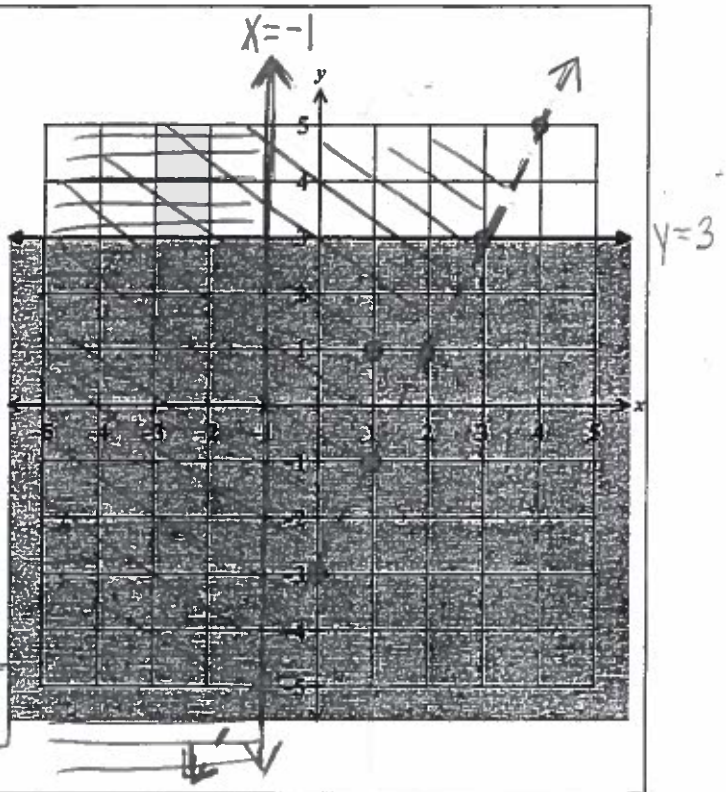
D. Identify a point that is in the solution of the system of inequalities.

$(1, 1)$

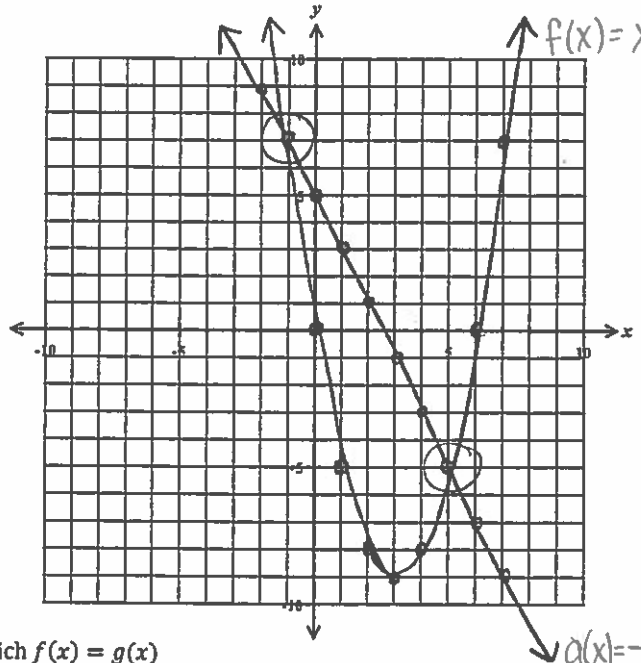
E. Find the area of the triangle enclosed by the three inequalities.

base = 4, height = 8 $A = \frac{bh}{2}$ $A = \frac{(4)(8)}{2}$

$A = 16$ units^2



2. Let $f(x) = x^2 - 6x$ and $g(x) = -2x + 5$. On the axes provided draw the graphs of $y = f(x)$ and $y = g(x)$



State all values of x for which $f(x) = g(x)$

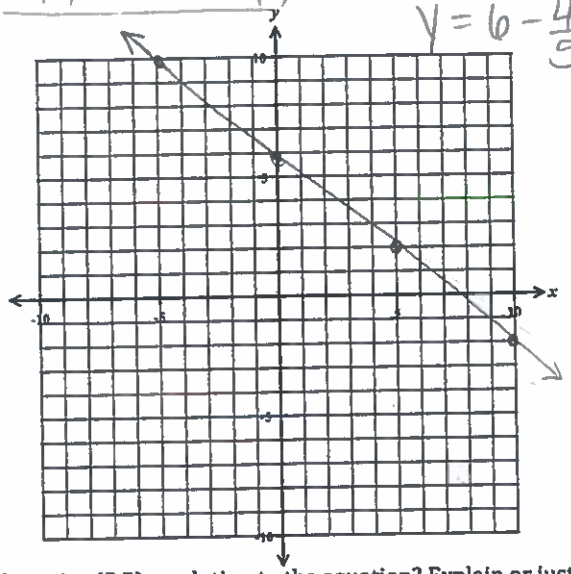
$(-1, 7)$ and $(5, -5)$

3. Graph the equation $4x + 5y = 30$ on the axes provided.

$4x+5y=30$
$-4x \quad -4x$

$\frac{5y}{5} = \frac{30-4x}{5} \quad \frac{5}{5}$

$y = 6 - \frac{4}{5}x$



Is the point (5,2) a solution to the equation? Explain or justify your answer.

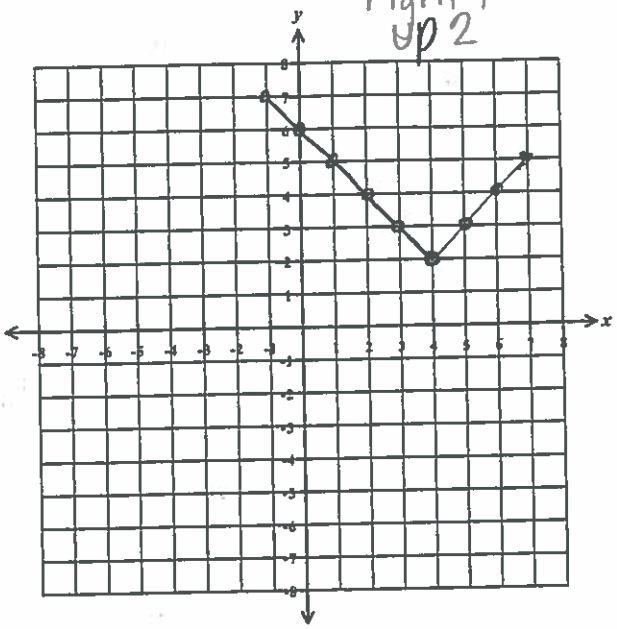
Yes b/c it is on the graph of the line.

Also $4(5)+5(2)=30$
$20+10=30$ ✓

4. Graph the function shown below on the axes provided over the interval $-1 \leq x \leq 7$.

$f(x) = |x-4|+2$

right 4
up 2



What is the range of the graph?

$2 \leq f(x) \leq 7$

5. Consider the function $f(x) = 4(2)^x$

A. Evaluate the following.

$f(-2) = 4(2)^{-2}$
$= 1$

$f(0) = 4(2)^0$
$= 4$

$f(3) = 4(2)^3$
$= 32$

$f(-3) = 4(2)^{-3}$
$= \frac{1}{2}$ or 0.5

B. Find the average rate of change of $f(x)$ over the interval $0 \leq x \leq 4$

$f(0) = 4$

$f(4) = 4(2)^4$
$= 64$

$\frac{64-4}{4-0} = \frac{60}{4} = \boxed{15}$

C. Find the equation of the exponential function, in the form $y = a(b)^x$, for the function shown in the table below.

x	0	1	2	3	4
y	3	12	48	192	768

×4 ×4 ×4 ×4

Equation $y = 3(4)^x$

6. Given $f(x) = 12x^{-2} + 5x^0 - 4$

A. Evaluate the function for $x = 2$. Show all work.

$f(2) = 12(2)^{-2} + 5(2)^0 - 4$

$= 12\left(\frac{1}{4}\right) + 5(1) - 4$

$= 3 + 5 - 4$

$= 8 - 4$

$\boxed{f(2) = 4}$

B. Evaluate the function for $x = 4$. Show all work.

$f(4) = 12(4)^{-2} + 5(4)^0 - 4$

$= 12\left(\frac{1}{16}\right) + 5(1) - 4$

$= \frac{3}{4} + 5 - 4$

$= 5\frac{3}{4} - 4$

$\boxed{f(4) = 1\ 3/4}$

7. Apply the properties of exponents to write each expression in simplest exponent form.

A. $\frac{(x^2)^3}{x^8} = \frac{x^6}{x^8} = x^{-2} = \boxed{\frac{1}{x^2}}$

B. $\frac{(2x^4)^3}{12x^6} = \frac{(2)^3(x^4)^3}{12x^6}$

$= \frac{8x^{12}}{12x^6}$

$\boxed{= \frac{3}{4}x^6}$

C. $f(x) = 5x^4$ and $g(x) = 4x^3$

Find $f(x) \cdot g(x)$. Express your answer in the form ax^b.

$(5x^4)(4x^3)$

$\boxed{20x^7}$

8. A bakery ordered 20 bags of flour f and 16 pounds of butter b on a Monday for a total cost of \$110. On Tuesday the bakery ordered 30 bags of flour and 12 pounds of butter for a cost of \$120.

A. Write a system of equations that could be used to find the cost of one bag of flour and one pound of butter.

$20f + 16b = 110$

$30f + 12b = 120$

B. Solve the system of equations to find the cost of each.

$3(20f + 16b = 110) \longrightarrow 60f + 48b = 330$

$-2(30f + 12b = 120) \longrightarrow -60f - 24b = -240$

$\frac{24b}{24} = \frac{90}{24}$

$b = 3.75$

$20f + 16(3.75) = 110$

$20f + 60 = 110$

$-60 \quad -60$

$\frac{20f}{20} = \frac{50}{20}$ $f = 2.5$

One bag of flour \$ 2.50 On pound of butter \$ 3.75

9. Solve the inequality for all values of x

$$\frac{4}{3}\left(2x-\frac{1}{4}\right) \le x+3$$

$$\frac{8}{3}x - \frac{4}{12} \le x + 3$$

$$-x \qquad -x$$

$$\frac{5}{3}x - \frac{4}{12} \le 3$$

$$+\frac{4}{12} \qquad +\frac{4}{12}$$

$$\frac{3}{5}\cdot\frac{5}{3}x \le \frac{10}{3}\cdot\frac{3}{5}$$

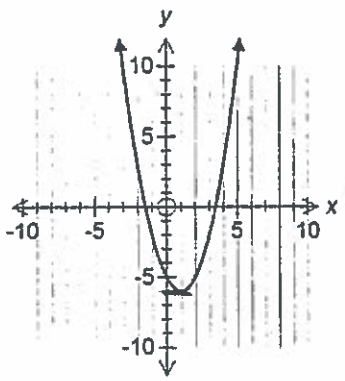
$$x \le 2$$

b. Write the solution set using interval notation $(-\infty, 2]$

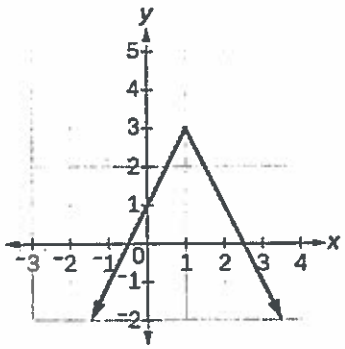
c. Graph the solution set on the number line provided.

10. Consider the functions shown below.

$f(x)$



$g(x)$



Which of the following shows the correct domain and range?

For $f(x)$

A. Domain $-3 \le x \le 5$ Range: $-6 \le y \le 10$

B. Domain $-\infty < x < \infty$ Range: $-6 \le y < \infty$

C. Domain $-3 \le x \le 5$ Range: $-6 \le y < \infty$

D. Domain $-6 \le x < \infty$ Range: $-\infty < y < \infty$

For $g(x)$

A. Domain $-\infty < x < \infty$ Range: $-\infty < y \le 3$

B. Domain $-1 \le x \le 3$ Range: $3 \le y < \infty$

C. Domain $-\infty < x \le 3$ Range: $-\infty < y < \infty$

D. Domain $-1 \le x \le 3$ Range: $-1 \le y \le 3$

Algebra 1

Name _____

Period _____

1. Mr. Widman started an investment fund on his 26th birthday. The initial investment was $5,000 which would earn an interest rate of 4.5% compounded annually. No deposits or withdrawals were made over the course of the investment.

A. Write an equation that shows the relationship between the amount of money in the account a and the time in years t that the money was invested.

$\frac{4.5}{100} = 0.045$

Equation $A = 5000(1+0.045)^t$

B. Use your equation to find the value of the investment when Mr. Widman turns 62 years old. Show how you arrived at your answer. Round to the nearest penny.

$t = 62-26 = 36$

$A = 5000(1.045)^{36}$

$\$24,386.89$

2. Factor completely

A. $\frac{4x^2}{4} - \frac{100}{4}$

$4(x^2-25)$

$4(x+5)(x-5)$

B. $x^2 + 3x - 54$

$(x+9)(x-6)$

C. $12x^2 - 32x - 35$ ×12

$12x^2-32x-420$

$(\frac{12x}{6} + \frac{42}{6})(\frac{12x}{2} - \frac{10}{2})$

$(2x+7)(6x-5)$

3. Let $f(x) = x - 4$ and $g(x) = 3x^2 - 4x + 3$

Express $f(x) \cdot g(x)$ in standard form.

$(x-4)(3x^2-4x+3)$

×	$3x^2$	$-4x$	$+3$
x	$3x^3$	$-4x^2$	$+3x$
-4	$-12x^2$	$+16x$	-12

$3x^3-4x^2-12x^2+16x+3x-12$

$3x^3-16x^2+19x-12$

B. Express $(x-7)^2$ in standard form

$(x-7)(x-7)$

$x^2-14x+49$

4. Express in standard form.

Subtract $2x^2 - 7x + 5$ from $-3x^2 + x - 4$

$(3x^2+x-4)-(2x^2-7x+5)$

$3x^2+x-4-2x^2+7x-5$

x^2+8x-9

5. Factor completely

$\frac{18x^3}{6x} - \frac{12x^2}{6x} - \frac{30x}{6x}$

$6x(3x^2-2x-5)$

$6x(3x-5)(x+1)$

6. Solve the system of equations.

$-7(3x+2y=17)$
$2(5x+7y=21)$

$-21x-14y=-119$
$10x+14y=42$

$-11x=-77$
$-11 \quad -11$

$x=7$

$3(7)+2y=17$
$21+2y=17$
$-21 \quad -21$
$2y=-4$
$\frac{2y}{2}=\frac{-4}{2}$

$y=-2$

7. Write an ***equation*** that defines $f(x)$ as a trinomial in standard form where...

$f(x)=(8-2x)(x+4)-(x^2-5x-3)$

	8	$-2x$
x	$8x$	$-2x^2$
4	32	$-8x$

$f(x)=-2x^2+32-x^2+5x+3$

$f(x)=-3x^2+5x+35$

Evaluate $f(-2)$

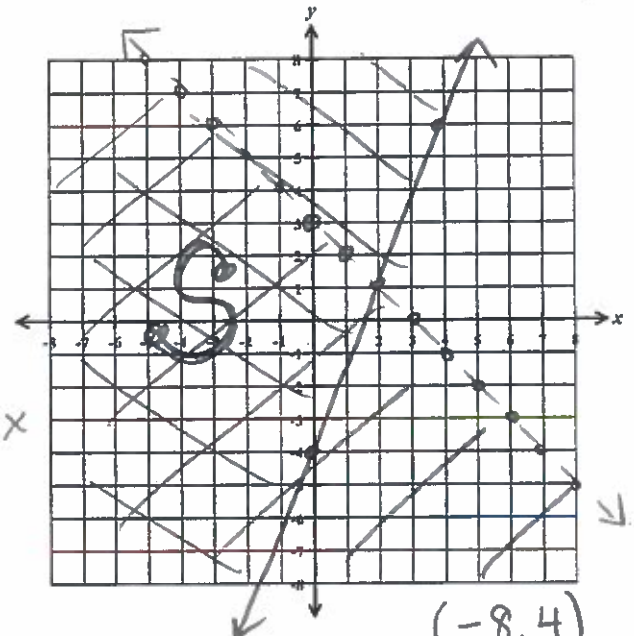
$f(-2)=-3(-2)^2+5(-2)+35$
$=-3(4)-10+35$
$=-12-10+35$

$f(-2)=13$

8. Graph the system of inequalities on the coordinate plane provided.

$5x-2y\leq 8$
$y<3-x$

$5x-2y\leq 8$
$-5x \quad -5x$
$\frac{-2y}{-2}\leq\frac{8-5x}{-2}\ \frac{}{-2}$
$y\geq -4+\frac{5}{2}x$



B. Name and plot one point that that falls in the solution set to the system of inequalities $(-8,4)$

C. Name and plot one point that that falls in the solution set to ***one of*** the inequalities $(2,6)$

D. Name and plot one point that that falls in the solution set to ***neither of*** the inequalities $(4,-5)$

9. The initial purchase price of a new car was $19,700. The car will depreciate in value at a rate of $16\frac{1}{2}\%$ per year.

A. Will the relationship between the value of the car and the time in years show exponential growth or decay? Explain your reasoning.

decay b/c it depreciates (loses value)

B. Write an equation that shows the value of the car, *y*, in dollars and the time in years, *x*, since the initial purchase.

$y = 19700(1-.165)^x$

$\frac{16.5\%}{100} = .165$

C. Use your equation to determine the value of the car after 6 years. Round your answer to the nearest penny. Show your work.

$y = 19700(1-.165)^6$

$y = 19700(.835)^6$

$y = \$6677.06$

D. After how many years will the value of the car be less than $4,000? Justify your answer.

After 9 years it will be less than $4000.

used table to see when y was less than $4000.

10. The local youth club needs a balance of at least $5,600 in their account to take a trip to Washington D.C. They currently have a balance of $3,000 in their account. To raise the money needed to take the trip, the group is selling tubs of cookie dough and boxes of cookies. For each tub of cookie dough sold, *d*, they earn a profit of $6.50, and for each box of cookies sold, *c*, they earn a profit of $1.75.

$5600 - 3000 = 2600$

Write an algebraic inequality to model the problem above.

$6.50d + 1.75c \geq 2600$

The youth group projects they will sell 300 buckets of cookie dough. Using your inequality, determine the minimum number of boxes of cookies they would need to reach their goal of $5,600.

$6.50(300) + 1.75c \geq 2600$

$1950 + 1.75c \geq 2600$

$-1950 \quad -1950$

$\frac{1.75c}{1.75} \geq \frac{650}{1.75}$

$c \geq 371.4$

At least 372 boxes of cookie