Unit 1: Functions and Their Inverses

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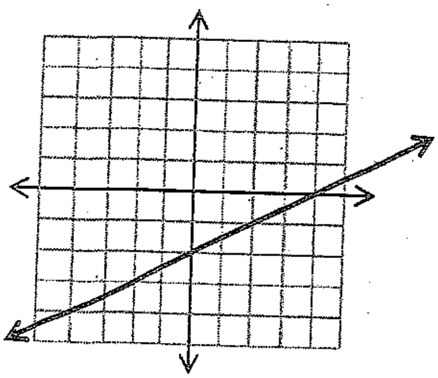
Day 1: Graphing Equations of Lines & Function Notation

SLOPE INTERCEPT FORM OF A LINE:______________________

What is the equation of the line in the graph displayed below:

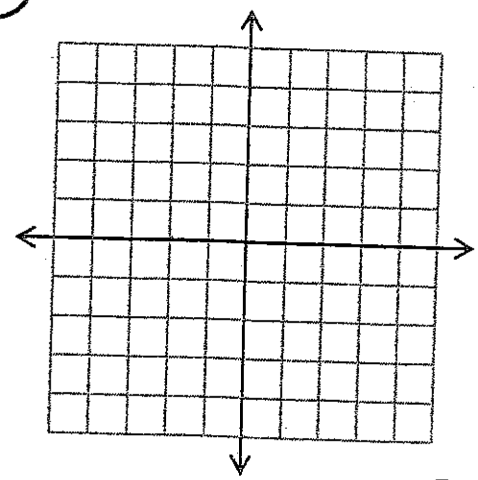


Slope:____ Y-Intercept:____

Equation:________________

Write the slope as a fraction & y-intercept as a point!

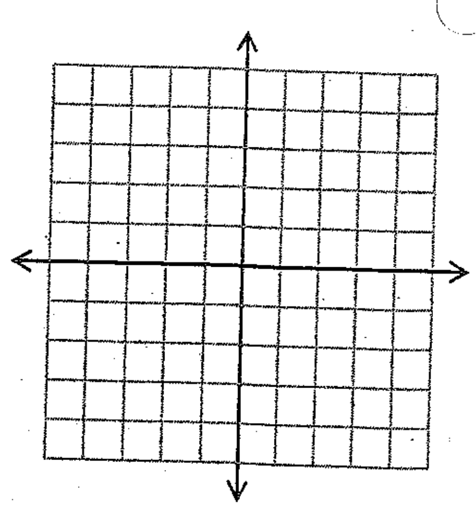
Let's graph the equation $y=\frac{1}{3}x-2$



Slope:_____ Y-Intercept:_______

Domain:________________ Range:_________________

Let's graph the equation $y=-2x+4$.

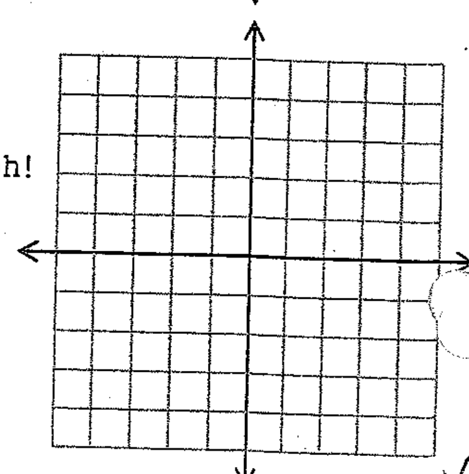


Slope:_____ Y-Intercept:_______

Domain:________________ Range:_________________

Let's graph the equation $2x+3y=6$.

Remember it MUST be in slope intercept form in order to graph!



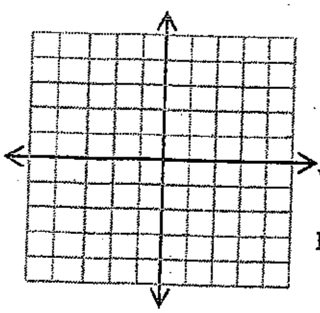
Slope:_____ Y-Intercept:_______

Domain:________________ Range:_________________

Let's practice putting equations in slope-intercept form (SOLVE FOR Y!!). Then state the slope and y-intercept.

$y - 10 = 3x$	$3x - 4y = 12$	$-2x - 7y = 14$
Slope:____ Y-Intercept:____	Slope:____ Y-Intercept:____	Slope:____ Y-Intercept:____

Graph a Vertical line

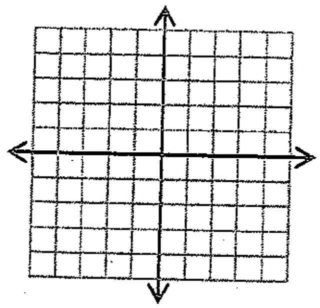


Find 3 points on your line:

WHAT DO YOU SEE?

Equation of your line:

Graph a Horizontal line:



Find 3 points on your line:

WHAT DO YOU SEE?

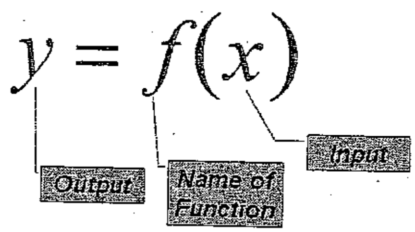
Equation of your line:

Using FUNCTION NOTATION

Output value   Input value

$f(x) = 5x + 3$

f of x equals 5 times x plus 3.



Given $f(x) = x^2 - 2$, find:	Given $g(x) = 2x + 7$, find:	Given $h(x) = -2x^2 + 7x - 11$, find:
$f(5)=$	$g(4)=$	$h(2)=$
$f(-5)=$	$g(-4)=$	$h(2a)=$
$f(0)=$	$g(a)=$	$3h(-3)=$

A little more of a challenge: Given $f(x) = 2x + 1$, find $-4[f(3) - f(1)]$.

2.1 Features of Functions

EQ: What is a function? How do we state the domain, range, and intervals in/decreasing?

Relation: ______________________________

Function: ______________________________

Domain: ______________________________

Range: ______________________________

Determining if a Set of Ordered Pairs is a Function

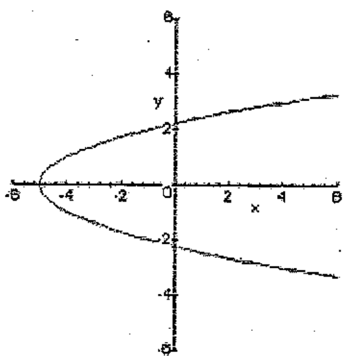
Example 1: What are the domain and range of this relation? {(-4, 0), (-3, 1), (0, -2), (1, 2), (3, 3)}

Domain: **Range:** **Is this a function?**

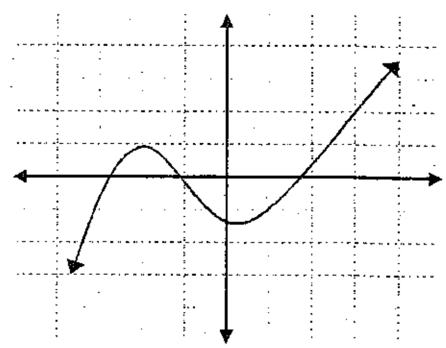
Determining if a Graph is a Function

Example 1: Are the following functions? Explain why or why not.

a)



b)



Determining if an Equation is a Function

Two things cannot be true:

1) y cannot be in absolute value bars
2) y cannot be raised to an even power

Example 2: State whether the following equations are functions:

a. $y = x^2 + 2$ b. $x = y^2 - 3y$ c. $y = 3^x$

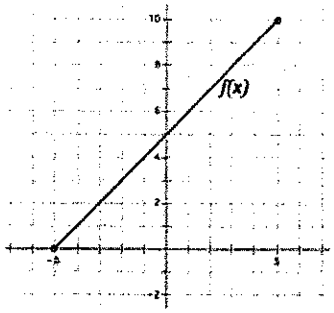
Intervals Increasing: ______________________________

Intervals Decreasing: ______________________________

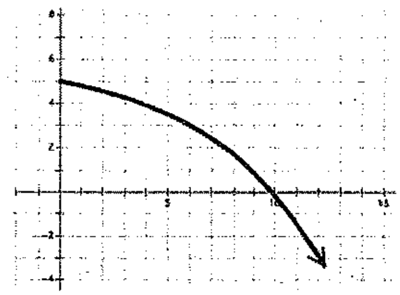
Constant Intervals: ______________________________

Example 3: Given each representation of a function, determine the domain and range. Then, determine the intervals in which the function is increasing, decreasing, and/or constant.

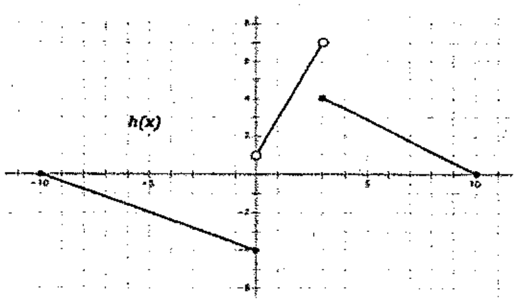
a)



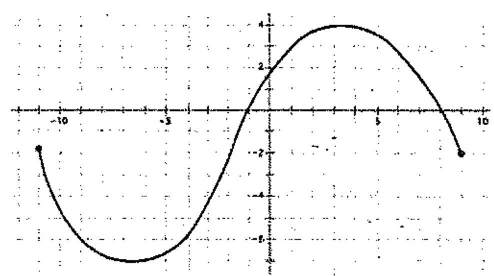
b)



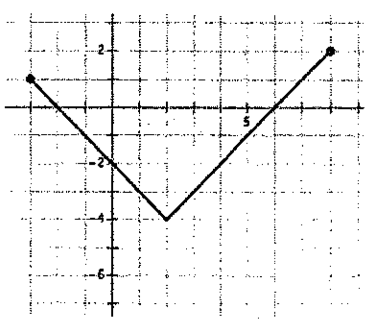
c)



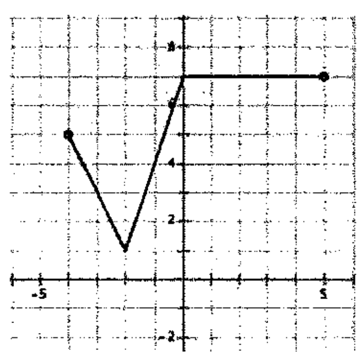
d)



e)



f)



Algebra 2 Name________________________ ID: 1

Assignment

Date________________ Period____

Evaluate each function.

1) $f(n) = -|n + 1| + 3$; Find $f(-10)$

2) $h(t) = 4^{-t-1} - 2$; Find $h(2)$

3) $k(n) = 2^n$; Find $k(-1)$

4) $h(n) = |-3n - 2| - 1$; Find $h(5)$

5) $h(n) = n^3 - 1$; Find $h(-1)$

6) $k(n) = n^2 - 4$; Find $k(6)$

7) $w(n) = |n + 1| - 3$; Find $w(-9)$

8) $f(x) = |2x|$; Find $f(-7)$

9) $g(n) = 3n + 5$; Find $g(4 + x)$

10) $f(t) = 3t^2 - 1 + 2t$; Find $f(2t)$

11) $f(t) = t + 5$; Find $f(2 + a)$

12) $k(t) = t^3 - 2 - 2t$; Find $k(-3t)$

13) $g(x) = |x - 3|$; Find $g(-2x)$

14) $g(n) = |n| - 1$; Find $g(3 + n)$

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Homework 2.1: Features of Functions

Name: ______________

Math 3

1. Determine whether the relation is a function. If it is not a function, circle the ordered pairs that cause it not to be a function.

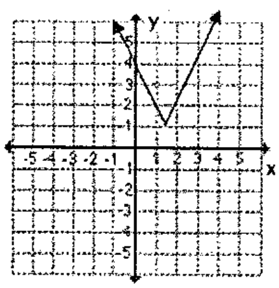
A. Yes No $\{(-2,2),(0,5),(1,6),(1,7),(2,-1),(3,2)\}$

B. Yes No $\{(0,1),(2,-1),(3,2),(4,2),(5,3),(-5,1)\}$

C. Yes No $\{(0,-5),(1,3),(2,2),(0,4),(-5,6),(3,4)\}$

2. Which of the following graphs represent functions? Circle your answers. If it is a function, state the domain and range. If the graph is not included, make a table and graph the function by hand.

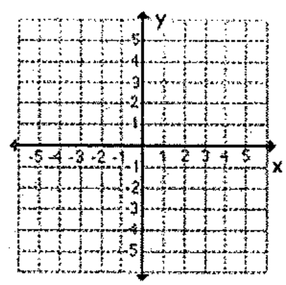
A. $y=|2x-3|+1$



Domain:

Range:

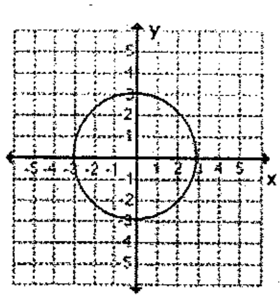
B. $y=x^2-2x+1$



Domain:

Range:

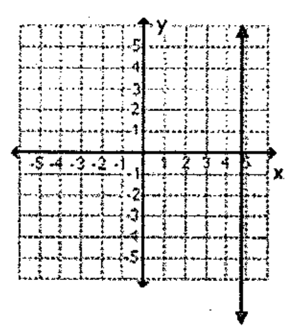
C. $x^2+y^2=9$



Domain:

Range:

D. x = 5



Domain:

Range:

3. Graph the following functions, and then find each of the following.

a) **Absolute Value:** $f(x) = -|x| + 7$

Shape: _____

x	-3	-2	-1	0	1	2	3	4
y								

x-intercept: ______________________

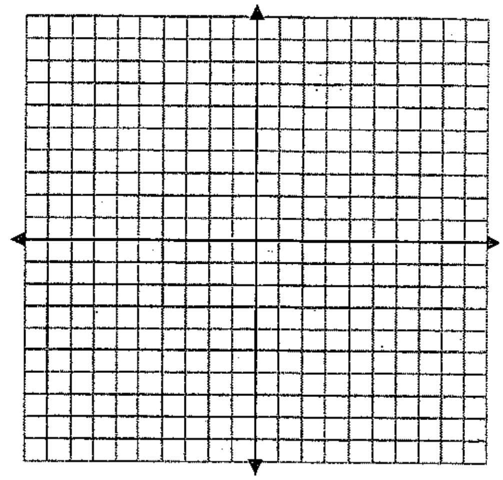
y-intercept: ______________________

Max or Min: ______________________

Vertex: ______________________

Interval Increasing: ______________________

Interval Decreasing: ______________________



b) **Quadratic:** $f(x) = -(x+1)^2 - 7$

Shape: _____

x	-4	-3	-2	-1	0	1	2
y							

x-intercept: ______________________

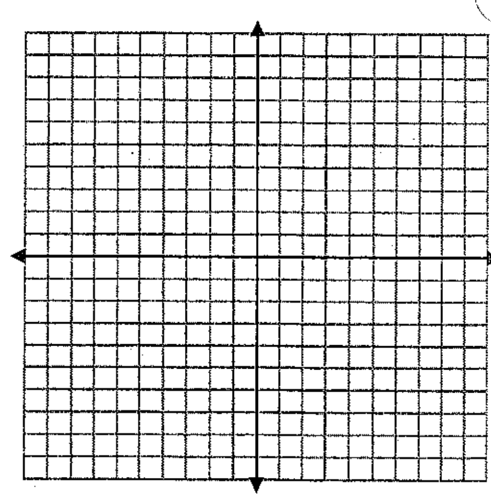
y-intercept: ______________________

Max or Min: ______________________

Vertex: ______________________

Interval Increasing: ______________________

Interval Decreasing: ______________________



For questions 3a-3b:

- What similarities do you see between the vertex and the equation?
- Do you believe the vertex has any bearing on where the graph is located? Explain your reasoning.
- What part of the equation do you think gives the graph its shape?

What do you know about solving Systems of Equations? Warmup Day 2

1. What is a system of equations?

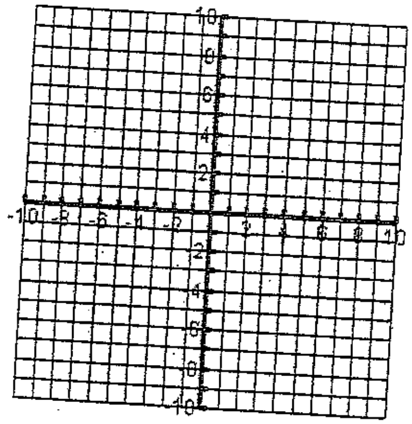
2. Three possible solutions for a system of equations:

3. Three ways to solve a system of equations:

4. Solve by graphing:

$x + y = 10$

$x - y = 4$



5. Solve by substitution: $3x + y = -9$

$-3x - 2y = 12$

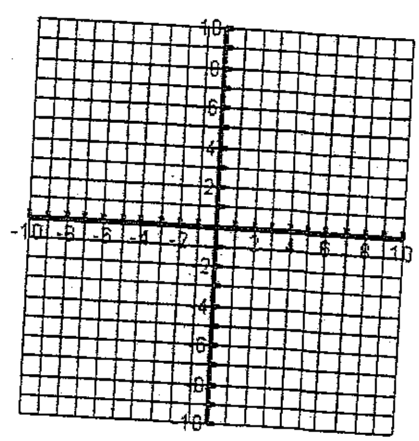
6. Solve by elimination: $2x + 4y = -4$

$3x + 5y = -3$

7. Solve by graphing:

$y > \frac{2}{3}x + 2$

$y < \frac{2}{3}x - 1$



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Precalculus | Name________________________ ID: 1

Assignment

Date________________ Period____

Solve each system of linear equations by an algebraic method.

1) $3x + 3y = -12$
$-5x - 2y = 14$

2) $-4x + 4y = 12$
$-2x + 2y = 8$

3) $-2x + 4y = -20$
$-x + 2y = -10$

4) $3x - y = 6$
$-5x - 2y = -21$

5) $2x + y = -1$
$4x - 3y = 3$

6) $2x - 2y = 12$
$-x + y = -5$

9

7) $-4x + 3y + 3z = -25$
$-2y - 4z = 24$
$x - 4y - z = 14$

8) $-2x - 4y + 4z = -4$
$-3x - 3y = -15$
$3x + y + 4z = -5$

9) $-4x - 2y + z = -10$
$2x - 4z = 12$
$-5x + 3y - 3z = -4$

10) $-4x - 2y - z = -3$
$x - 2y - 2z = -6$
$-3y + 3z = 9$

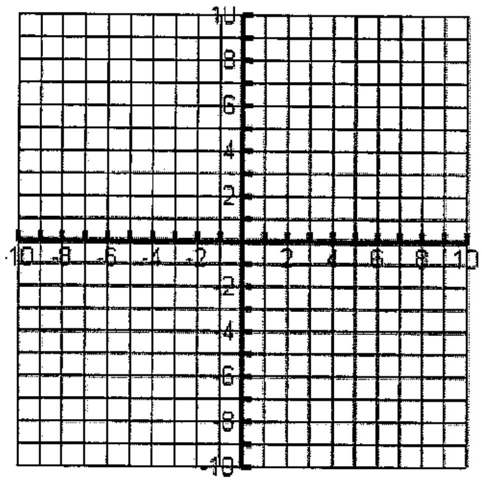
11) $-3x - 2y = 3$
$-3x - 5y + 4z = 8$
$x - 5y - z = 17$

12) $3x + 4y - z = -2$
$4x + 2y = -4$
$-2x + 4y + z = 16$

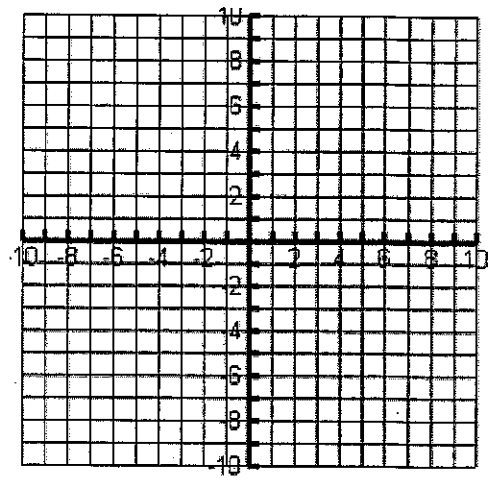
Solving Systems of equations Homework

Solve by Graphing.

1. $3x - 6y = 12$
   $2x - 4y = 8$



2. $x + y = 2$
   $y = -2x - 1$



Solve by Substitution.

3. $2x - 3y = -1$
   $y = x - 1$

4. $y = -3x + 5$
   $5x - 4y = -3$

Solve by Elimination.

5. $5x + y = 9$
   $10x - 7y = -18$

6. $-3x + 7y = -16$
   $-9x + 5y = 16$

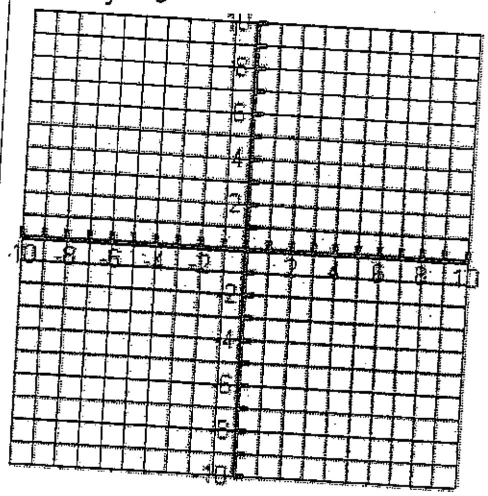
Name ____________________ Class __________ Date __________

1-2 Homework

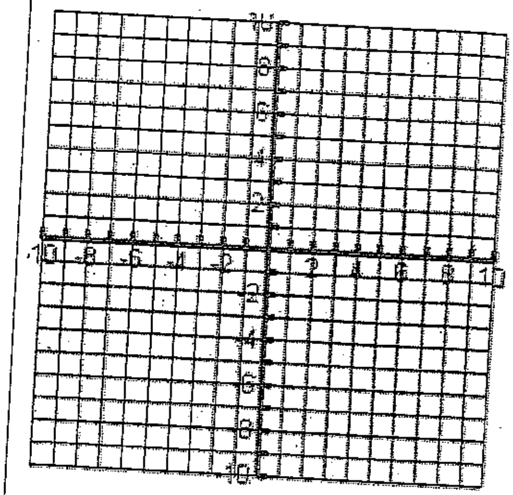
Systems of Equations with Context

Solve by Graphing.

$3x - 6y = 12$
$2x - 4y = 8$



$x + y = 2$
$y = -2x - 1$



Solve by Substitution.

$2x - 3y = -1$
$y = x - 1$

$y = -3x + 5$
$5x - 4y = -3$

Solve by Elimination.

$5x + y = 9$
$10x - 7y = -18$

$-3x + 7y = -16$
$-9x + 5y = 16$

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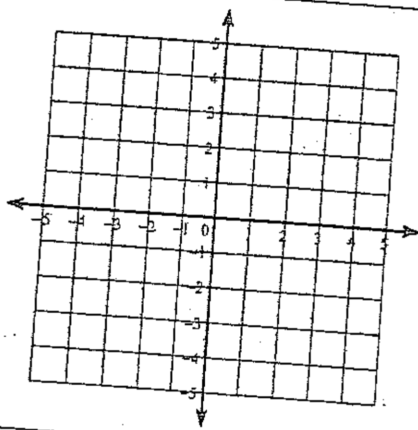
Pairing Solving Systems Activity

A

Name________________

Graphing	Substitution

1. $y = 2x - 3$
   $y = -3x + 2$



Your Answer: ____________

Your Partner's Answer: ___________

Do your answers match? ________

If "**yes**", move on to the next problem.

If "**no**", switch papers, check your partner's work and identify any mistakes.

Your Answer: ____________

Your Partner's Answer: ___________

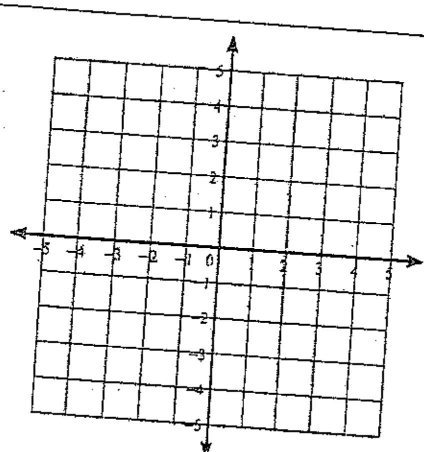
Do your answers match? ________

If "**yes**", move on to the next problem.

If "**no**", switch papers, check your partner's work and identify any mistakes.

2. $5x - y = -5$
   $3x - 6y = 24$

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



Your Answer: ____________

Your Partner's Answer: ___________

Do your answers match? ________

If "**yes**", move on to the next problem.

If "**no**", switch papers, check your partner's work and identify any mistakes.

Your Answer: ____________

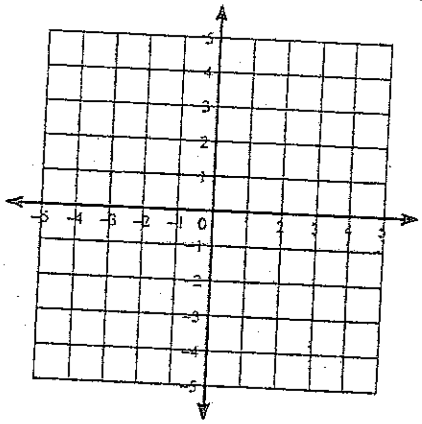
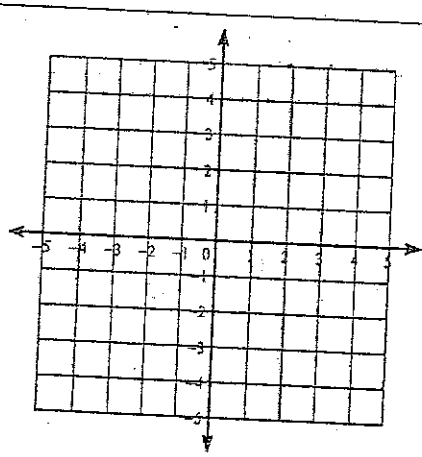
Your Partner's Answer: ___________

Do your answers match? ________

If "**yes**", move on to the next problem.

If "**no**", switch papers, check your partner's work and identify any mistakes.

4. $x = 4y$
   $x + 2y = 12$

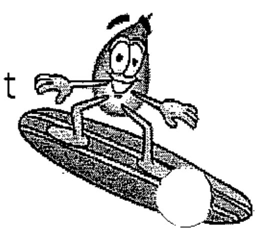
Graphing	Elimination
5. $-2x - y = 1$ $-6x = 3y + 3$ 	**Your Answer:** ________ **Your Partner's Answer:** ________ **Do your answers match?** ______ If "**yes**", move on to the next problem. If "**no**", switch papers, check your partner's work and identify any mistakes.
Your Answer: ________ **Your Partner's Answer:** ________ **Do your answers match?** ______ If "**yes**", move on to the next problem. If "**no**", switch papers, check your partner's work and identify any mistakes.	6. $-4x + 3y = 3$ $x - 3y = -6$
7. $x - 2y + 8 = 0$ $-6 - 2y = -x$ 	**Your Answer:** ________ **Your Partner's Answer:** ________ **Do your answers match?** ______ If "**yes**", move on to the next problem. If "**no**", switch papers, check your partner's work and identify any mistakes.
Your Answer: ________ **Your Partner's Answer:** ________ **Do your answers match?** ______ If "**yes**", move on to the next problem. If "**no**", switch papers, check your partner's work and identify any mistakes.	8. $3x - 2y = 2$ $5x - 5y = 10$

Applications with Systems ~ Pick a Method

Suppose that the Greene Cell Phone company charges $50 per month plus 15 cents per minute while the Johnston Cell Phone Company charges no monthly fe but 25 cents per minute. After how many minutes of phone usage would a monthly phone bill be the same from both companies?

Jake's Surf Shop rents surfboards for $6.00 plus $3.00 per hour. Rita's rents them for $9.00 plus $2.50 per hour.

- After how many hours of surfing will the rental fee be the same for both surf shops?
- You only want to surf for 2 hours; which Surf Shop should you go t



For each question, define your variables, write a system of equations, and solve using any method. Please use a separate sheet of paper to show all work.

1. The length of a rectangle is 3 cm more than twice the width. The perimeter of the rectangle is 42 cm. Find the dimensions of the rectangle.

2. Suppose you have $200 in your account and you save $10 dollars each week. Your friend has $110 in their account and starts saving $15 each week. When will your account balances be the same?

3. The difference of two numbers is 40. Their sum is 66. Find the numbers.

4. A youth group and their leaders visited Mammoth Cave. Two adults and 5 students in one van paid $77. Two adults and 7 students in another van paid $95. Find the adult price and student price of the tour.

5. A winter clothing store had a sale and Cory bought two pairs of gloves and four hats for $43. Mark bought two pairs of gloves and two hats for $30. How much did each pair of gloves and each hat cost?

6. At a recreation and sports facility, 3 members and 3 nonmembers pay a total of $180 to take a yoga class. A group of 5 members and 3 nonmembers pay $210 to take the same class. How much does it cost each member and nonmember to take the yoga class?

7. Joey has $5.75 made up of all dimes and quarters. If Joey has 38 coins, how many of each coin does he have?

Graphing Systems of Inequalities Exploration

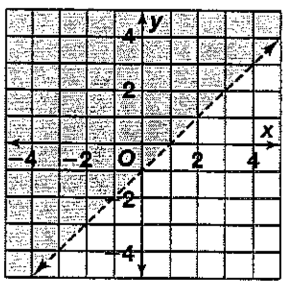
Example:

$-x + y > -1$

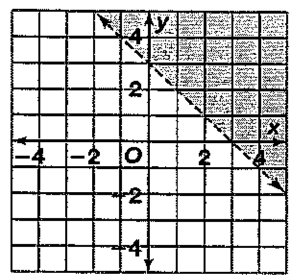
$x + y > 3$

Graph each inequality. First graph the boundary lines. Then decide which side of each boundary line contains solutions and whether the boundary line is included.

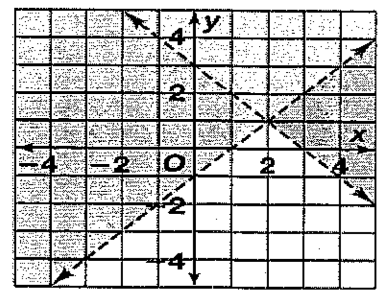
$-x + y > -1$



$x + y > 3$



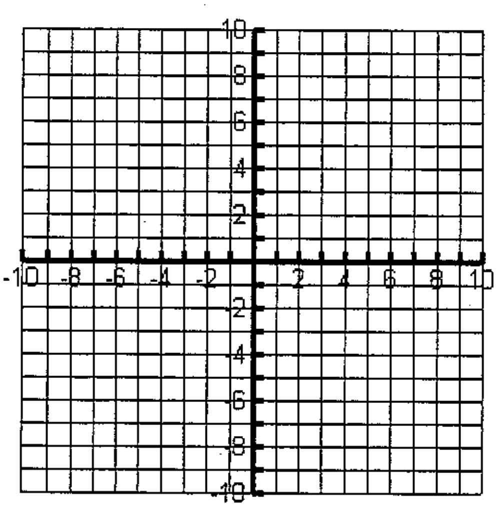
$-x + y > -1$
$x + y > 3$



<u>Try these:</u>

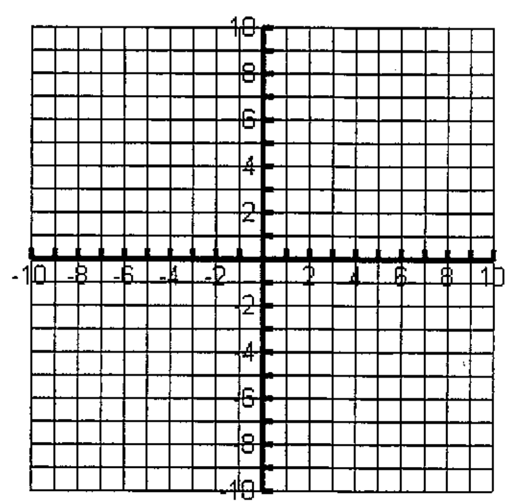
1. $3x + 2y \leq -1$

   $x + 4y > -12$



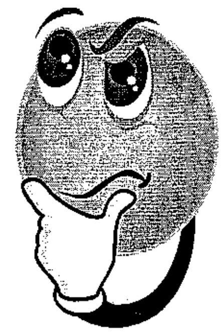
2. $y > \frac{2}{3}x + 2$

   $y < \frac{2}{3}x - 1$



Graphing an Inequality

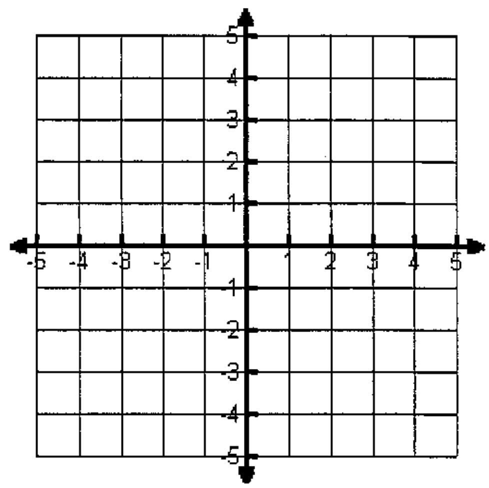
1. Solve the inequality for y (if necessary). Graph each inequality on the same set of axes.
2. Graph the inequality as if it contained an = sign.
3. Draw the line solid if the inequality is or
4. Draw the line dashed if the inequality is $<$ or $>$
5. Pick a point not on the line to use as a test point. The point (0,0) is a good test point if it is not on the line.
6. If the point makes the inequality true, shade that side of the line. If the point does not make the inequality true, shade the opposite side of the line.
7. The area where the shading overlaps is the solution to the system of inequalities.



PRACTICE:

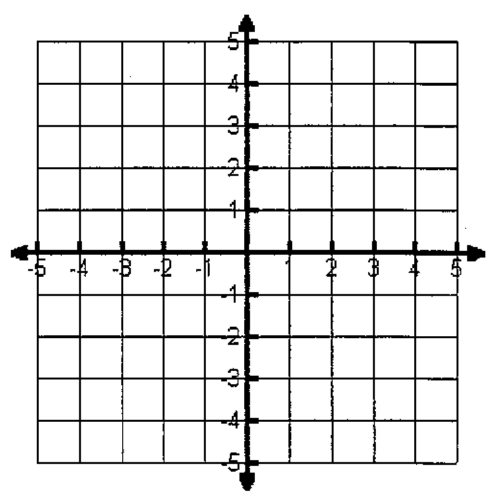
Ex: $x < 3$

$y \geq -1$



Ex: $3x - 2y \leq -2$

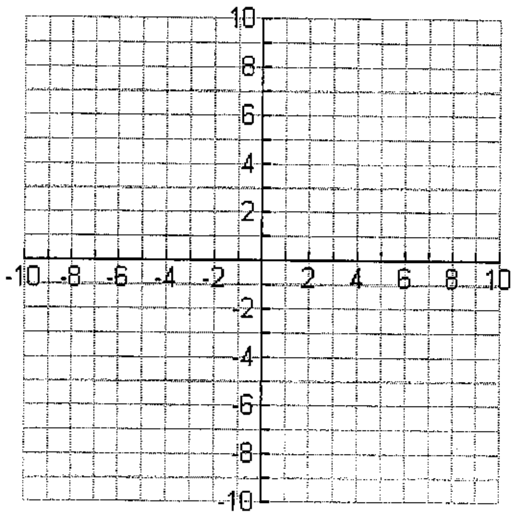
$x + 4y \geq -12$



Graph the following inequalities on graph paper.
Used colored pencils to shade.

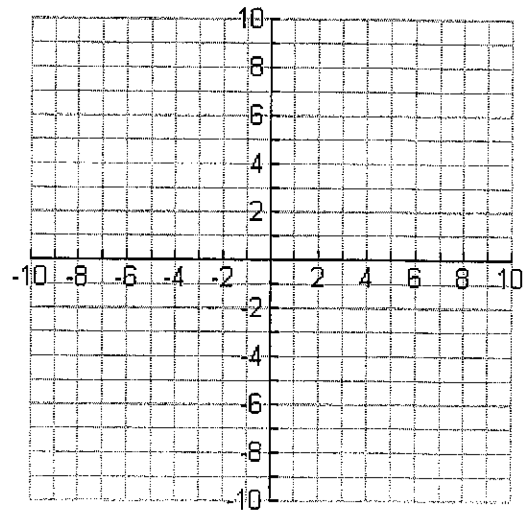
1) $x + 2y \le 8$

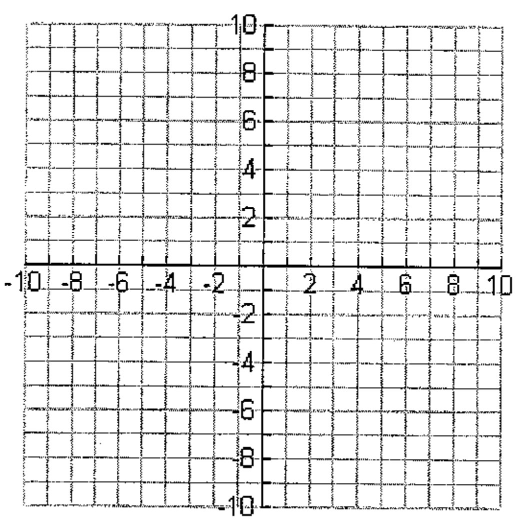
$y \le x + 4$



2) $x + y < 3$

$y \ge -x^2$





4) Katie works part-time at the Fallbrook Riding Stable. She makes $5 an hour for exercising horses and $10 an hour for cleaning stalls. Because Katie is a full-time student, she cannot work more than 12 hours per week. Graph two inequalities that illustrate how many hours Katie needs to work at each job if she plans to earn not less than $90 per week.

Write a system of inequalities to model the given scenario.

Use your graphing calculator, to find a possible solution.

Name ______________________ Class ____________ Date ____________

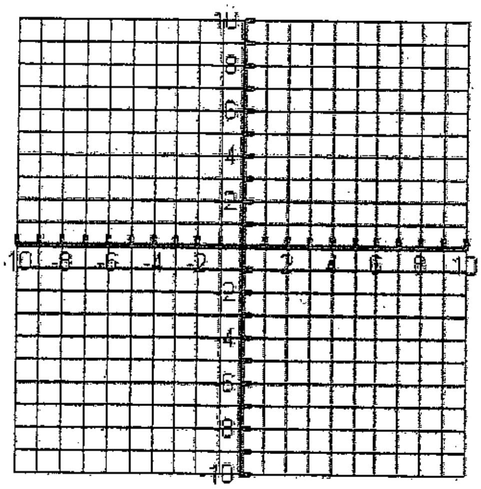
1-3 Homework

Linear Inequalities with Context

Solve the system of inequalities.

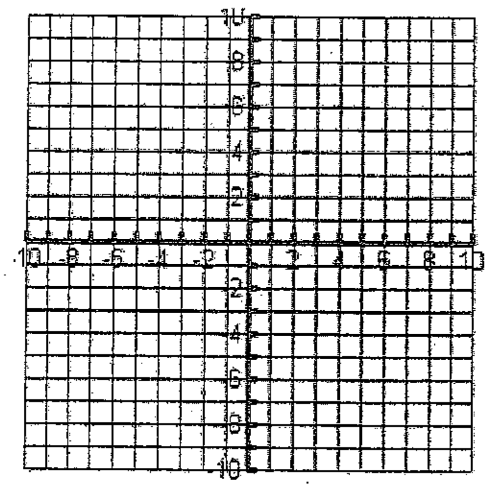
$2x+3y>-9$

$-x+y\le 4$



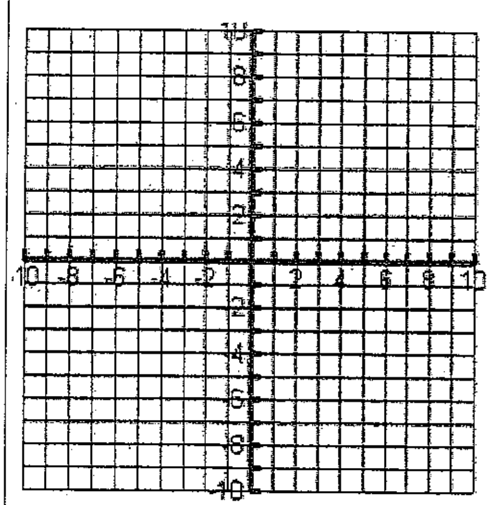
$4x+2y\le -8$

$-x-3y<6$



$f(x)>2x^2-6x-7$

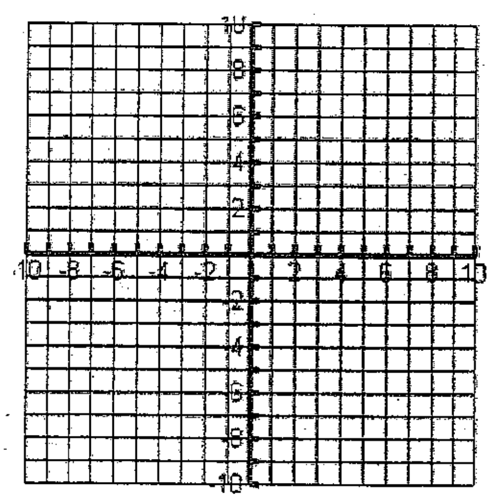
$4x+f(x)\le 10$



$-(x-2)^2+7\le y$

$-2x+2y<-6$

****Try to graph the quadratic function without a calculator.****



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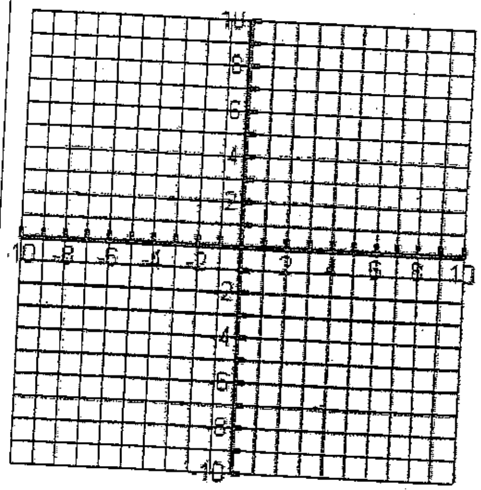
$y < -x + 4$

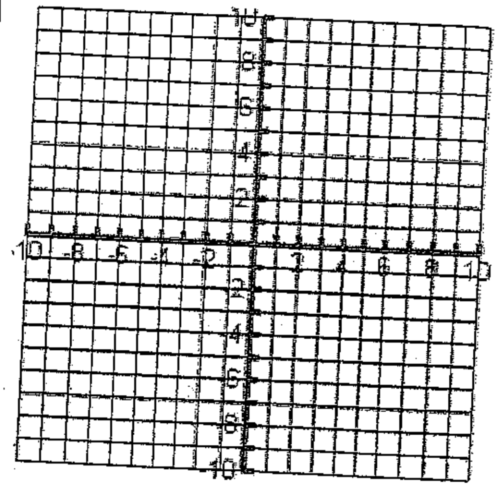
$y < x - 6$

$y > -3x - 4$

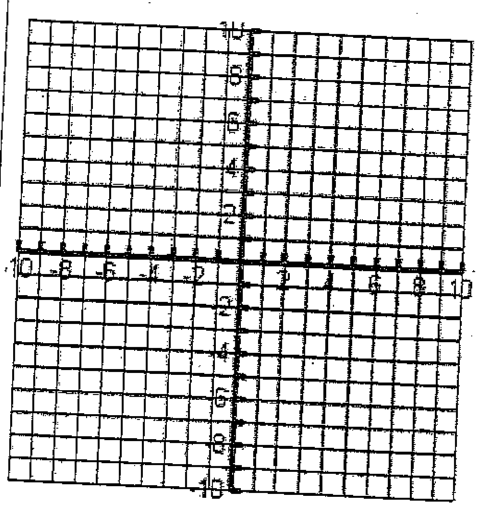


$f(x) \le -(x+3)^2 + 8$

$f(x) \ge 2(x+3)^2 - 6$



A sundae requires 3 ice-cream scoops and 4 strawberries, and a milkshake requires 2 ice-cream scoops and 6 strawberries. Ramses wants to make sundaes and milkshakes with at most 25 ice-cream scoops and 37 strawberries. Let's form a system of inequalities to represent his conditions. Let x denote the number of sundaes he makes and y the number of milkshakes he makes. Graph your solution on the following graph.



For a person of height h (in inches), a healthy weight W (in pounds) is one that satisfies this system of inequalities:

$$w \ge \frac{19h^2}{703}$$

$$w \le \frac{25h^2}{703}$$

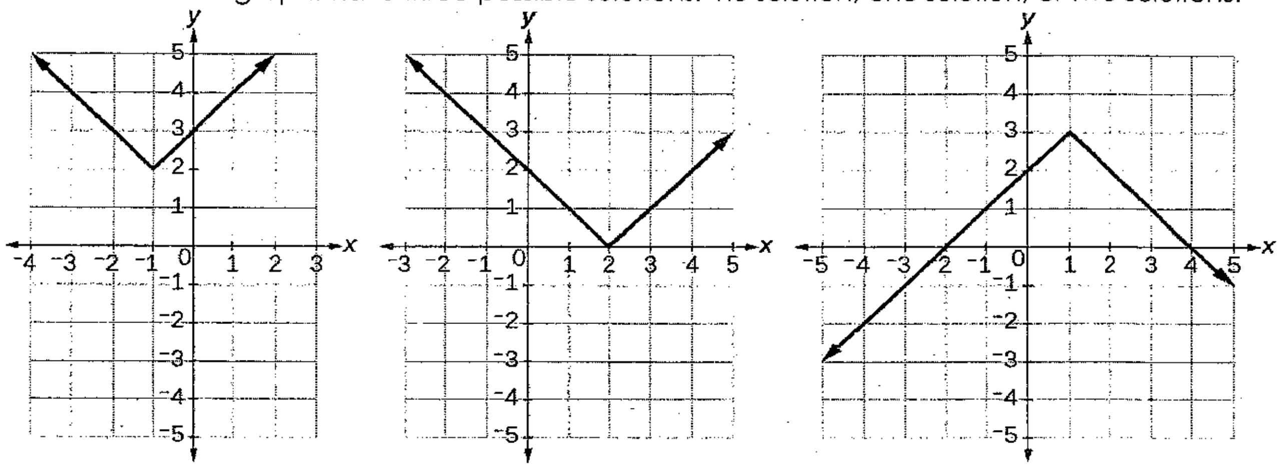
Graph the system for $0 \le h \le 80$ using your graphing calculator. What is the range of healthy weights for a person 67 inches tall?

1.6 Absolute Value Equations

SWBAT solve absolute value equations and check solutions using substitution.

Absolute Value: ____

Absolute value graphs have three possible solutions: no solution, one solution, or two solutions.



(a) (b) (c)

Solving absolute value equations by hand is almost the exact same as solving regular equations with one major difference. In most cases you have *2 solutions.*

Example: |x| = 5

We know that when x = 5, |5| will also equal 5, but it is also true that |-5| will equal 5. So, for |x| = 5, x = {-5, 5}. They both work.

Isolating absolute value equations is similar to isolating an equation for x.

<u>Regular Equations</u>	<u>Absolute Value Equations</u>
1a) 5x + 9 = 144	1b) 5|3x − 6| + 9 = 144
2a) $\frac{x}{7} - 3 = 1$	2b) $\frac{\lvert 12x-8 \rvert}{7} - 3 = 1$
3a) $\frac{2}{3}x - 11 = -3$	3b) $\frac{2}{3}\lvert 2x - 10\rvert - 11 = -3$

4a) $\frac{4x-5}{3} = 9$

4b) $\frac{4|8x-16|-5}{3} = 9$

How to Solve Absolute Value Equations

1. Isolate the absolute value.

NOTE: *Never distribute into the absolute value bars!*

2. Split the equation into two, with one positive and one negative.
3. Check your solution by substituting your answer(s) into the original problem!

Example 1: Solve $|2x+6|-3=13$

Example 2: Solve $4|5x-10|+23=3$

Example 3: $|x+5| = 3x-7$

You Try! $|2t-3| = 3t-2$

Unit 1 Day 4 ~ Absolute Value Functions

Absolute value variable equations are written as:

- $f(x) = |mx + b| + c$
- Graph looks like a right side up or upside down ____________
  - Opens up if the coefficient in front of the absolute value symbols is _____________.

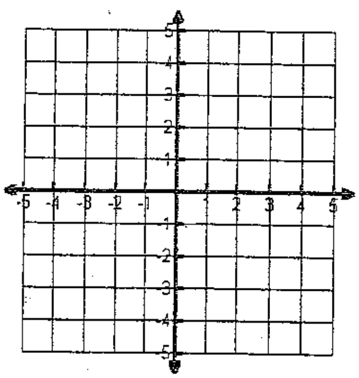
    $f(x) = 4|x + 2| + 3$ opens up

  - Opens down if the coefficient in front of the absolute value symbols is _____________.

    $f(x) = -4|x + 2| + 3$ opens down

- The vertex of the graph will be . You can use your calculator to find it!!

Let's start with $f(x) = |x|$ and graph the equation. This is called the parent function.

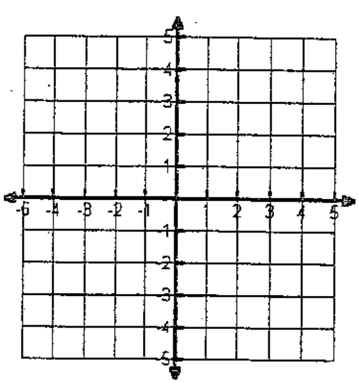


What's the vertex? (___,___)

Does it open up or down? ____

Domain:________________ Range:__________________

You try $f(x) = |x + 2|$. How is it different from the parent graph? ____________________

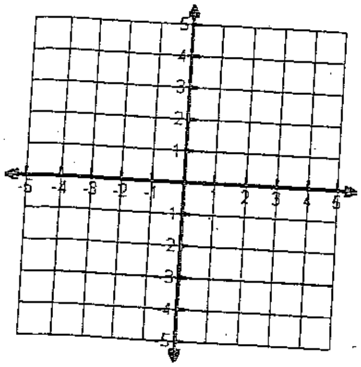


What's the vertex? (___,___)

Does it open up or down? ____

Domain:________________ Range:__________________

$f(x) = |x| + 2$. How is it different from the parent graph?



What's the vertex? (__,__)

Does it open up or down? ___

Domain:_______________ Range:__________________

Vertical Transformations:

A constant added outside the absolute value symbol shifts the graph UP that many units.

$f(x) = |x| + 5$ moves the parent graph _______________

A constant subtracted outside the absolute value symbol shifts the graph DOWN that many units.

$f(x) = |x| - 3$ moves the parent graph _______________

Horizontal Transformations:

A constant added inside the absolute value symbols shifts the graph LEFT horizontally.

$f(x) = |x + 2|$ moves the parent graph ____________________

A constant subtracted inside the absolute value symbols shifts the graph RIGHT horizontally.

$f(x) = |x - 2|$ moves the parent graph ____________________

Reflection over the x-axis:

If you have a _______________ in front of the absolute value, the graph will be reflected, or _____________, over the x-axis.

$f(x) = -|x|$ moves the parent graph ____________________

Vertical Stretch/Compression:

$C \cdot f(x)$, where C is a real number > 0

If $C > 1$, then $f(x)$ has a vertical _________ by a factor of C units.

If $0 < C < 1$, then $f(x)$ has a vertical __________ by a factor of C units.

$f(x) = 2|x|$ How does this compare to the parent?__________________

$f(x) = 0.5|x|$ How does this compare to the parent?__________________

Quick Recap:

Homework 1.5: Absolute Value Equations

Name: ____________________

Math 3

Solve each equation. Check your answers.

1. $|-3x| = 18$

2. $|5y| = 35$

3. $|t + 5| = 8$

4. $3|z + 7| = 12$

$|2x - 1| = 5$

6. $|4 - 2y| + 5 = 9$

Solve each equation. Check for extraneous solutions.

7. $|4w + 3| - 2 = 5$

8. $2|z + 1| - 3 = z - 2$

9. $3|2x+5|=9x-6$

10. $2|4w-5|=12w-18$

11. $|5p+3|-4=2p$

12. $|4-3m|=m+10$

13. $\frac{3}{4}|8t-12|=6(t-1)$

14. $|7y-3|+1=0$

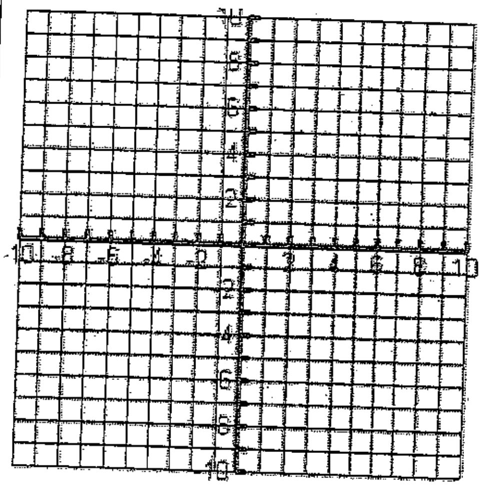
Name ____________________ Class __________ Date __________

1-4 Homework

Absolute Value Functions

Graph the following absolute value functions. Identify the vertex as well as the domain and range of each function.

$y = |x - 3| + 2$

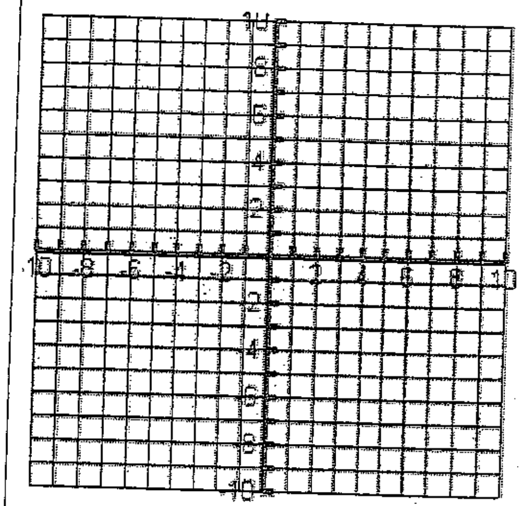


Vertex: ____________

Domain: ____________

Range: ____________

$y = |x + 5| - 4$

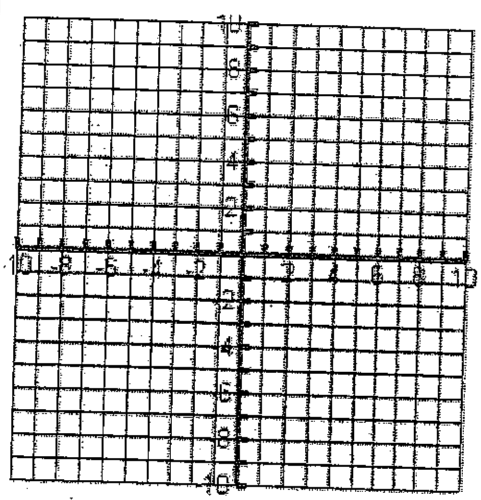


Vertex: ____________

Domain: ____________

Range: ____________

$y = -|x + 2| + 3$

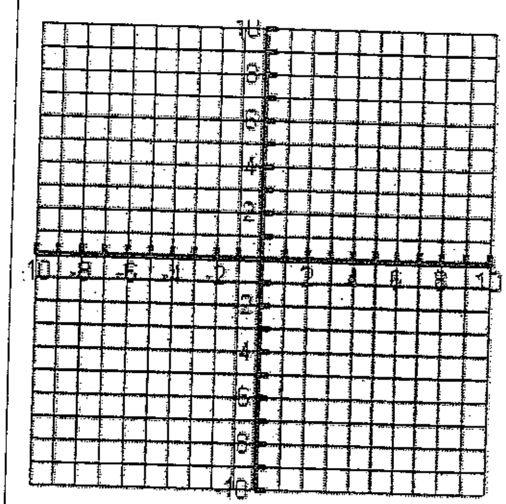


Vertex: ____________

Domain: ____________

Range: ____________

$y = 3|3x + 6| - 3$



Vertex: ____________

Domain: ____________

Range: ____________

1.6: Absolute Value Inequalities Name: ____________

Math 3

Solve and then graph the following inequalities:

1. $|2x-5|+2 \le 13$

2. $|6-3x| < 15$

3. $|5-x|+4 \le 9$

4. $|11-2x|-6 > 11$

5. $|7-x|+2 \ge 12$

6. $9-|x+4| < 5$

7. Which of the following is the inequality of the graph below?

a. $|3-2x| \ge 3$

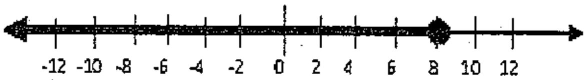
b. $|3-2x| > 3$

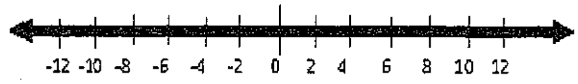
c. $|3-2x| \le 3$

d. $|3-2x| < 3$

~~8. Which of the following is the solution of~~ $\left|\frac{3}{4}x-3\right|-8\geq-5$?

a.


b.


c.


d.


1. The weight of a 40 lb bag of fertilizer varies as much as 4 oz from the stated weight. Write an absolute value inequality and a compound inequality for the weight, *w*, of a bag of fertilizer.

2. Write an absolute value inequality and a compound inequality for the temperature, *t*, that was recorded to be as low as 65°F and as high as 87°F on a certain day.

3. The duration of a telephone call to a software company's help desk is at least 2.5 minutes and at most 25 minutes. Write an absolute value inequality and a compound inequality for the duration, *d*, of a telephone call.

4. The circumference, *c*, of basketball for woman must be between 28.5 and 29 inches. Write an absolute value inequality and a compound inequality for the circumference.

Unit 1: Functions and Their Inverses
Day 5: Systems and Inequalities of Absolute Value Functions Student Notes

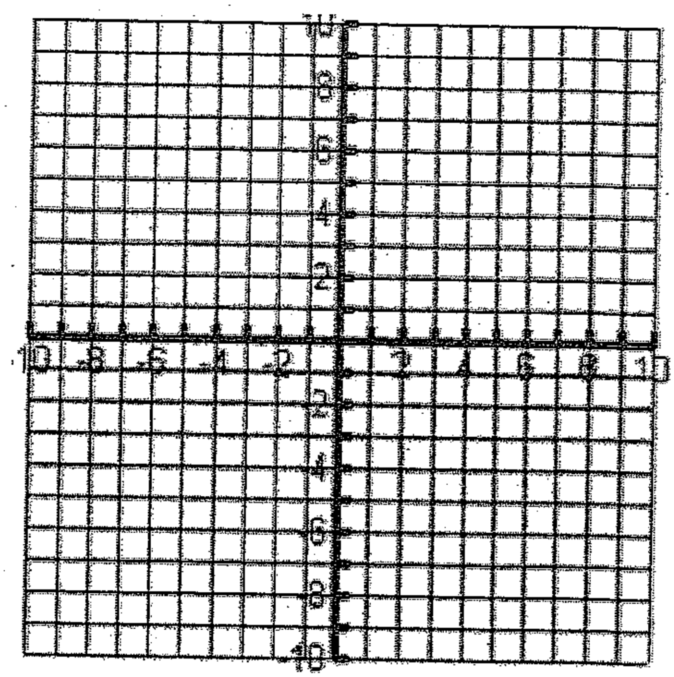
Recall Solving Absolute Value Equations and Inequalities Algebraically

$\|2x-4\|+7=17$	$\|x-3\|-7\leq 10$
$\|2x-8\|+6>0$	$\|x-3\|-7\leq -8$

Graphing Absolute Value Inequalities
Example 1

Similarly to Linear and Quadratic Equations, you will graph the function using dashed and solid lines. Afterwards, choose a test point to see where the shading needs to take place.

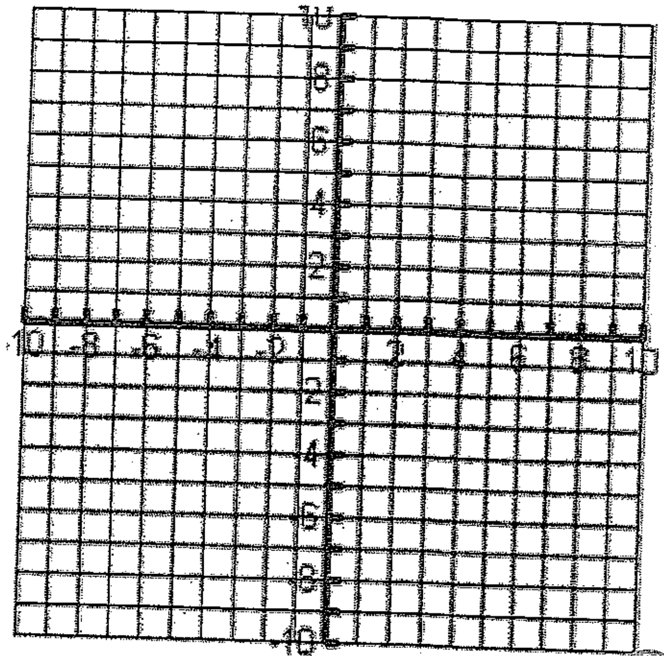
$y\leq\|x-2\|+5$



Example 2

Graph the following Absolute Value Inequality.

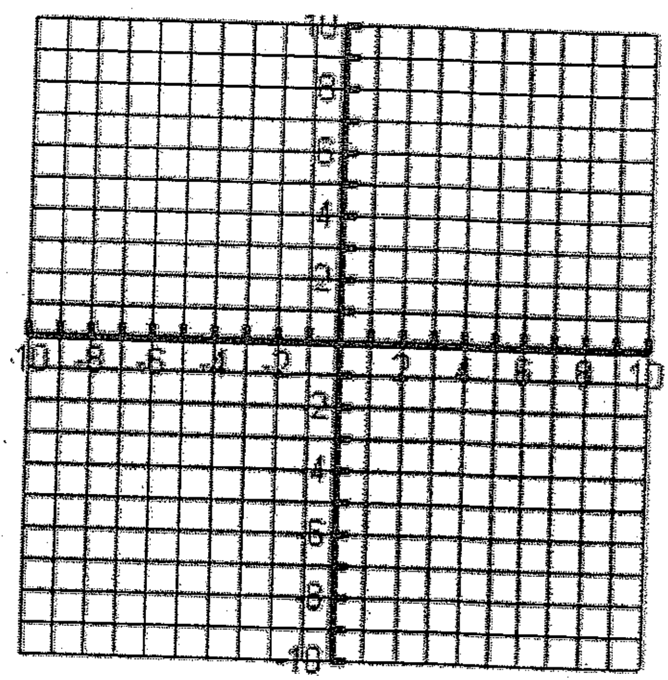
$y > |x - 6| + 4$



Example 3

Graph the following Absolute Value Inequality.

$y < -|x + 2| + 7$



Name________________

Absolute Value Inequalities

Date________________ Period____

Solve each inequality and graph its solution.

1) $|6n| \le 18$

−6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6

2) $|p+4| \le 8$

−12 −10 −8 −6 −4 −2 0 2 4 6

3) $|m-2| < 8$

−8 −6 −4 −2 0 2 4 6 8 10 12

4) $|5x| \le 10$

−7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5

5) $|x| + 5 \ge 11$

−8 −6 −4 −2 0 2 4 6 8 10

6) $|m| - 2 > 0$

−7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7

7) $|r| - 3 > 2$

−8 −6 −4 −2 0 2 4 6 8 10

8) $|n| + 2 \ge 5$

−6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8

9) $|x-2| - 5 < -2$

−4 −3 −2 −1 0 1 2 3 4 5 6 7 8

10) $|x-4| - 3 < 5$

−4 −2 0 2 4 6 8 10 12 14

11) $1 + |1+b| < 4$

−7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5

12) $|v+5| - 6 < -5$

−10 −8 −6 −4 −2 0

13) $|10p-4| < 34$

−7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5

14) $|6+9x| \le 24$

−4 −3 −2 −1 0 1 2 3 4 5 6 7 8

33

15) $|-8a-3|>11$

−5 −4 −3 −2 −1 0 1 2 3 4 5 6 7

16) $|1-4k| \geq -11$

−5 −4 −3 −2 −1 0 1 2 3 4 5 6 7

17) $9|m-8|-10<26$

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

18) $9|x+8|+10<55$

−16 −14 −12 −10 −8 −6 −4 −2

19) $9|r-2|-10<-73$

−6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8

20) $7\left|\frac{n}{3}\right|-9<12$

−10 −8 −6 −4 −2 0 2 4 6 8 10

21) $2|10b+7|-1>73$

−7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6

22) $7+|6v+7| \leq 60$

−12 −8 −4 0 4 8

23) $4|6-2a|+8 \leq 24$

−2 −1 0 1 2 3 4 5 6 7 8 9 10

24) $9|3n-2|+6>51$

−6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6

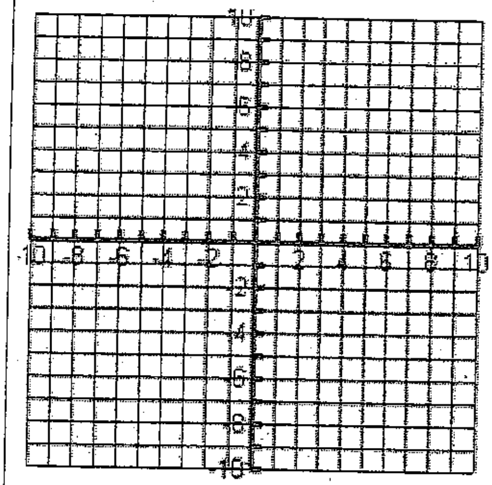
25) $3+4|3x+7| \geq -89$

−6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6

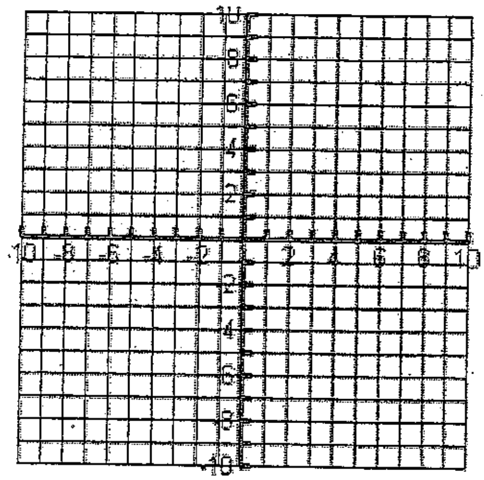
26) $9|1+8n|-3 \geq 78$

−5 −4 −3 −2 −1 0 1 2 3 4 5 6 7

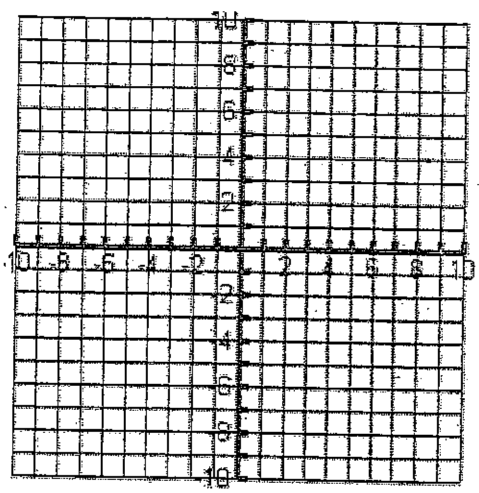
$f(x) \le |x-2| + 6$



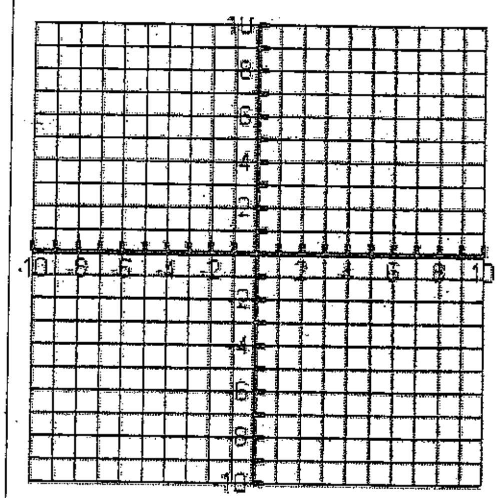
$-y > |x+5|$



$f(x) > |x+4| - 6$



$f(x) < |2x-2| + 2$



Given the following absolute value inequality, identify a solution that is in the region of possible solutions.

$-y - 7 \le |x-4| - 5$

$$f(x) = \begin{cases} 2x - 1 & if\ x \le 1 \\ 3x + 1 & if\ x > 1 \end{cases}$$

- One equation gives the value of f(x) when ___________
- And the other when ___________

Evaluate f(x) when x=0, x=2, x=4

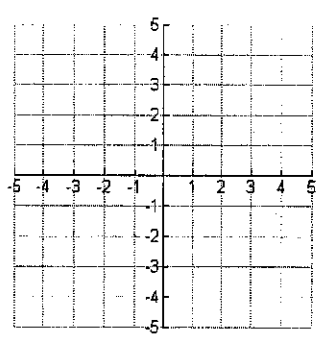
$$f(x) = \begin{cases} x+2, if\ x<2 \\ 2x+1, if\ x \ge 2 \end{cases}$$

- First you have to figure out which equation to use
- You NEVER use both

X=0 X=2 X=4

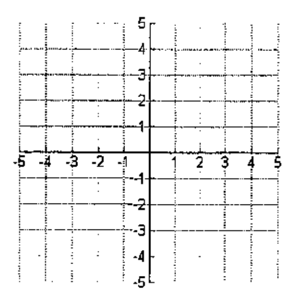
Graph:

$$f(x) = \begin{cases} \frac{1}{2}x+\frac{3}{2}, if\ x<1 \\ -x+3, if\ x \ge 1 \end{cases}$$

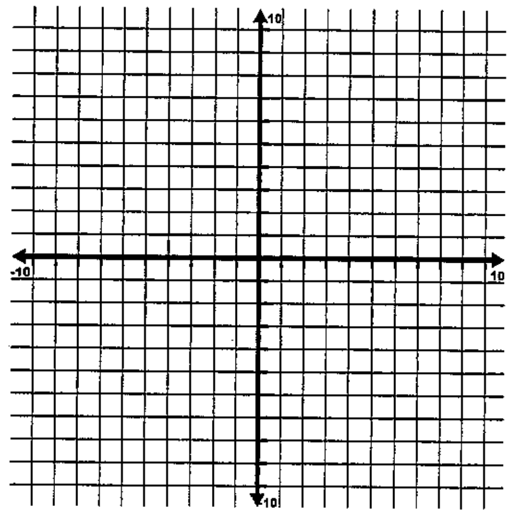


Graph:

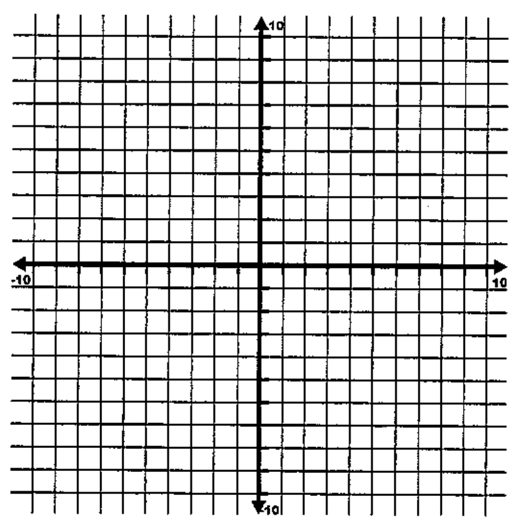
$$f(x) = \begin{cases} x-1, if\ x>2 \\ -x+1, if\ x \le 2 \end{cases}$$



Graph $f(x) = \begin{cases} |x+3| & if\ x \le -1 \\ x^2 + 1 & if\ x > -1 \end{cases}$



Graph f(x)= $\begin{cases} 2x + 1 \text{ if } x < 3 \\ -x^2 - 4 \text{ if } x \geq 3 \end{cases}$



Worksheet Piecewise Functions Name:________________________

Part I. Carefully graph each of the following. Identify whether or not he graph is a function. Then, evaluate the graph at any specified domain value. You may use your calculators to help you graph, but you must sketch it carefully on the grid!

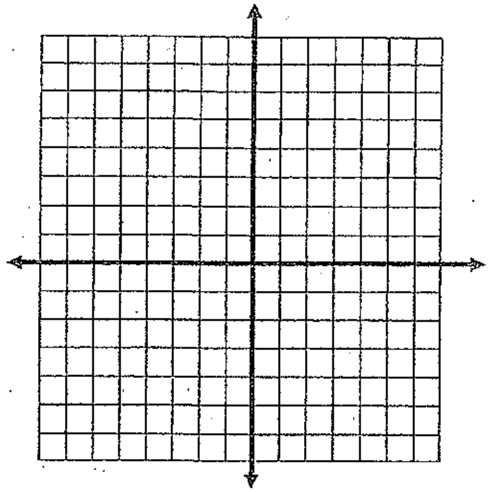
1. $f(x) = \begin{cases} x+5 & x < -2 \\ x^2+2x+3 & x \geq -2 \end{cases}$

Function? Yes or No

$f(3) =$

$f(-4) =$

$f(-2) =$



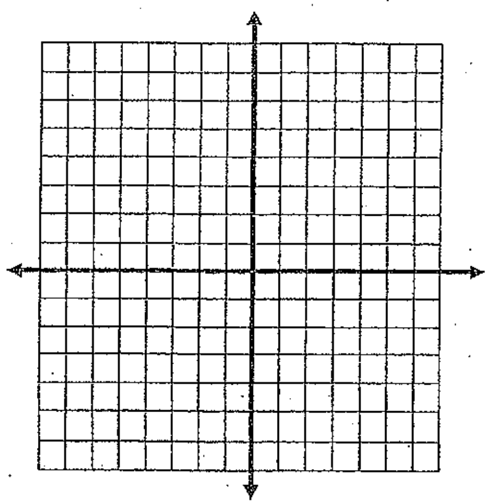
2. $f(x) = \begin{cases} 2x+1 & x \geq 1 \\ x^2+3 & x < 1 \end{cases}$

Function? Yes or No

$f(-2) =$

$f(6) =$

$f(1) =$



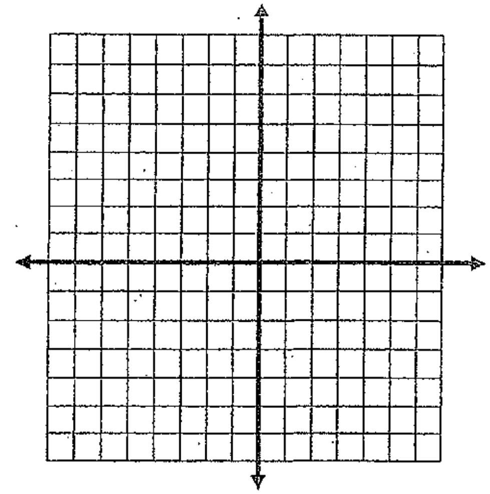
3. $f(x) = \begin{cases} -2x+1 & x \leq 2 \\ 5x-4 & x > 2 \end{cases}$

Function? Yes or No

$f(-4) =$

$f(8) =$

$f(2) =$



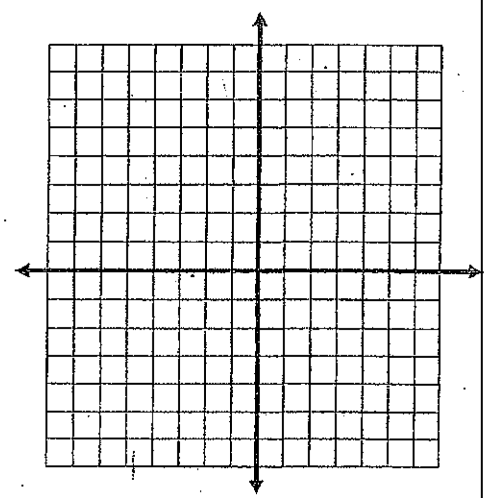
4. $f(x) = \begin{cases} x^2-1 & x \leq 0 \\ 2x-1 & 0 < x \leq 5 \\ 3 & x > 5 \end{cases}$

Function? Yes or No

$f(-2) =$

$f(0) =$

$f(5) =$



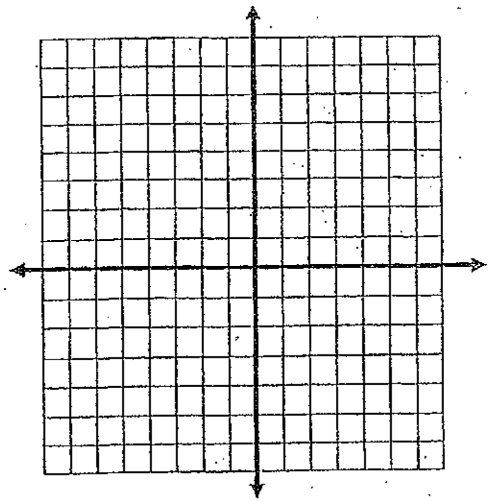
5. $f(x)=\begin{cases}x^2 & x\le 0\\ -x^2+4 & x>0\end{cases}$

Function? Yes or No

$f(-4)=$

$f(0)=$

$f(3)=$



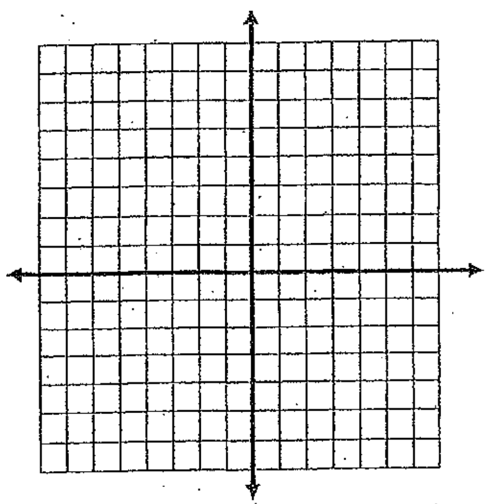
6. $f(x)=\begin{cases}5 & x\le -3\\ -2x-3 & x>-3\end{cases}$

Function? Yes or No

$f(-4)=$

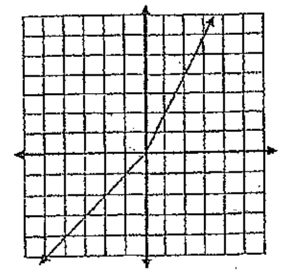
$f(0)=$

$f(3)=$



Part II. Write equations for the piecewise functions whose graphs are shown below. Assume that the units are 1 for every tic marc.

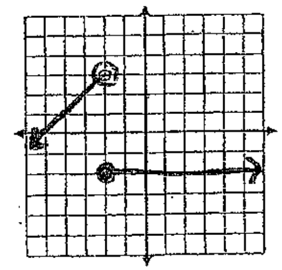
7.



f(−4)=

f(2)=

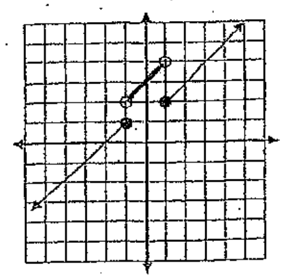
8.



f(−2)=

f(3)=

9.



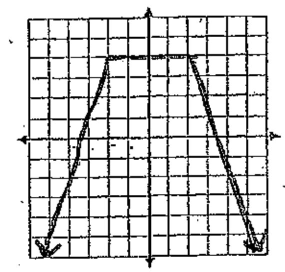
f(1)=

f(−1)=

f(0)=

f(x)=4 x=

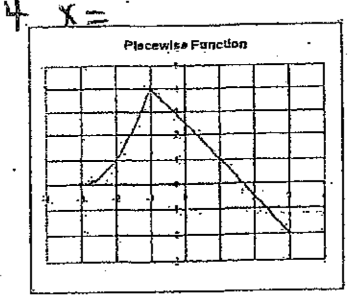
10.



f(−4)=

f(1)=

11.



f(x)=4 x=

f(3)=

Name________________

Period____________

Worksheet - Piecewise Functions

Evaluate the following for $f(x)=\begin{cases}3x-5, & x>4\\ x^2, & x\le 4\end{cases}$:

1. f(7)

2. f(4)

3. f(-3)

Evaluate the following for $f(x)=\begin{cases}-2|x+1|, & x\le 1\\ 3, & 1<x<3\\ 6-2x, & x\ge 3\end{cases}$:

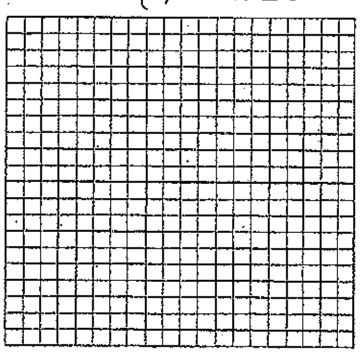
4. f(10)

5. f(2)

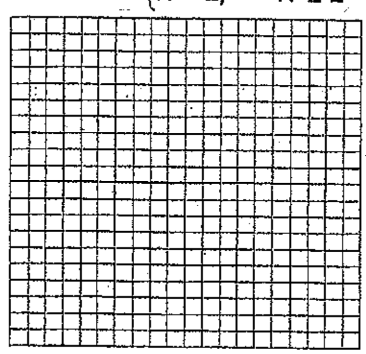
6. f(0)

Graph the following piecewise functions.

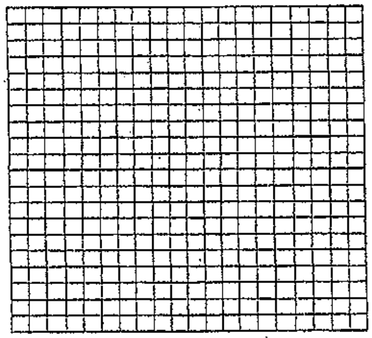
7. $f(x)=\begin{cases}-2, & x<0\\ 3, & x\ge 0\end{cases}$



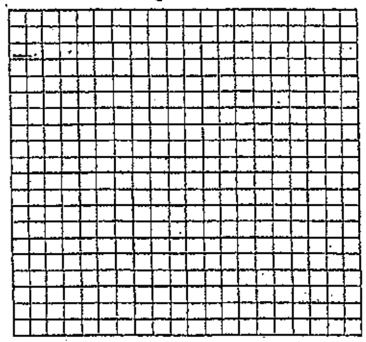
8. $g(x)=\begin{cases}-x+2, & x<2\\ x-2, & x\ge 2\end{cases}$



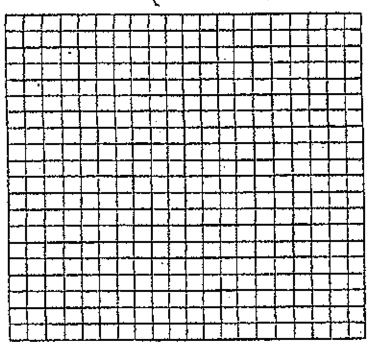
9. $h(x) = \begin{cases} -3x + 2, & x \le 2 \\ \frac{1}{2}x - 4, & x > 2 \end{cases}$



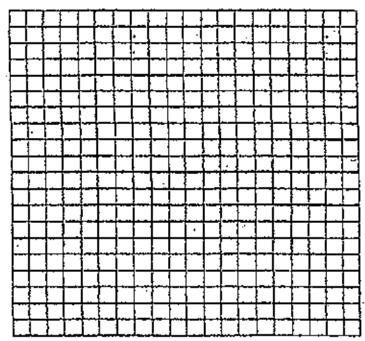
10. $f(x) = \begin{cases} 4, & x \le -2 \\ x^2, & -2 < x < 2 \\ 4, & x \ge 2 \end{cases}$



11. $g(x) = \begin{cases} 3x + 12, & x \le -3 \\ |x|, & -3 < x < 3 \\ -3x + 12, & x \ge 3 \end{cases}$



12. $h(x) = \begin{cases} x^2 - 4, & x < 3 \\ \frac{2}{3}x - 5, & x \ge 3 \end{cases}$



13. Which of the piecewise functions are continuous?

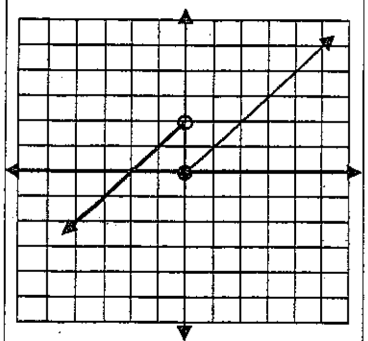
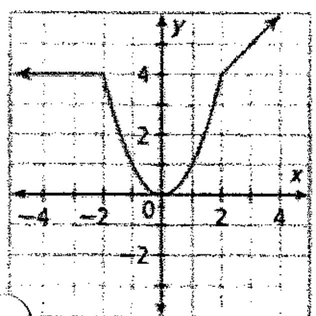
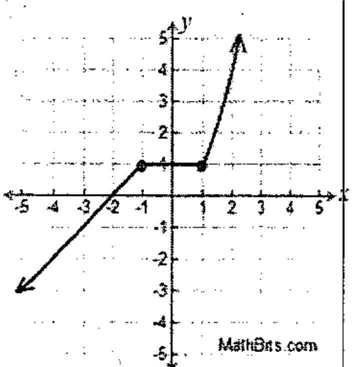
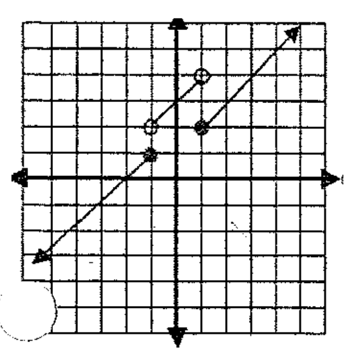
14. Which of the piecewise functions are discontinuous?

2.4 Applications of Piecewise Functions

EQ: How can we write and graph piecewise functions given a real-life situation?

Writing a Piecewise Function

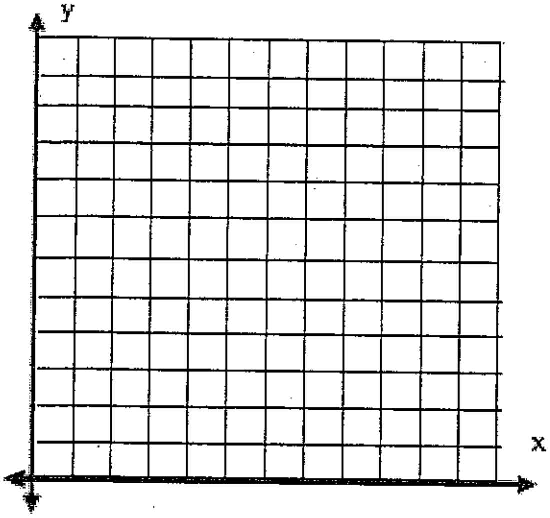
Write equations for the piecewise functions whose graph is shown.

Graph	Equation of Pieces	Domain for Pieces	Piecewise Function
			$f(x) = \begin{cases} \\ \end{cases}$
			$f(x) = \begin{cases} \\ \end{cases}$
			$f(x) = \begin{cases} \\ \end{cases}$
			$f(x) = \begin{cases} \\ \end{cases}$

Using a Piecewise Function

You have a summer job that pays time and a half for overtime. That is, if you work more than 40 hours per week, your hourly wage for the extra hours is 1.5 times your normal hourly wage of $7.

Write and graph a piecewise function that gives your weekly pay, P, in terms of the number, h hours you work.

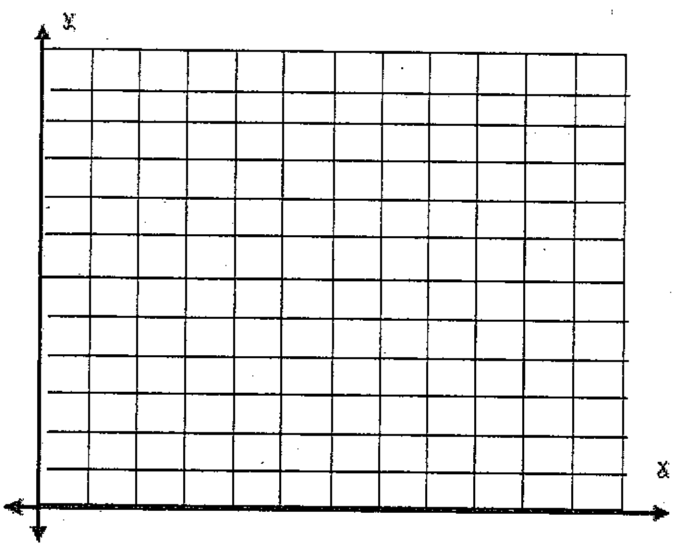


a. What is the domain?

b. What is the reasonable domain?

c. How much will you get paid if you work 45 hours?

Your favorite dog groomer charges according to your dog's weight. If your dog is 15 pounds and under, th groomer charges $35. If your dog is between 15 and 40 pounds, she charges $40. If your dog is over 40 pounds, s charges $40, plus an additional $2 for each pound.



a. What is the domain?

b. What is the ***reasonable domain***?

c. What would you be charged if your dog weighed 60 lbs?

Name________________________________ Period_______ Date_________

Piecewise Function Applications 1

1. Todd travels at a rate of 40 mph for 6 minutes. Then he stopped at a stoplight for 3 minutes. For 9 minutes he traveled 20 mph through a residential area. He sat at the school to pick up his sister for 4 minutes the car. Then he traveled home for 45 mph.

   a. Graph Todd's distance from home.
   b. Write a function d(t) that represents the graph.
   c. How far is Todd from home after 10.5 minutes? 7 minutes?
   d. How long was Todd's entire trip?

2. Mr. Smith left home and traveled at an average speed of 30 mph for 10 minutes. Then he stopped at the grocery store for 5 minutes. He then travels 4 minutes farther at a rate of 15 mph to the post office. Mr. Borchert then returns home at a constant speed of 45 mph.

   a. Graph Mr. Smith's distance from home.
   b. Write a function d(t) that represents the graph.
   c. How far is Mr. Smith from home after 6 minutes? 16 minutes?
   d. How long was Mr. Smith's entire trip?

3. A skydiver jumps from an altitude of 3500 feet. He falls at a rate of 50 feet per second. After 2000 feet, the skydiver opens his parachute and the new rate of fall is 20 feet per second.

   a. Write a skydiver's altitude (A) as a function of time (t).
   b. Graph the function.
   c. What is the skydiver's altitude after 20 seconds?
   d. What is the skydiver's altitude after 75 seconds?
   e. How long will it take the skydiver to reach the ground?

4. A scuba diver begins at sea level. She falls to the ocean floor at a rate of 15 feet per second. After 540 feet she slows to 5 feet per second.

   a. Write a scuba diver's depth (d) as a function of time (t).
   b. Graph the function.
   c. What is the scuba diver's depth after 25 seconds?
   d. What is the scuba diver's depth after 65 seconds?
   e. If the area of water in which the diver is diving is 1500 feet deep, how long will it take him to reach the bottom?

5. A trucking company transports goods between Chicago and New York, a distance of 960 miles. The company's policy is to charge, for each pound, $.50 per mile for the first 100 miles, $.40 per mile for the next 300 miles, $.25 per mile for the next 400 miles and no charge for the remaining 160 miles.

   a. Graph the relationship between the cost of transportation in dollars and mileage over the entire 960-mile route.
   b. Write a function that can be used to find the cost of transporting goods at any point in the trip.

6. The Ironman Triathlon is a race that consists of three parts: a 2.4 mile swim followed by a 112 mile bike race and then a 26.2 mile marathon. A participant swims steadily at 2mph, cycles steadily at 20 mph, and then runs steadily at 9 mph. Assuming that no time is lost during the transition from one stage to the next, find a formula for the distance *d*, covered in miles, as a function of the elapsed time *t* in hours, from the beginning of the race. Graph the function.

7. A floor-refinishing company charges $1.83 per square foot to strip and refinish a tile floor for up to 1000 square feet. There is an additional charge of $350 for toxic waste disposal for any job that includes more than 150 square feet of tile.

   a. Express the cost, *C,* of refinishing a floor as a function of the number of square feet, *x*, to be refinished.
   b. Graph the function.

8. The tax table below list income tax brackets.

Income	Tax Brackets
Up to $10,000	5%
Greater than $10,000 but less than $20,000	7%
More than $20,000	8.5%

   a. What type of function is described by the tax rates?
   b. Write the function if x is income and t(x) is the tax rate.
   c. Graph the tax brackets for the different taxable incomes
   d. David Jones lives in the state with this tax brackets. In which tax bracket is Mr. Jones if he makes $38,000 last year?

Homework 2.4: Applications of Piecewise

Name: ______________________

Math 3

1. Use the piecewise function to evaluate the following:

$$f(x) = \begin{cases} \frac{3}{x-2}, & x < -3 \\ 2x^2 - 3x, & -3 < x \leq 6 \\ 8, & x > 6 \end{cases}$$

   a. f(-1) =

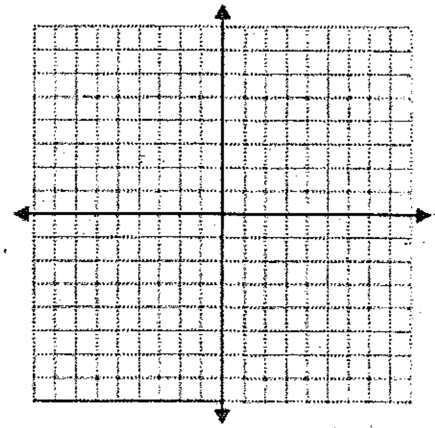
   b. f(-4) =

   c. f(9) =

   d. f(6) =

2. Graph the following piecewise function.

$$f(x) = \begin{cases} -\frac{1}{3}x - 2, & x \leq 0 \\ \frac{1}{2}x + 1, & x > 0 \end{cases}$$



3. Use the piecewise function to fill in the table.

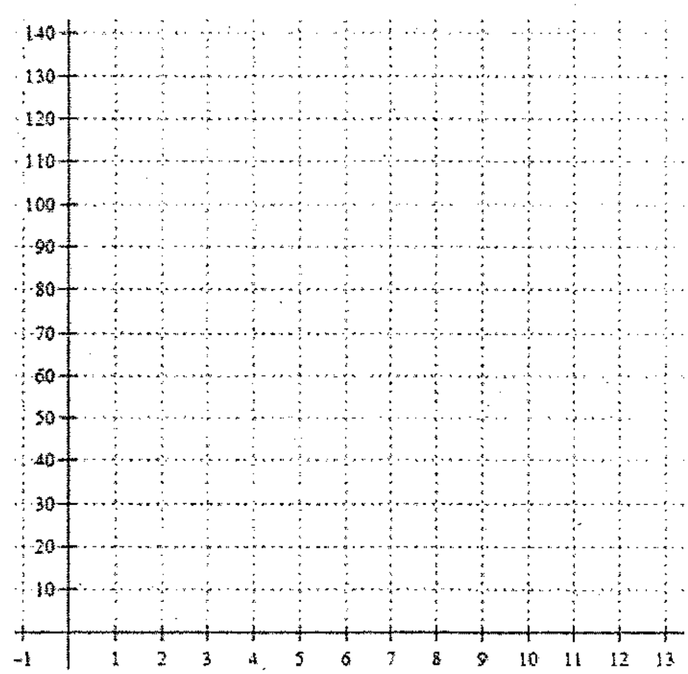
$$f(x) = \begin{cases} -x + 4, & x \leq 0 \\ -3x + 18, & x > 0 \end{cases}$$

x	f(x)
-2	
0	
1	
	-12
	9

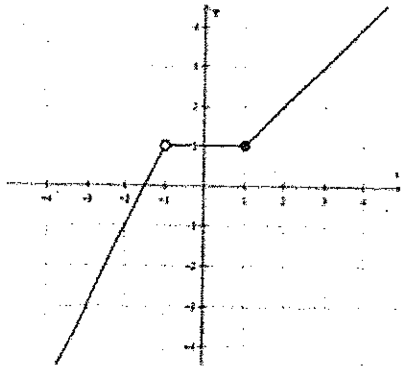
4. Sully's blood pressure changes throughout the school day. Sketch a graph of his blood pressure over time. **LABEL THE GRAPH!** Let x stand for the time since 8:00 am, so 10:00 am would be x = 2, 12:00 pm would be x = 4, etc...

<u>Sully's Day</u>

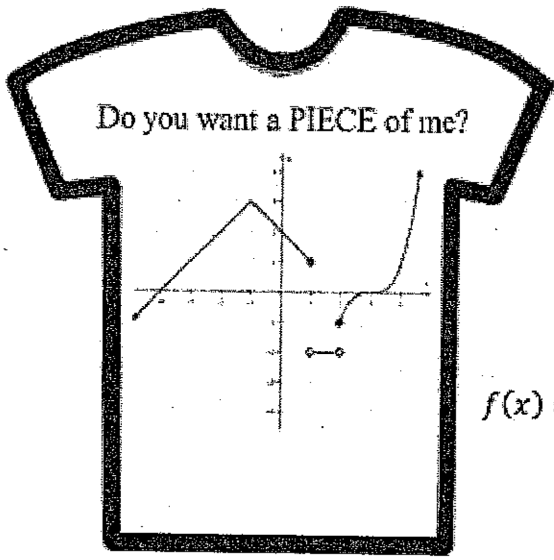
- Sully's blood pressure starts at 90 and rises 5 points every hour for the first 4 hours.
- Sully chills out for lunch from 12-1 and maintains a cool 110 blood pressure.
- Last period of the day is from 1-3 pm and Sully's blood pressure rises from 110 at 10 points per hour.
- School ends and Sully's blood pressure starts dropping 2 points per hour until his 8 o'clock bedtime.



5. Use the picture of the piecewise function to answer the following:

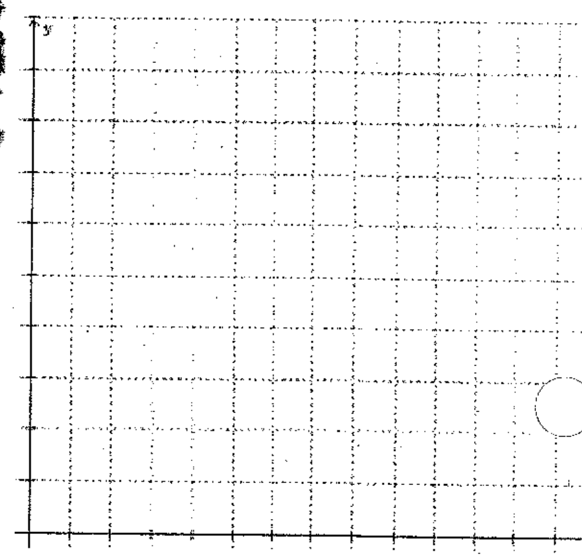
Graph	Equation of Pieces	Domain for Pieces	Piecewise Function
			$f(x) =$

6. Ms. Russell wants to make t-shirts for his Math 3 students (shown below). Custom Ink will make the shirts and sell them for the following prices. Write a piecewise function to represent cost, y, in dollars and t-shirts, x. Graph it! Label the graph!



0-20 shirts = \$25 each
21-30 shirts = \$20 each
31-50 shirts = \$15 each
51+ shirts = \$10 each

$f(x) =$



SAT Practice

7. Minli's house is located 1.4 miles from her school. When she walks home from school, it takes her an average of 24 minutes. Assuming that Minli walks at a constant rate, which of the following functions best models Minli's distance from home, d, in miles if she has walked a total of t minutes on her trip home that day?

- $d = 1.4 - \frac{7}{120}t$
- $d = 1.4 - 24t$
- $d = 1.4 - \frac{120}{7}t$
- $d = 1.4 + \frac{7}{120}t$

$$P = P_o + \rho g h$$

8. The absolute pressure, P, in a fluid density, ρ, at a given depth, h, can be found with the above equation, where P_o is the atmospheric pressure and g is the gravitational acceleration. Which of the following is the correct expression for the depth in terms of the absolute pressure, atmospheric pressure, fluid density, and gravitational acceleration?

- $h = \frac{P - P_o}{\rho g}$
- $h = \frac{P + P_o}{\rho g}$
- $h = \frac{P}{\rho g} - P_o$
- $h = \frac{P}{\rho g} + P_o$

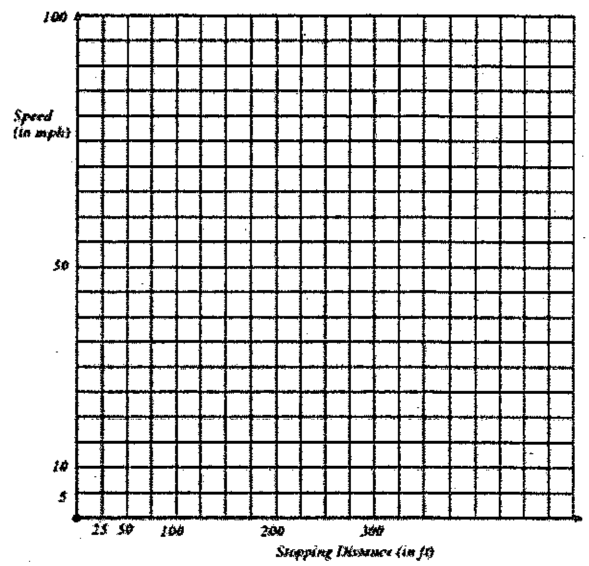
2.6 Inverse Functions and Relations

EQ: How can we find the inverse of functions and determine if a function is one-to-one?

The speed limit for driving in a school zone is 20mph. That seems so slow if you're riding in a car. But have you ever wondered how quickly you could come to a complete stop going that speed (even if you have super quick reflexes)? It would take you over 13 feet! The **speed of a vehicle *s*** and the **stopping distance *d*** are related by the function $s(d) = \sqrt{30d}$.

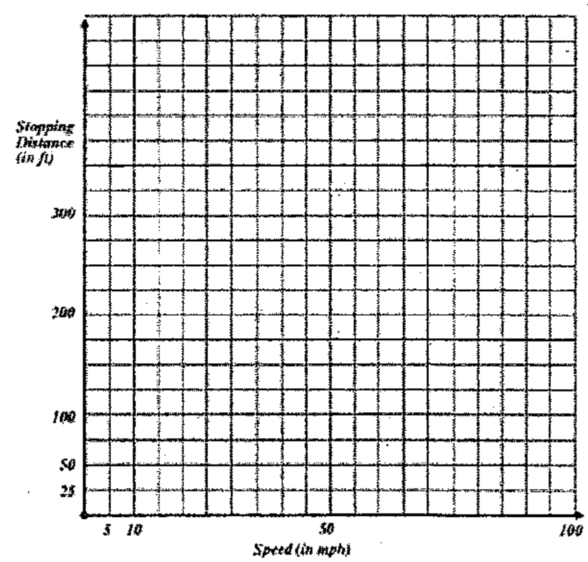
Fill in the table of values for s(d). Round to the nearest whole number. Then, graph s(d) and answer the questions.

d ft	$s(d)$ mph
25	
50	
100	
200	
300	



If you were a police officer investigating an accident, you would be able to measure the length of the skid marks on the road and then approximate the speed of the driver. The driver swears he was sure he was going under 60 mph. The tire marks show a pattern for 150 feet. Is the driver's sense of his speed accurate? Justify your answer.

Use your answers in the problem to make a graph of stopping distance as a function of speed.



How are the two graphs related?

Inverse Relations: ______________________________

Vertical Line Test: ______________________________

Horizontal Line Test: ______________________________

1-to-One: ______________________________

Example 1: Are the following inverses of each other?

a)

x	y
-2	15
-1	-7
0	8
1	2
2	0

x	y
15	-2
-7	-1
8	0
2	1
0	2

b)

Input	Output
-1	5
0	3
1	4
2	7
3	4

Input	Output
3	0
4	7
5	10
4	14
10	25

Example 2: Are the following one-to-one?

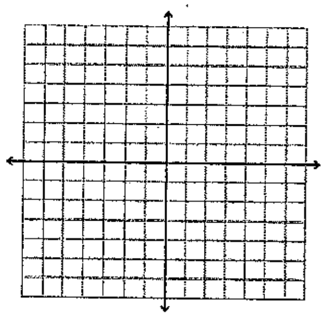
a)

Input	Output
-1	5
0	3
1	4
2	7
3	4

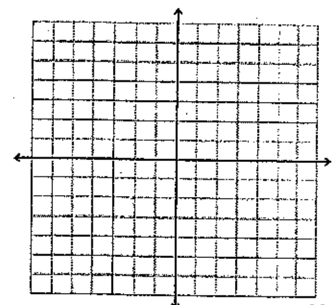
b)

x	y
-3	5
-2	9
-1	2
0	11

Example 2: Graph $y = x^2$

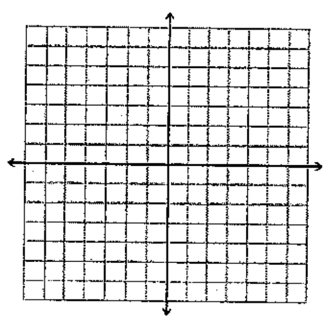


Graph the inverse:

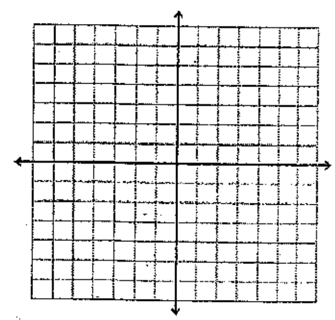


a) Is the inverse a function?
b) Is the function one-to-one?

Example 3: Graph $y = x + 2$



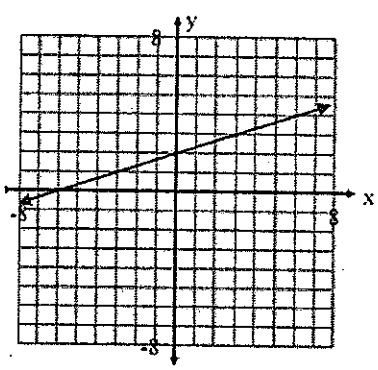
Graph the inverse:



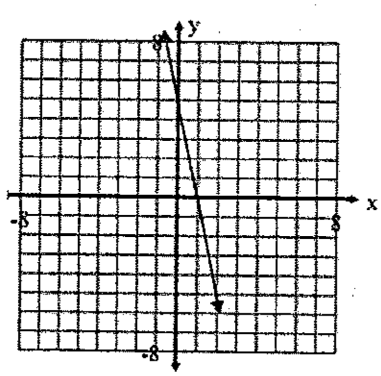
a) Is the inverse a function?
b) Is the function one-to-one?

You Try! Draw the graph of the inverse function for each of the functions shown below on the same coordinate plane.

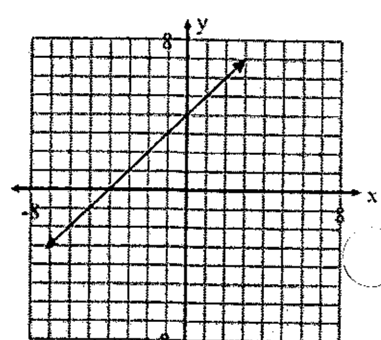
a)



b)



c)



2.7 Inverse Relations (Equations)

EQ: How can we find the inverse of a function given the equation of a function?

To find an inverse:

1. Swap x and y
2. Solve for y
3. Rewrite by writing $f^{-1}(x) =$

Example 1: Find the inverse of the function $f(x) = x^2 - 9$

Example 2: Find the inverse of the function $f(x) = \frac{x+3}{6}$

You Try! Find the inverse of the function $f(x) = 3x^2 + 5$

Challenge! Find the inverse of $f(x) = \frac{x-6}{x}$

III. Inverse Relations & Functions

A. Given Ordered Pairs

To find the inverse: Switch the x and y coordinates within each ordered pair. **Don't change signs.**

Examples: Find the inverse and then determine if each is function.

$\{(4, 7)\ (3, -1)\ (4, -5)\}$ __________ Inverse: ________________________ __________

B. Given an Equation

1st Switch the x & y variables in the equation.
2nd Solve the equation for y
3rd Replace y with $f^{-1}(x)$ $f^{-1}(x)$ is the inverse function notation.

Examples:

1. $y = -2x + 10$ $f^{-1}(x) =$ ____________________________

B. Given an Equation

1st Switch the x & y variables in the equation.
2nd Solve the equation for y
3rd Replace y with $f^{-1}(x)$ $f^{-1}(x)$ is the inverse function notation.

2. $f(x) = \dfrac{3x + 1}{4}$ $f^{-1}(x) =$ ____________________________

3. $y = 5$ $f^{-1}(x) =$ ____________________________

4. $y = 3 - 2x^2$ $f^{-1}(x) =$ ____________________________

Homework 2.6: Inverse Relations (Graphs & Tables)

Name: ____________________

Math 3

Find a table of values for each function and its inverse.

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

Function	
x	f(x)

Inverse	
x	$f^{-1}(x)$

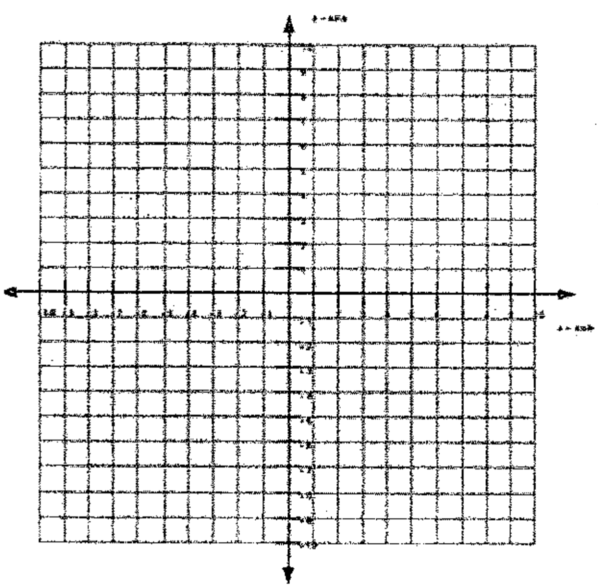
b. $f(x) = (2 - x)^2$

Function	
x	f(x)

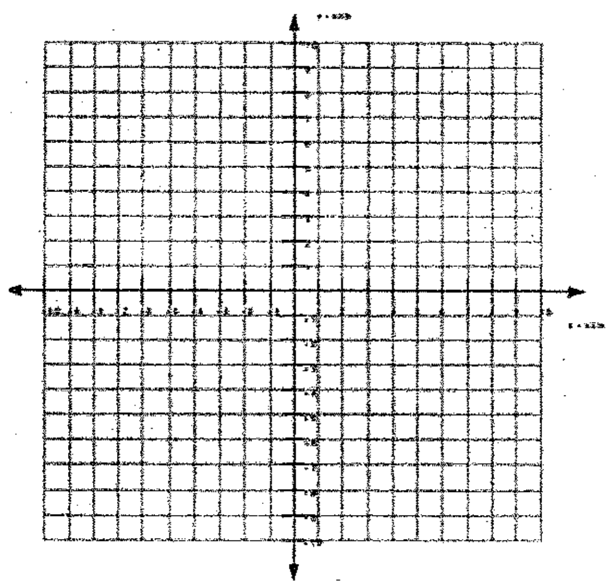
Inverse	
x	$f^{-1}(x)$

2. Graph each function, its inverse, and their line of symmetry. Label the function and its inverse on each graph.

a. $f(x) = \frac{1}{2}x + 1$



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



3. Find the domain and range of the each function and the domain and range of its inverse in problems 2 (a-b) above.

a. $f(x) = \frac{1}{2}x + 1$

$f(x)$ Domain: ________ Range: ________

$f^{-1}(x)$ Domain: ________ Range: ________

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

$f(x)$ Domain: ________ Range: ________

$f^{-1}(x)$ Domain: ________ Range: ________

4. For each function in problems 2 and 3 (a-b) above, identify whether its inverse is or is not a function. Explain your answer in complete sentences:

a. Is the inverse of $f(x) = \frac{1}{2}x + 1$ a function? Explain.

b. Is the inverse of $f(x) = (x-2)^2 + 3$ a function? Explain.

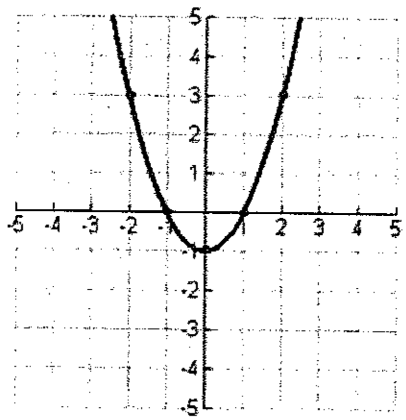
5. Find the inverse for each relation.

a) {(1, -3), (2, 3), (5, 1), (6, 4)}

b) {(-5, 6), (-6, -8), (1, -2), (10, 3)}

Directions: Graph the inverse for each relation below (put your answer on the same graph).

6.



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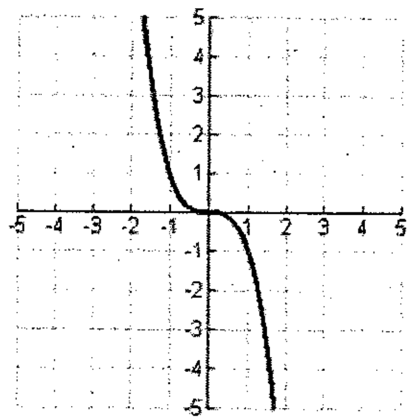

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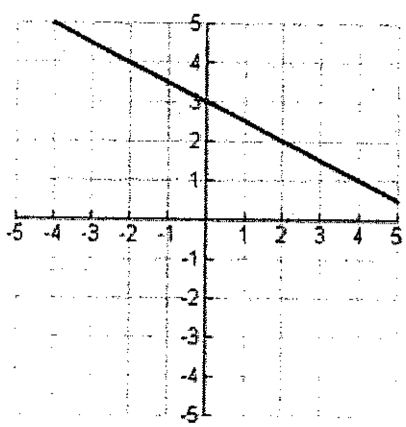

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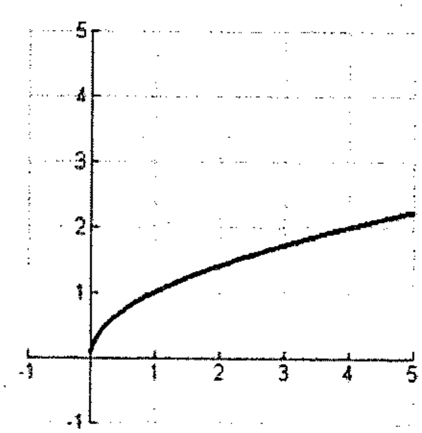

Homework 2.7: Inverse Relations (Equations)

Name: ____________________

Math 3

Directions: Find the inverse function. Be sure to write the inverse as $f^{-1}(x) =$

1. $g(x) = \dfrac{1}{x} - 2$

2. $h(x) = \sqrt[3]{x} - 3$

3. $h(x) = 2x^3 + 3$

4. $g(x) = -4x^2 + 1$

5. $g(x) = \dfrac{7x + 18}{2}$

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

FUNCTION OPERATIONS AND FUNCTION COMPOSITION

Example

Given $f(x) = 2x + 3$ and $g(x) = x^2$

Evaluate the following:

a. f (1) + g (1) = _______ b. (f + g) (1) = _______

c. f (-2) - g (-2) = _______ d. (f - g) (-2) = _______

e. f (5) • g (5) = _______ f. (f • g) (5) = _______

g. f (-4) ÷ g (-4) = _______ h. (f / g) (-4) = _______

AS YOU SEE, we can add, subtract, multiply, and divide functions!!

THE RESULT IS A NEW FUNCTION!

RECALL $f(x) = 2x + 3$ and $g(x) = x^2$

Addition	(f + g) (x) = f(x) + g(x)	EXAMPLE f (3) + g (3) =(f + g) (3)	Add f(x) + g(x) = (f + g) (x) =
Subtraction	(f - g) (x) = f(x) - g(x)	EXAMPLE f (3) - g (3) =(f - g) (3)	Subtract f(x) - g(x) = (f - g) (x) =
Multiplication	f (x) • g (x) =(f • g)(x)	EXAMPLE f (3) • g (3) = (f • g) (3)	Multiply f (x) • g (x)= (f • g)(x)=
Division	f (x) ÷ g (x)= (f / g)(x)= $\frac{f(x)}{g(x)}$ =	f (3) ÷ g (3) = (f / g)(3)= $\frac{f(3)}{g(3)}$	Divide f (x) / g (x)= $\frac{f(x)}{g(x)}$ = (f / g)(x)=

GUIDED PRACTICE

Using g(x) = 4x + 3 and h (x) = x – 2, f(x) = $\frac{x}{5}$, give the domain of each function

a) g(x) = 4x + 3 Domain: ____________

b) h(x) = x – 2 Domain: ____________

c) f(x) = $\frac{x}{5}$, Domain: ____________

Evaluate the following:

1. f(5) – h(-4) = _______
2. g(4) * f(5) = _______
3. h(x) - f(x) = _______
4. f(5) ÷ h(-4) = _______
5. f(-10) ÷ h(2) = _______
6. 2 f(x) – 3 g (x) = _______
7. g(x) * g (x+2) = _______
8. (h + g) (- 1) = _______
9. g(-3) + 5 f(-5) * h(4x) = _______
10. g(x) – h(x) = _______
11. -2 g(x+1) + h(x-2) = _______

FYI: THE **DOMAIN** OF a NEW FUNCTION FORMED BY THE SUM, DIFFERENCE, PRODUCT, OR QUOTIENT OF TWO OR MORE FUNCTIONS IS THE INTERSECTION OF EACH OF THE DOMAINS OF THE FUNCTIONS THAT ARE BEING ADDED, SUBTRACTED, MULTIPLIED, OR DIVIDED.

ie. We end up with the **restrictions of the individual** functions .

NOTE: in division $\frac{f(x)}{g(x)}$, **g(x) ≠0**

Which example from above illustrates the importance of the restriction g(x) ≠0.

5. G(F(x+2))

6. G ∘ F (2x))

II. Evaluate.

a. (f ∘ g) (x) and b. (g ∘ f) (x) when $f(x) = |x - 1|$ and $g(x) = \sqrt{x}$

7. x= 4 a) b)

8. x = 1 a) b)

III. Evaluate

a. f (g (x)) and b. g (f(x)) when f(x) = x+3 and g(x) = - 2x+ 4

9. a) b)

IV. F or f(x) = x+3 and g(x) = - 2x+ 4, find

a. f (g (x))

b. g (f(x))

c. g (g (x))

Name ______________________ Class __________ Date __________

1-8 Homework

Inverses in Context & Function Operations

#1 To make a long-distance call, your phone company charges $1.50 to make the connection, and an additional $0.10 for every minute that you are on the line once connected.

a. Write an equation for the price of a long-distance call, p, in terms of the length of the call in minutes, m:

b. When you get the phone bill, you see that your sister made a long-distance call that cost $2.75. How long was she on the phone?

c. Think about how you solved part (b). Write an equation to determine m in terms of p. (That is, how do you calculate the length of a call based on its price?)

Operations on Functions

#2 $f(x)=x^2-6x+2$ Find f(-2a)	#3 $f(x)=-2x^2+4x+10$ $g(x)=3x^2+11x-7$ Find f(x)-g(x)
#4 $f(x)=-2x^2+4x+10$ $g(x)=3x^2+11x-7$ Find f(x)+g(x)	#5 $f(x)=-2x^2+4x+10$ $g(x)=3x^2+11x-7$ Find f(x) • g(x)
#6 $h(x)=6x-7$ Find h(a+b)	#7 $f(x)=x^2-6x+2$ $g(x)=9x-1$ Find 2f(x) - 3g(x)

COMPOSITION OF FUNCTIONS

Definition of Composition of Functions: The composition of function *f* with function *g* is written $(f \circ g)(x) = f(g(x))$

The composition of function *g* with function *f* is written $(g \circ f)(x) = g(f(x))$.

START ON THE INSIDE FUNCTION AND WORK YOUR WAY OUT!!!

Using OUR GOOD FRIENDS $g(x) = 4x + 3$ and $h(x) = x - 2$,

EVALUATE:

a. $g(h(-4))$

b. $h(g(-4)$

c. $h(g(x))$

d. $g(h(x))$

I. GIVEN $F(x) = x+3$ and $G(x) = x^2 - 1$, evaluate the following:

1. $(F \circ G)(2)$

2. $F(G(0))$

3. $F(G(y+3))$

4. $G(F(x))$

#8

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

$g(x) = 9x - 1$

Find $(f+g)(x)$

#9

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

Find $5[f(x+2)]$

#10 Let $f(x) = x - 5$ and $g(x) = x^2$

Find $(g \circ f)(-3x)$

#11 Let $f(x) = x - 5$ and $g(x) = x^2$

Find $(f \circ g)(-3x)$

#11 Let $f(x) = x^2 + 4$ and $g(x) = 2x$

Find $(g \circ f)(-2)$

#12 Let $f(x) = x^2 + 4$ and $g(x) = 2x$

Find $(f \circ g)(-2)$

#13 Let $f(x) = x + 8$ and $g(x) = 2x$

Find $(f \circ g)(4c)$

#14 Let $f(x) = x + 8$ and $g(x) = 2x$

Find $(g \circ j)(4c)$

#15 Let $f(x) = x - 5$ and $g(x) = x^2$

Find $(f \circ g)(3n)$

#16 Let $f(x) = x - 5$ and $g(x) = x^2$

Find $(g \circ f)(3n)$

Create Your Own Review Sheet Unit 1: Functions and Their Inverses

Topics and Vocabulary	Examples and Notes
Domain and Range, Linear Functions	
Systems of Equations Elimination & Substitution	
Systems of Equations Graphing & Applications	
Systems of Inequalities	
Absolute Value Equations	

Absolute Value Inequalities	
Graphing & Evaluating Piecewise Functions	
Piecewise Functions Applications	
Inverse Functions	
Function Operations with Compositions	