

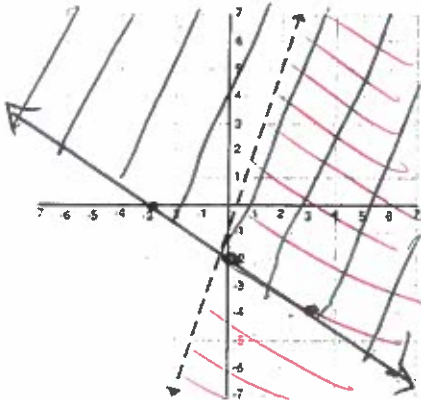
# Regents Review Packet #1

Algebra 1

Name KEY

Period \_\_\_\_\_

1. Consider the linear inequality shown below.



A. Write the inequality for the graph.

$$y < 3x - 1$$

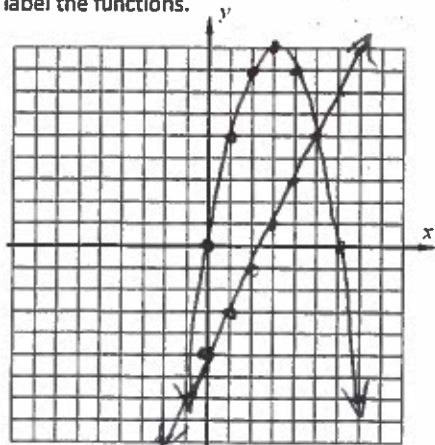
B. On the same axes graph the linear inequality  $-4x - 6y \leq 12$  To create a system of inequalities.

$$\begin{array}{r} -4x - 6y \leq 12 \\ +4x \qquad +4x \\ \hline -6y \leq 4x + 12 \\ -6 \qquad -6 \qquad -6 \\ \hline y \geq -\frac{2}{3}x - 2 \end{array}$$

C. State one point that lies in the solution set of the system of inequalities.

$$(4, 0)$$

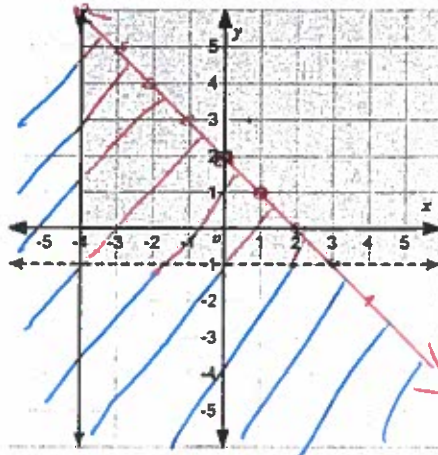
3. Let  $f(x) = 6x - x^2$  and  $g(x) = 2x - 5$ . On the axes provided below draw and label the functions.



B. At what value(s) of  $x$  does  $f(x) = g(x)$ ?

$$-1 \text{ and } 7$$

2. The graph below shows the solution set after a system of inequalities was graphed.



A. Write the original inequality for the line that is parallel to the  $x$ -axis.

$$y > -1$$

B. Write the original inequality for the line that is parallel to the  $y$ -axis.

$$x \geq -4$$

C. Graph the inequality  $y + x \leq 2$

$$\hookrightarrow y \leq -x + 2$$

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

$$A = \frac{bh}{2}$$

$$A = \frac{7 \cdot 7}{2} = 24.5 \text{ units}^2$$

4.  $A = -2x + 5x^2 - 3$  and  $B = 4x^2 - 9 + 3x$

Write  $A$  and  $B$  in standard form

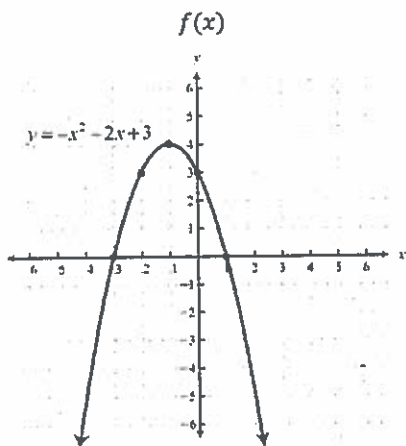
$$A = 5x^2 - 2x - 3$$

$$B = 4x^2 + 3x - 9$$

Find  $A - B$  in standard form.

$$\begin{aligned} (5x^2 - 2x - 3) - (4x^2 + 3x - 9) \\ 5x^2 - 2x - 3 - 4x^2 - 3x + 9 \\ x^2 - 5x + 6 \end{aligned}$$

5. Three quadratic functions are shown below, one in graph form, one in equation form, and one in table form.



$g(x)$

$$y = -2x^2 + 5x$$

$$x = \frac{-b}{2a} = \frac{-5}{2(-2)} = 1.25$$

$$y = -2(1.25)^2 + 5(1.25)$$

$$y = 3.125$$

$h(x)$

x	y
-6	-7
-5	-2
-4	1
-3	2
-2	1
-1	-2
0	-7

Determine which function has the largest maximum value  $f(x)$ . Explain your reasoning.

$f(x)$  has a max of 4,  $g(x)$  has a max of 3.125, and  $h(x)$  has a max of 2.

6. Justin's grandparents started an investment fund when he turned 4 years old. The initial investment was \$2,500 which would earn an interest rate of 6.5% compounded annually (grow exponentially.) 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.

Equation  $a = 2500(1 + .065)^t$

B. Use your equation to find the value of the investment on Justin's 21<sup>st</sup> birthday. Show how you arrived at your answer. Round to the nearest penny.

$$21 - 4 = 17$$

$$a = 2500(1.065)^{17}$$

$$a = 7292.62$$

C. Justin decided to withdraw the money on his 18<sup>th</sup> birthday rather than wait till he turned 21. How much less money will Justin receive? Show how you arrived at your answer.

$$a = 2500(1 + .065)^{14}$$

$$a = 6037.19$$

$$7292.62 - 6037.19$$

$$\$1255.43 \text{ less}$$

7. Solve the inequality for all values of  $x$ .

$$x + 10 - \frac{5}{2}x < 2(x + 5) - 14$$

$$-1.5x + 10 < 2x + 10 - 14$$

$$-1.5x + 10 < 2x - 4$$

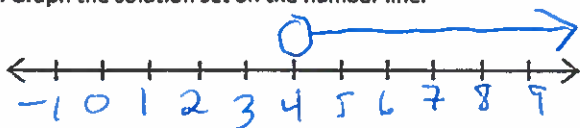
$$\begin{array}{r} -1.5x + 10 < 2x - 4 \\ + 1.5x \quad + 1.5x \\ \hline 10 < 3.5x - 4 \\ + 4 \quad + 4 \\ \hline 14 < 3.5x \\ \frac{14}{3.5} < \frac{3.5x}{3.5} \\ 4 < x \end{array}$$

$x > 4$

$(4, \infty)$

B. State the solution set using interval notation  $(4, \infty)$

C. Graph the solution set on the number line.



8. Algebraically determine the equation of the line that passes through the points  $(-2, -7)$  and  $(2, -1)$ .

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - (-7)}{2 - (-2)} = \frac{6}{4} = \frac{3}{2}$$

$$y = \frac{3}{2}x + b$$

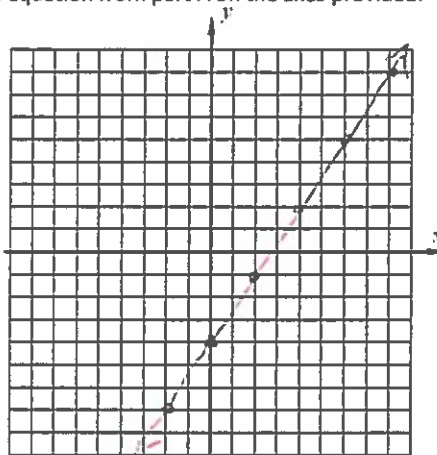
$$-1 = \frac{3}{2}(2) + b$$

$$-1 = 3 + b$$

$$-4 = b$$

$$y = \frac{3}{2}x - 4$$

B. Graph the equation from part A on the axes provided.



9. Sarah purchased 5 tickets to Disney and 4 tickets to Universal Studios for a total cost of \$893. Michael purchased 3 Disney tickets and 5 Universal Studio's tickets for a total cost of \$775.

Write and solve a system of equations to find the price of one Disney ticket and one Universal Studios ticket. Be sure to define your variables.

Let  $d$  = Disney price  
Let  $u$  = Universal price

$$\begin{array}{r} 3(5d + 4u = 893) \\ -5(3d + 5u = 775) \\ \hline 15d + 12u = 2679 \\ -15d - 25u = -3875 \\ \hline -13u = -1196 \\ \frac{-13u}{-13} = \frac{-1196}{-13} \\ u = 92 \end{array}$$

$$5d + 4(92) = 893$$

$$5d + 368 = 893$$

$$\begin{array}{r} 5d + 368 = 893 \\ -368 \quad -368 \\ \hline 5d = 525 \\ \frac{5d}{5} = \frac{525}{5} \\ d = 105 \end{array}$$

Disney is \$105  
Universal is \$92

10. The function  $h(t) = -16t^2 + 400$  represents the height in feet,  $h(t)$ , of an object above the ground at  $t$  seconds after being thrown off a cliff at an elevation of 400 feet.

A. Complete the table below.

$t$	0	1	2	3	4	5
$h(t)$	400	384	336	256	144	0

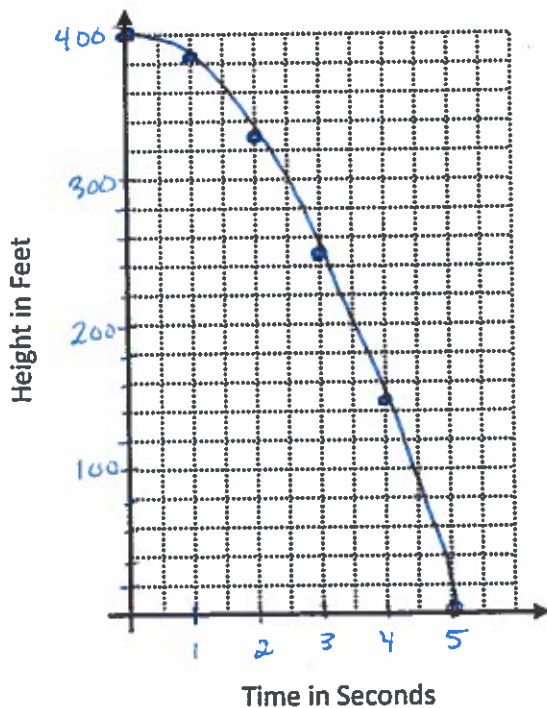
B. What is the domain of this function?  $0 \leq t \leq 5$

C. What is the range of this function?  $0 \leq h(t) \leq 400$

D. What is the value of  $h(3)$ ? 256. What does this value represent?

After 3 seconds the object is 256 feet above the ground.

E. Graph the function. Make sure to scale your axes accordingly.



1. Determine the average rate of change for the three functions below over the interval  $-2 \leq x \leq 2$ .

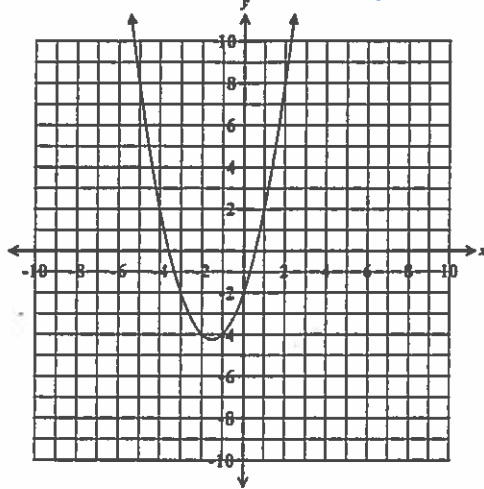
$f(x)$

x	y
-2	-7
-1	-3
0	1
1	5
2	9

$(-2, -7)$   $(2, 9)$   
 $\frac{9 - (-7)}{2 - (-2)} = \frac{16}{4} = 4$

$f(x)$  A.R.O.C = 4

$(-2, -3)$   $(2, 8)$   
 $g(x)$



$g(x)$  A.R.O.C = 2.75

$\frac{8 - (-3)}{2 - (-2)} = \frac{11}{4} = 2.75$

$h(x)$

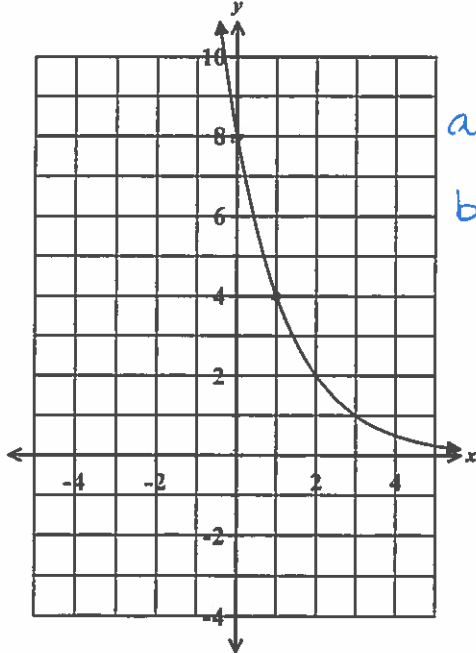
$h(x) = 4(2)^x$

$(-2, 1)$   $(2, 16)$

$\frac{16 - 1}{2 - (-2)} = \frac{15}{4}$

$h(x)$  A.R.O.C = 3.75

2. Write the exponential equation for the graph shown below.



$a = 8$   
 $b = \frac{1}{2}$

Equation  $y = 8\left(\frac{1}{2}\right)^x$

3. Perform the indicated polynomial operation.

A. Let  $A = -2x^2 - 3x + 5$  and  $B = 2 - 4x + 3x^2$

Express  $A - B$  in standard form.

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

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

Find  $f(x) \cdot g(x)$

$(3x^2y)(2x^3y - 4x)$   
 $6x^5y^2 - 12x^3y$

4. Express each in standard form.

A.  $(4x - 3)^2$

$$(4x - 3)(4x - 3)$$

$$16x^2 - 24x + 9$$

B.  $(4x - 3)(2 + 5x)$

$$8x + 20x^2 - 6 - 15x$$

$$20x^2 - 7x - 6$$

6. Express each in standard form

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

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

$$(x + 3)(x^2 - 8x + 16)$$

$$x^3 - 8x^2 + 16x + 3x^2 - 24x + 48$$

$$x^3 - 5x^2 - 8x + 48$$

B.  $(x + 2)(x - 2)(x + 1)(x - 1)$

$$(x^2 - 4)(x^2 - 1)$$

$$x^4 - x^2 - 4x^2 + 4$$

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

5. Perform the indicated polynomial operation.

A. Express the product of  $2x^2 - 3x + 5$  and  $x - 4$  in standard form.

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

$$2x^3 - 3x^2 + 5x - 8x^2 + 12x - 20$$

$$2x^3 - 11x^2 + 17x - 20$$

B. Subtract  $-3x^2 - 5x + 4$  from  $-x^2 + 2x - 5$

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

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

$$2x^2 + 7x - 9$$

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

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

$$f(x) = 8x - 4x^2 + 6 - 3x - 2x^2 + 3x - 5$$

$$f(x) = -6x^2 + 8x + 1$$

Find  $f(-2)$

$$f(-2) = -6(-2)^2 + 8(-2) + 1$$

$$f(-2) = -24 - 16 + 1$$

$$f(-2) = -39$$

8. Mark wants to purchase a combination of at least 16 turkey subs or roast beef subs for a party. Each turkey sub,  $x$ , is priced at \$5 and each roast beef sub,  $y$ , is priced at \$4. Mark has at most \$80 to spend on the subs.

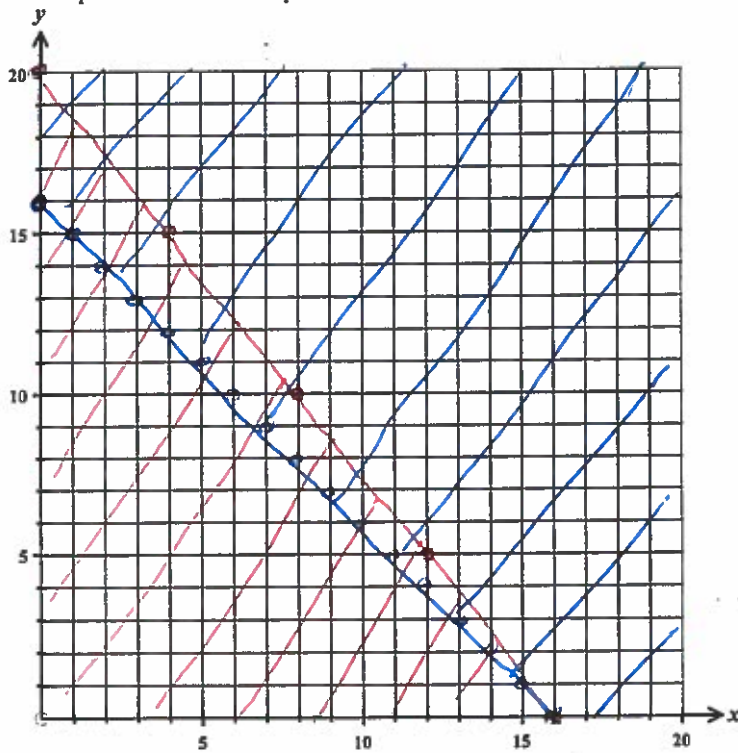
A. Write a *system of inequalities* that can be used to model this situation.

$$y \geq -x + 16 \quad \leftarrow x + y \geq 16$$

$$5x + 4y \leq 80 \quad \rightarrow \quad \frac{4y}{4} \leq \frac{-5x + 80}{4}$$

$$y \leq -1.25x + 20$$

B. Graph the inequalities on the axes provided.



C. Name one combination of subs that will allow Mark to stay within his budget.

Turkey subs 5      Roast beef subs 12

D. Using the combination of hours you chose for part C, how much would Mark spend?

$$5(5) + 4(12)$$

$$25 + 48$$

$$\$73$$

9. When doctors prescribe medicine, they must consider how much the drug's effectiveness will decrease as time passes. If each hour a drug is 20% less effective as the previous hour, at some point the patient will not be receiving enough medicine and must be given another dose.

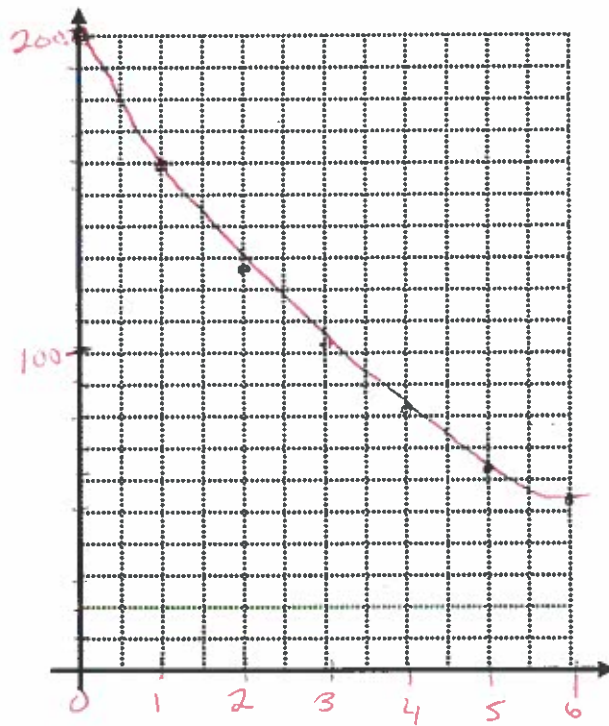
A. Will this relationship show exponential growth or decay? Explain your reasoning.

Exponential decay since it is less effective.

B. A patient was given an initial dose of 200 mg of medication. Write an equation that shows the relationship between the amount of medication remaining in the patient's bloodstream,  $y$ , and the time in hours,  $x$ , since the medication was administered.

$$y = 200(1 - .2)^x$$

C. Draw a graph of the function over the first 12 hours after the initial dosage. Be sure to scale and label your axes appropriately and include a title.



D. When the level of medication falls below 50mg, the patient will need a new dose. After what number of hours does the level of medication fall below 50mg? Justify your answer.

After 6 hours the dose falls below 50mg.

$$(6, 52.43) \quad (7, 41.94)$$