

## Pre-Calculus (week of April 27)

More Transformations. This unit comes from a different source than what we did during the regular school year. The concepts are the same in all transformations. If you can't print the actual assignments where you can make a readable graph, make sure you use words to describe the transformation (ex: left 3, down 4, or flip over x-axis). Then do the best you can to draw the graphs.

On some of these assignments or past assignments, I will consider a participation grade (100 if done) but you must make an effort to complete the assignment to get that 100. Anything less would get you a lower grade.

Same as last week. Do the best you can. Use the notes. Good luck.

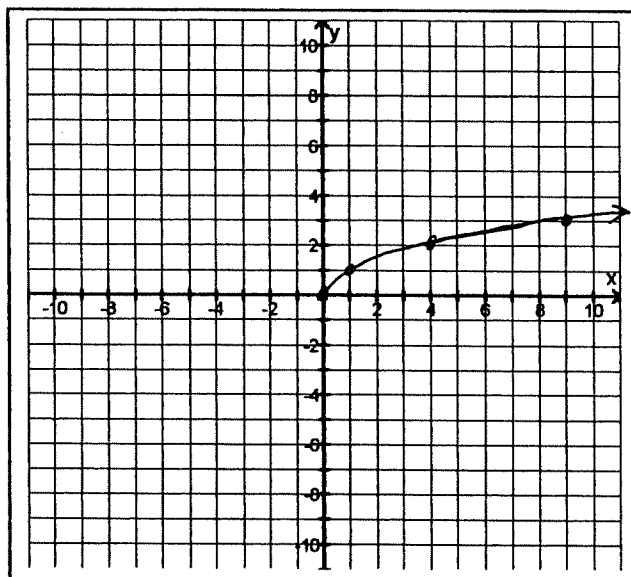
I am going to leave extra hard copies at the office if you want to pick them up and do the assignments. You could then email copies of them to me at: [fwilganowski@bremondisd.net](mailto:fwilganowski@bremondisd.net). It would be easier to do if you can't print the original at home.

# Square Root and Semi-Circle Functions

## The Square Root Parent Function

Graph  $f(x) = \sqrt{x}$

| x | y |
|---|---|
| 0 | 0 |
| 1 | 1 |
| 4 | 2 |
| 9 | 3 |



Domain:  $[0, \infty)$

Range:  $[0, \infty)$

Characteristics: One-to-One  
Increasing:  $[0, \infty)$

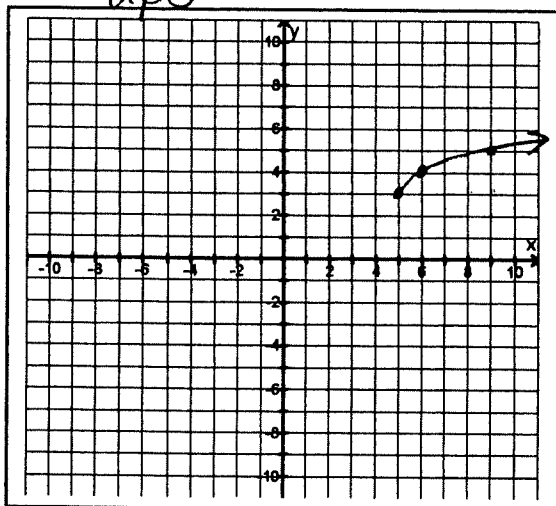
$x_{int}: (0,0)$   
 $y_{int}: (0,0)$

Graph the following transformations of  $f(x)$ . Check on your calculator.

1.  $f(x) = \sqrt{x-5} + 3$

Transformations:

Right 5  
Up 3

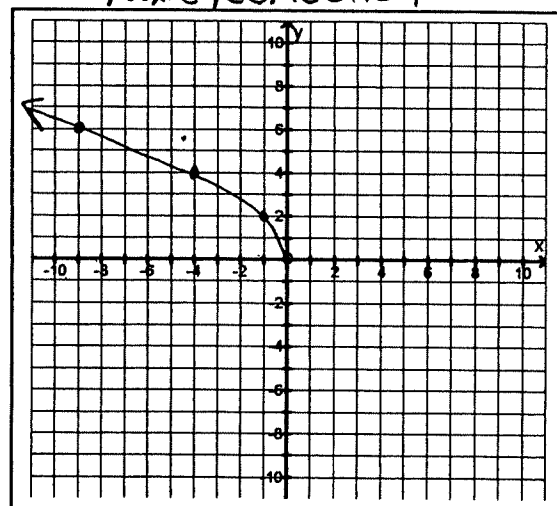


Domain:  $[5, \infty)$  Range:  $[3, \infty)$

2.  $f(x) = 2\sqrt{-x}$

Transformations:

Vertical Stretch by 2  
Y-axis Reflection



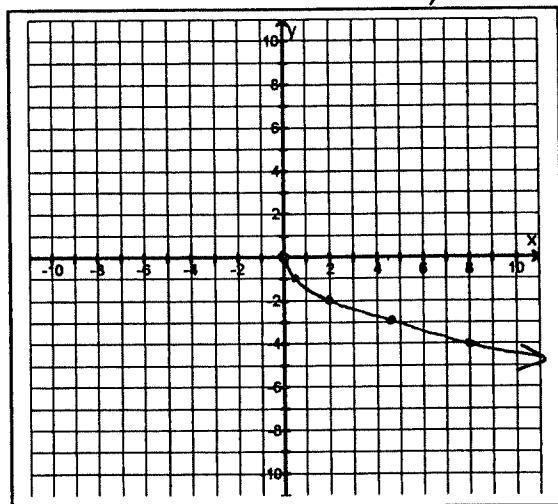
Domain:  $(-\infty, 0]$  Range:  $[0, \infty)$

3.  $f(x) = -\sqrt{2x}$

Transformations:

X-axis reflection

Horizontal shrink by  $\frac{1}{2}$



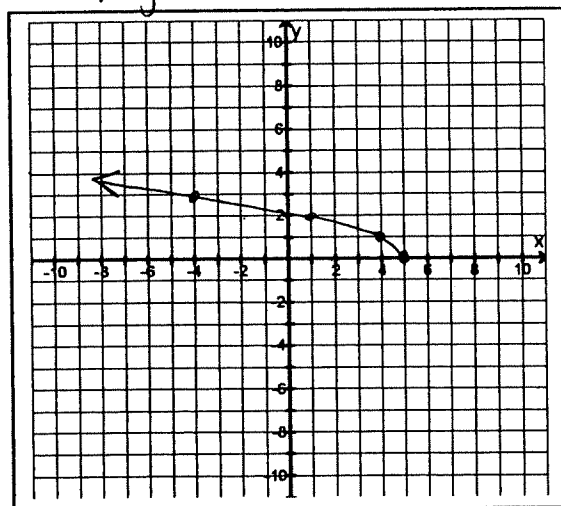
Domain:  $[0, \infty)$  Range:  $(-\infty, 0]$

4.  $f(x) = \sqrt{5-x} = \sqrt{-x+5}$

Transformations:

Y-axis reflection

right 5

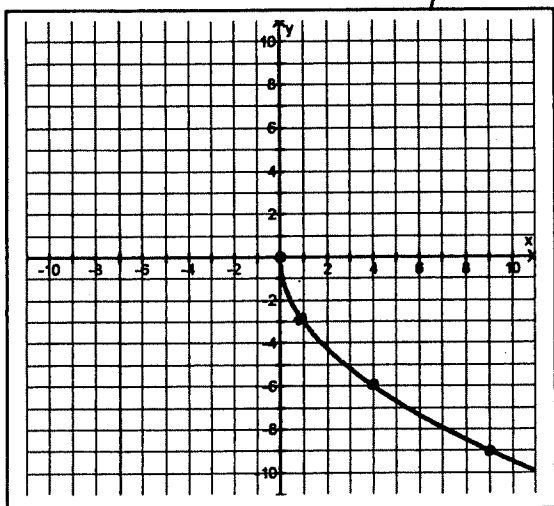


Domain:  $(-\infty, 5]$  Range:  $[0, \infty)$

Write the function for the following graphs.

X-axis reflection

5. Vertical Stretch by 3

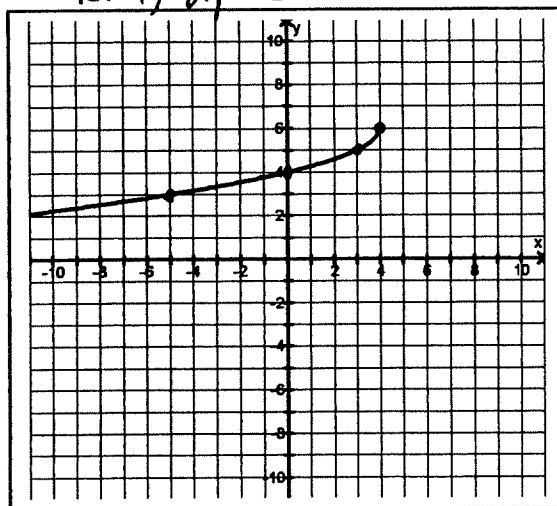


$$f(x) = -3\sqrt{x}$$

Y-axis Reflection

X-axis Reflection

6. R+4, Up 6



$$f(x) = -\sqrt{-(x-4)} + 6$$

Write the equation for a circle with center at (0, 0) and radius of 6 and then graph. Solve the equation for y.

Not A  $\rightarrow x^2 + y^2 = 36$   $x^2 + y^2 = r^2$   
Function

$$y^2 = 36 - x^2$$

$$y = \pm \sqrt{36 - x^2}$$

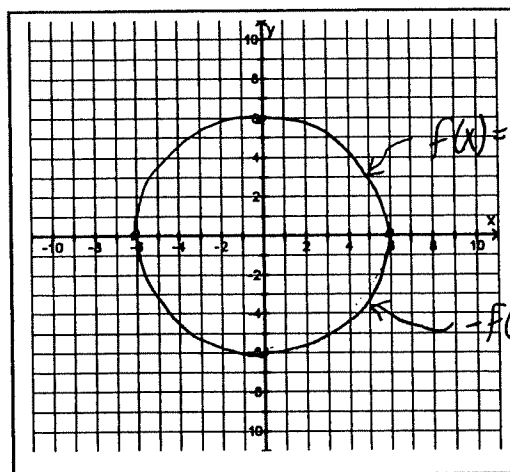
2 functions:

$$f(x) = \sqrt{36 - x^2}$$

(Top Half)

$$-f(x) = -\sqrt{36 - x^2}$$

(Bottom Half)



### The Semi-Circle Parent Function

Graph  $f(x) = \sqrt{r^2 - x^2}$

Example:  $f(x) = \sqrt{36 - x^2}$  ( $r=6$ )

| x  | y |
|----|---|
| -r | 0 |
| 0  | r |
| r  | 0 |

Domain:  $[-r, r]$

Range:  $[0, r]$

Characteristics:

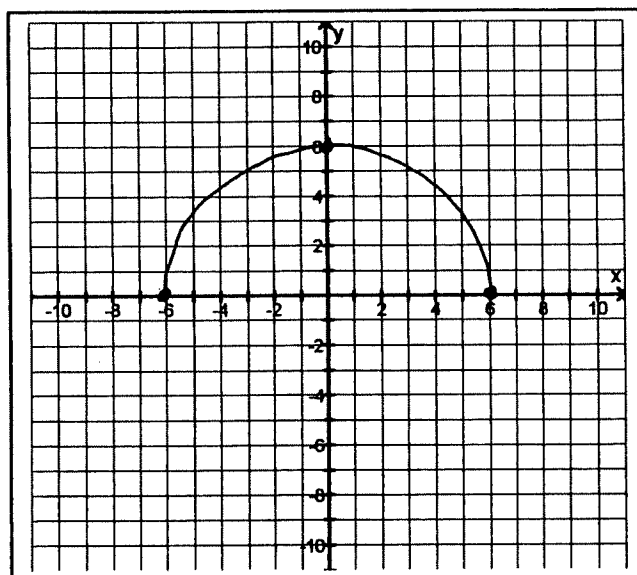
Even Function

Y-axis Symmetry

Inc:  $(-r, 0)$

Dec:  $(0, r)$

Max of  $r$  at  $x=0$

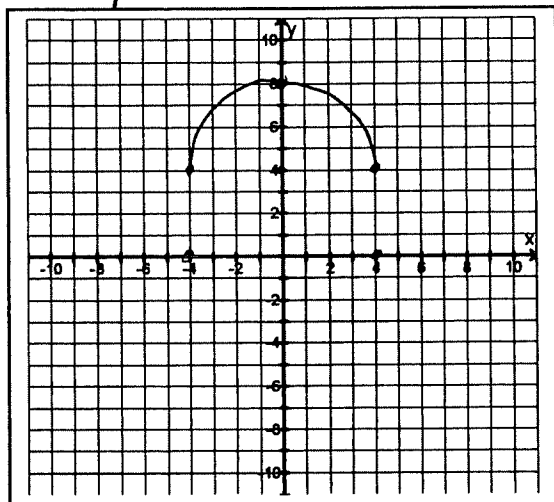


7.  $f(x) = \sqrt{16 - x^2} + 4$

Transformations:

$r = 4$

Up 4



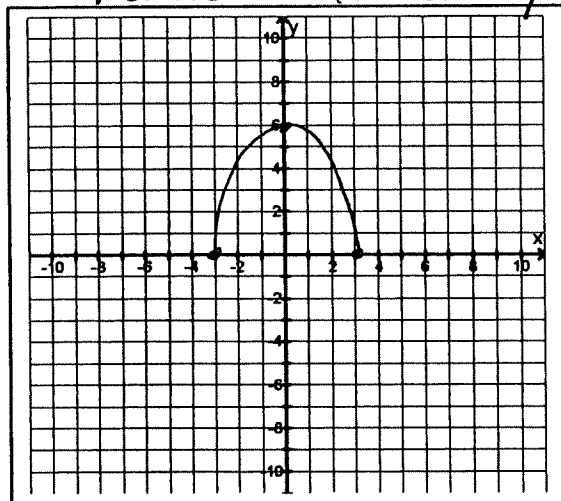
Domain:  $[-4, 4]$  Range:  $[4, 8]$

8.  $f(x) = 2\sqrt{9 - x^2}$

Transformations:

$r = 3$

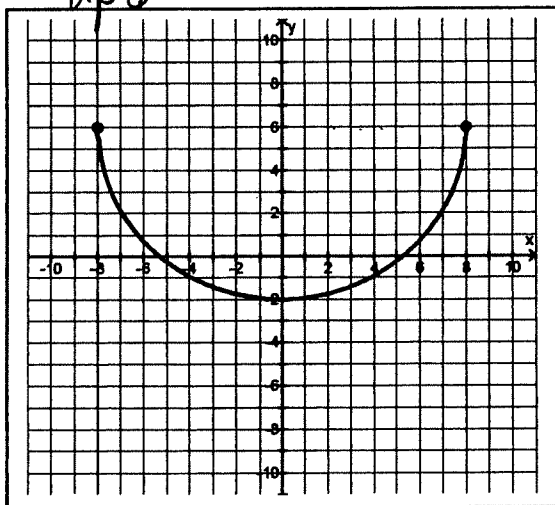
Vertical Stretch by 2



Domain:  $[-3, 3]$  Range:  $[0, 6]$

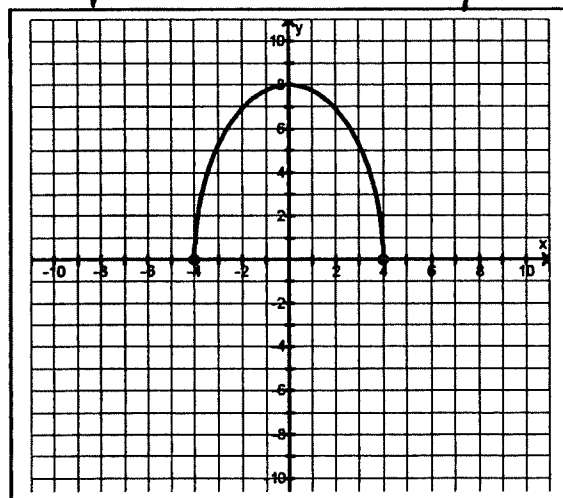
Write the equation of the following functions.

9.  $r = 8$   
x-axis's reflection  
Up 6



$f(x) = -\sqrt{64 - x^2} + 6$

10.  $r = 4$   
Vertical Stretch by 2

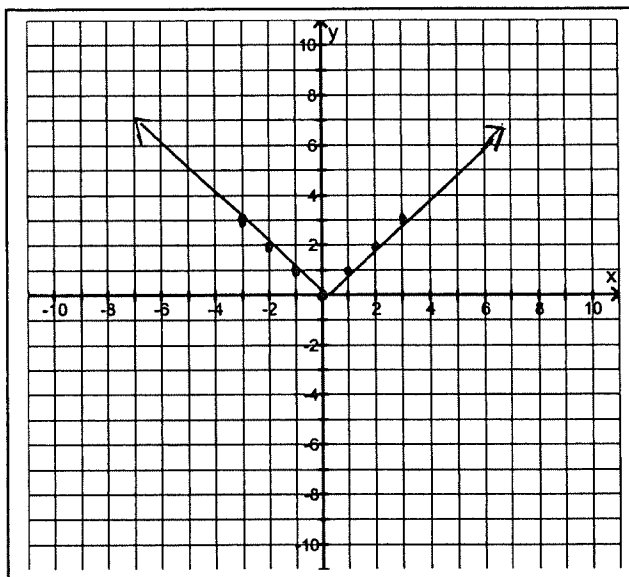


# Absolute Value Function

## The Absolute Value Parent Function

Graph  $f(x) = |x|$

| x  | y |
|----|---|
| -3 | 3 |
| -2 | 2 |
| -1 | 1 |
| 0  | 0 |
| 1  | 1 |
| 2  | 2 |
| 3  | 3 |



Domain:  $\mathbb{R}$

Range:  $[0, \infty)$

Characteristics: Even

Y-axis Symmetry

Dec:  $(-\infty, 0)$  Min of 0 at  $x=0$

Inc:  $(0, \infty)$

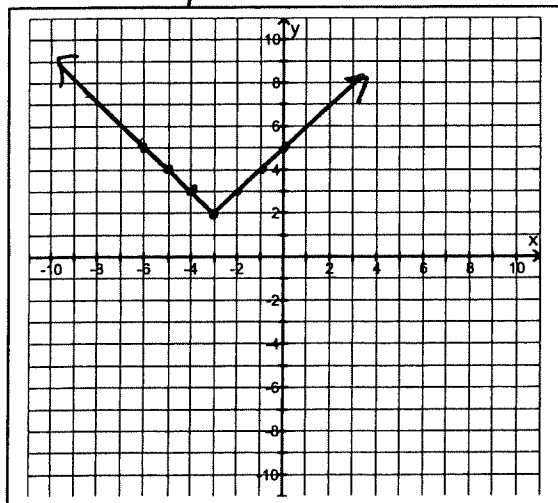
Graph the following transformations of  $f(x)$ . Check on your calculator.

1.  $f(x) = |x+3|+2$

Transformations:

Left 3

Up 2



Domain:  $\mathbb{R}$  Range:  $[2, \infty)$

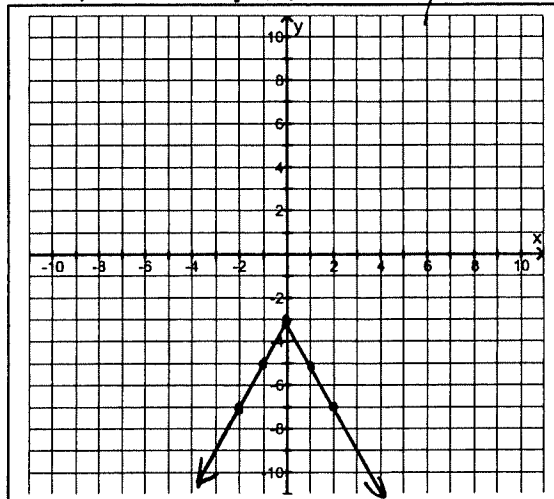
2.  $f(x) = -2|x|-3$

Transformations:

x-axis reflection

Down 3

Vertical Stretch by 2



Domain:  $\mathbb{R}$  Range:  $(-\infty, -3]$

$$3. f(x) = |2x - 6|$$

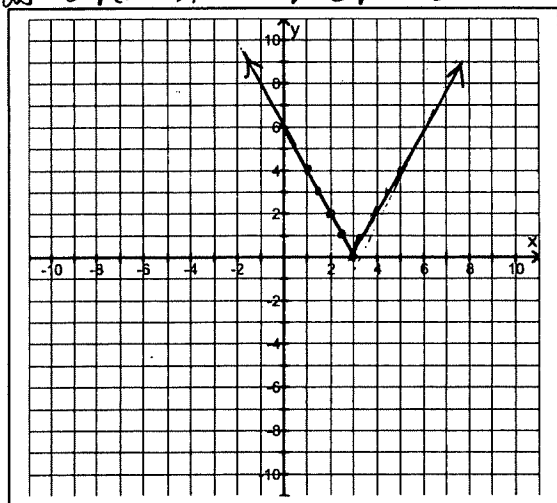
$$= |2(x - 3)|$$

Transformations:

Horizontal Shrink by  $\frac{1}{2}$

Right +3

Note: You could also simplify this function as  $2|x - 3|$  and use vertical stretch by 2.



Same Graph.

Domain:  $\mathbb{R}$  Range:  $[0, \infty)$

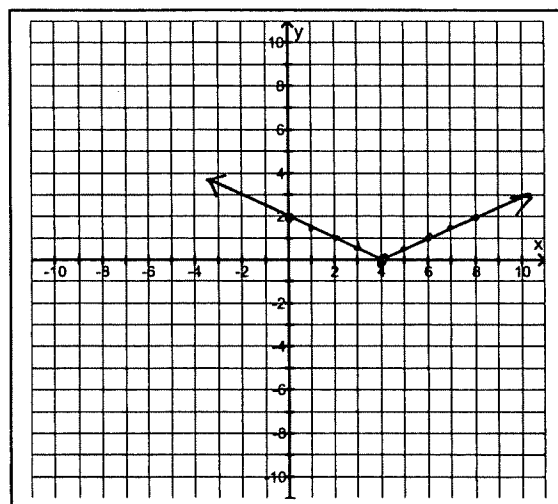
$$4. f(x) = \left| 2 - \frac{1}{2}x \right|$$

$$= \left| -\frac{1}{2}x + 2 \right| = \left| -\frac{1}{2}(x - 4) \right|$$

Transformations:

Vertical Shrink by  $\frac{1}{2}$

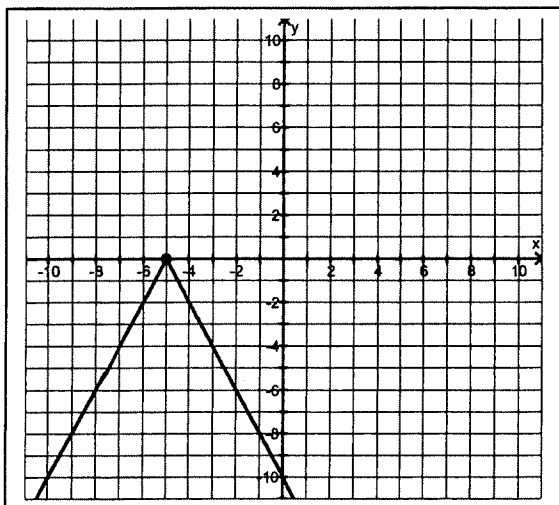
Right +4



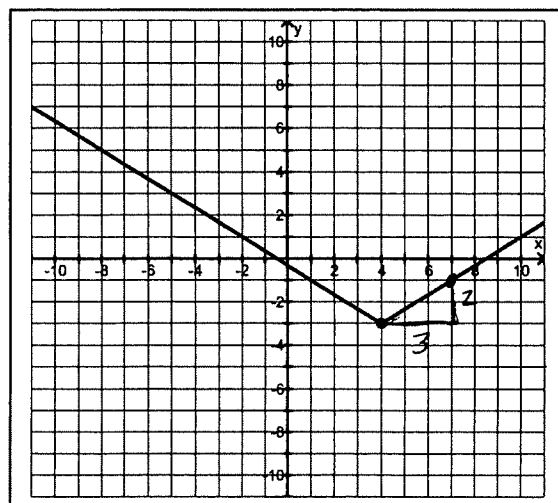
Domain:  $\mathbb{R}$  Range:  $[0, \infty)$

Write the function for the following graphs.

$$5. f(x) = -2|x + 5|$$



$$6. f(x) = \frac{2}{3}|x - 4| - 3$$



Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

# Worksheet - Square Root and Semi-Circle Functions

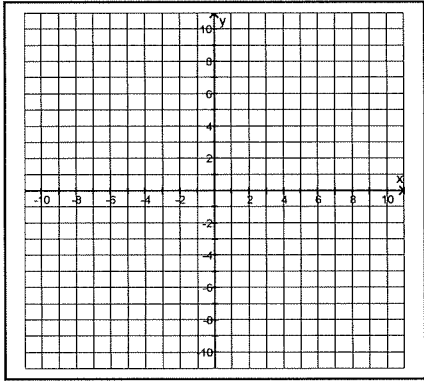
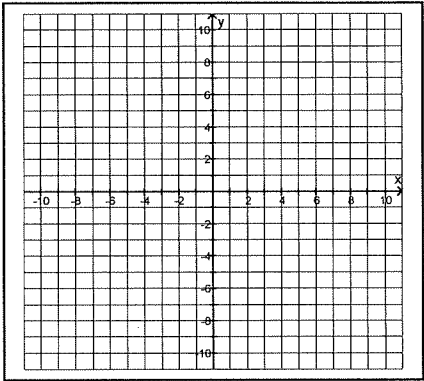
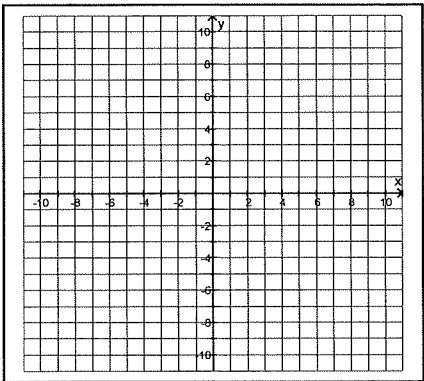
Describe and graph the transformations.

1.  $f(x) = -\sqrt{x+3}$
2.  $f(x) = \sqrt{2x+10}$
3.  $f(x) = 3\sqrt{x} - 4$

Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_

Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_

Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_

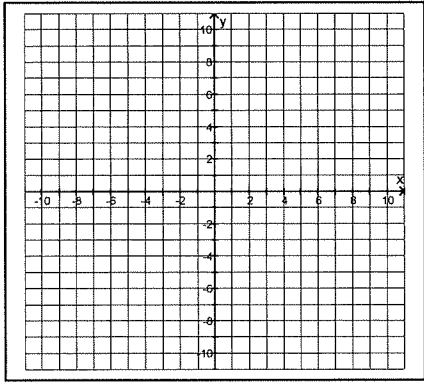
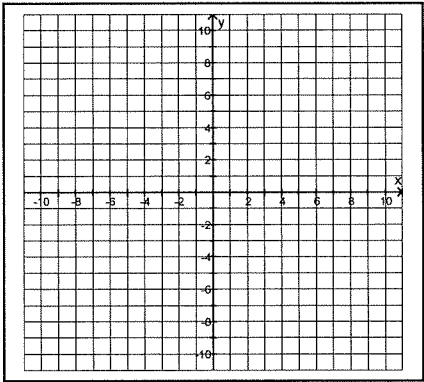
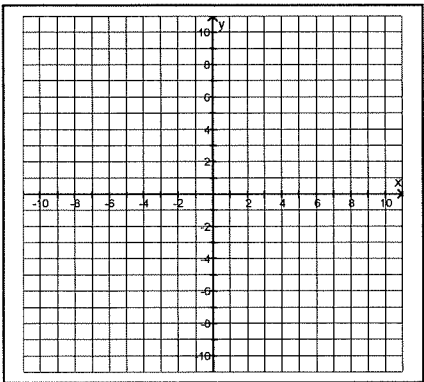


4.  $f(x) = \sqrt{8-x}$
5.  $f(x) = 2\sqrt{36-x^2} - 7$
6.  $f(x) = 5 - \sqrt{x}$

Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_

Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_

Domain: \_\_\_\_\_  
 Range: \_\_\_\_\_



7.  $f(x) = -\sqrt{81 - x^2}$

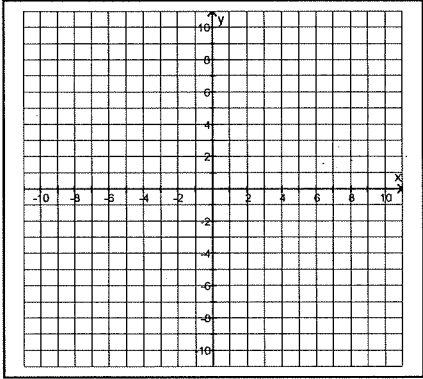
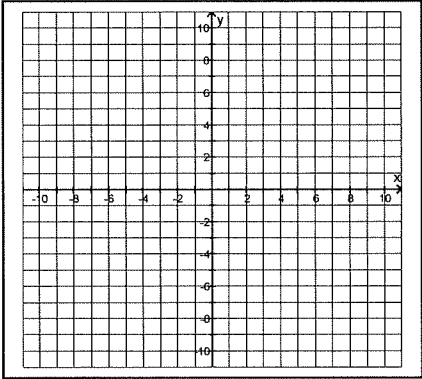
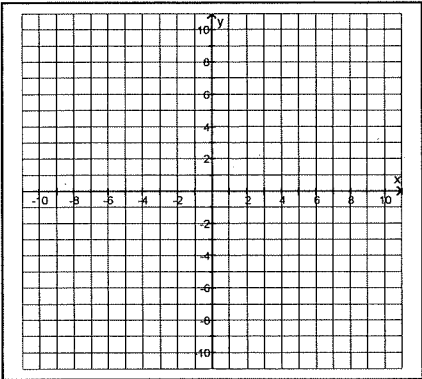
8.  $f(x) = -(2x + 2)^2$

9.  $f(x) = \frac{1}{2}\sqrt{100 - x^2}$

Domain: \_\_\_\_\_  
Range: \_\_\_\_\_

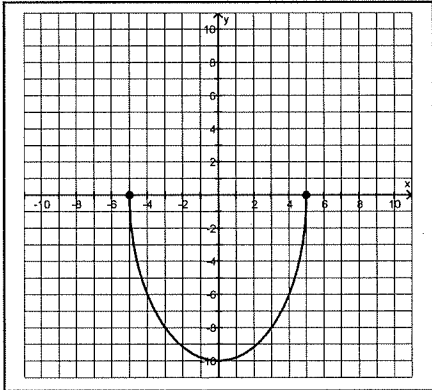
Domain: \_\_\_\_\_  
Range: \_\_\_\_\_

Domain: \_\_\_\_\_  
Range: \_\_\_\_\_

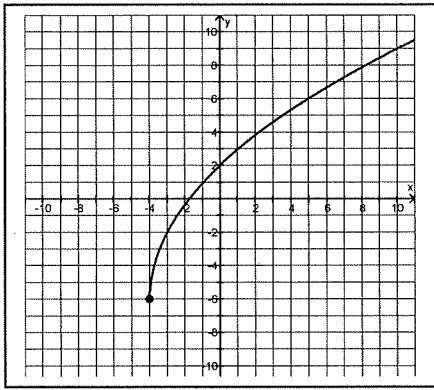


Write the function for the following graphs.

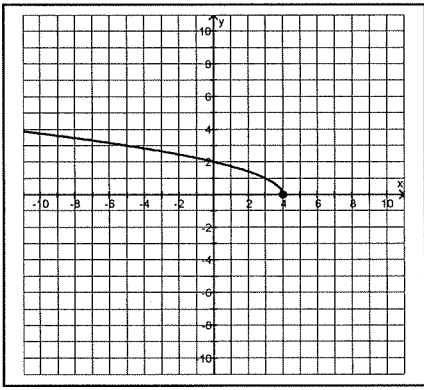
10. \_\_\_\_\_



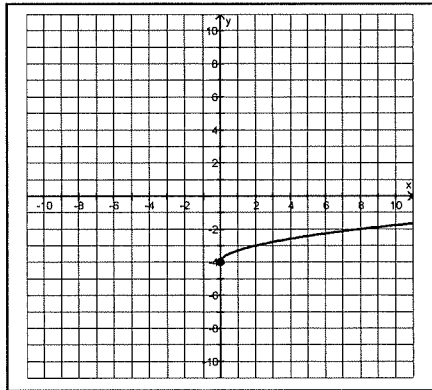
11. \_\_\_\_\_



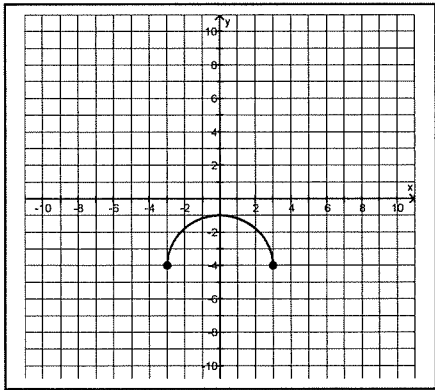
12. \_\_\_\_\_



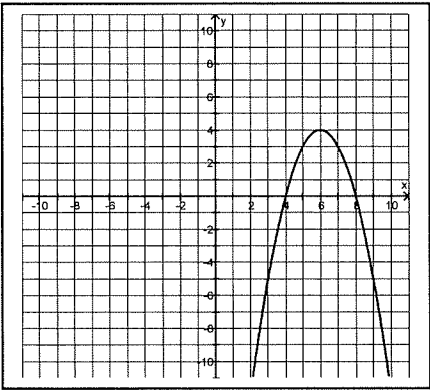
13. \_\_\_\_\_



14. \_\_\_\_\_



15. \_\_\_\_\_



Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

## Worksheet - Absolute Value Functions

Describe and graph the transformations.

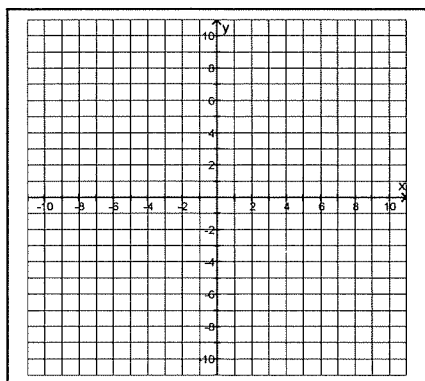
1.  $f(x) = -|x - 5| + 6$

2.  $f(x) = |2x - 8|$

3.  $f(x) = \frac{3}{4}|x + 5| - 4$

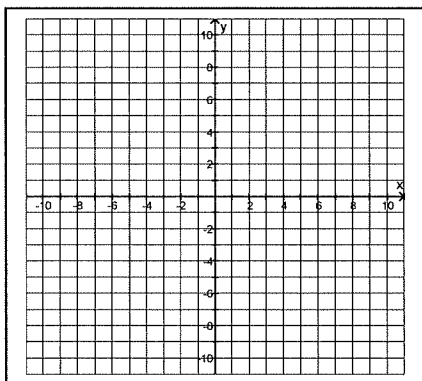
Domain: \_\_\_\_\_

Range: \_\_\_\_\_



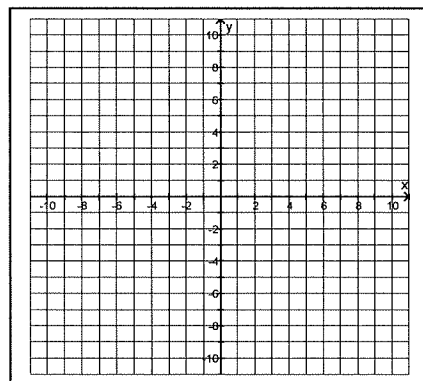
Domain: \_\_\_\_\_

Range: \_\_\_\_\_



Domain: \_\_\_\_\_

Range: \_\_\_\_\_



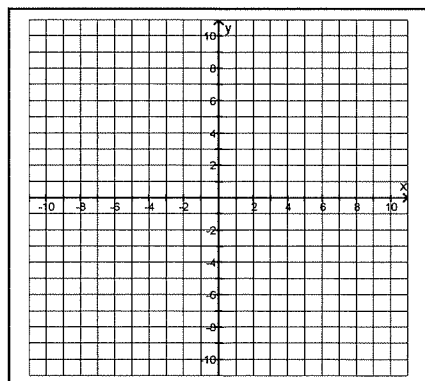
4.  $f(x) = -\left|\frac{1}{2}x - 3\right|$

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

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

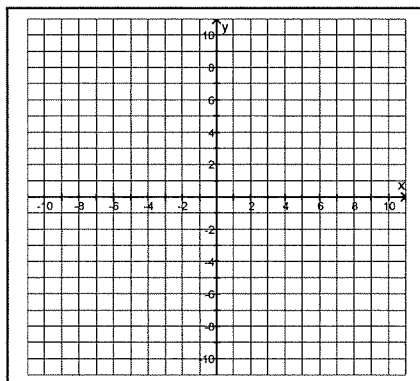
Domain: \_\_\_\_\_

Range: \_\_\_\_\_



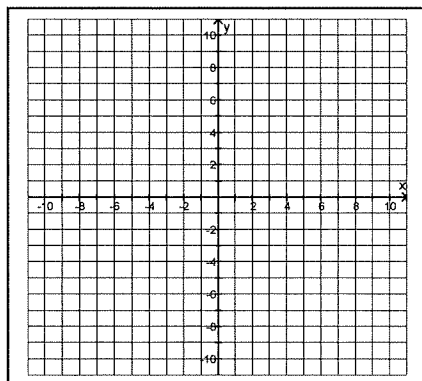
Domain: \_\_\_\_\_

Range: \_\_\_\_\_



Domain: \_\_\_\_\_

Range: \_\_\_\_\_



7.  $f(x) = |2x - 6|$

8.  $f(x) = 2x - 6$

9.  $f(x) = 3\sqrt{7 - x}$

Domain: \_\_\_\_\_

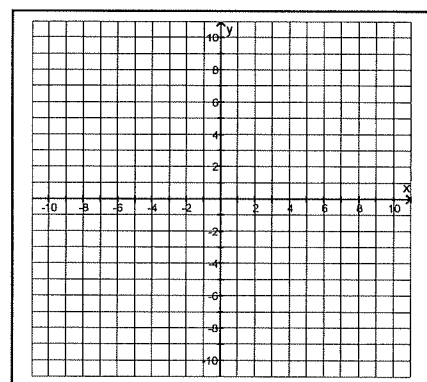
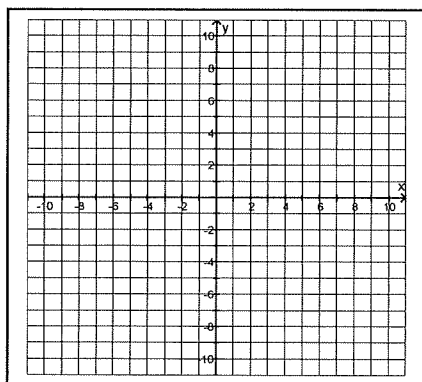
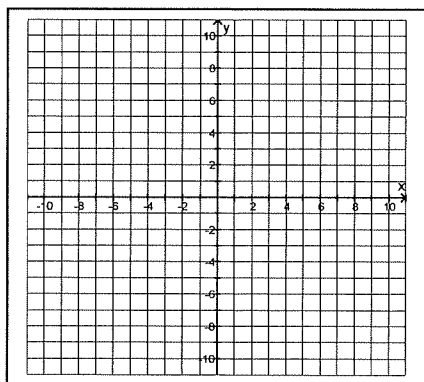
Range: \_\_\_\_\_

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

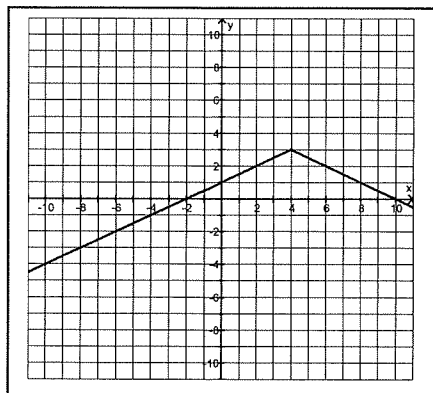
Domain: \_\_\_\_\_

Range: \_\_\_\_\_

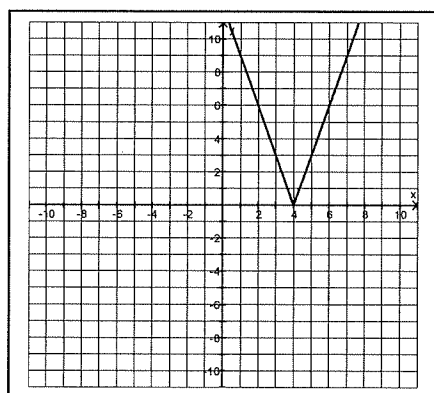


Write the equation for each transformation.

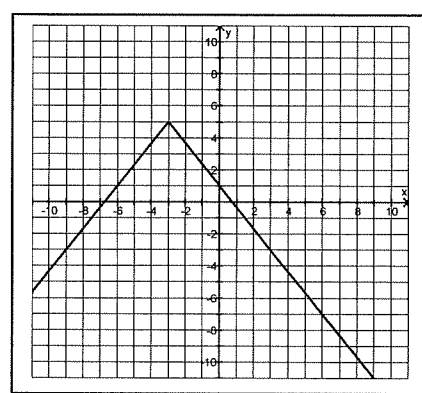
10. \_\_\_\_\_



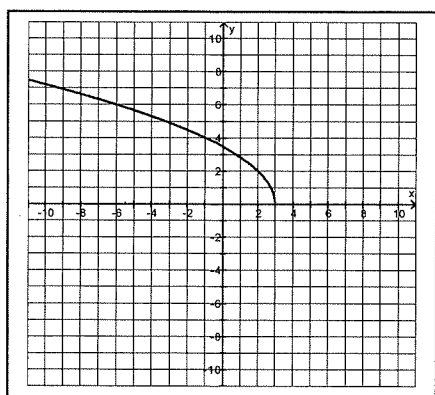
11. \_\_\_\_\_



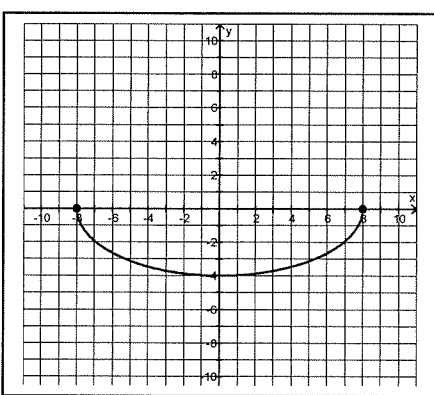
12. \_\_\_\_\_



13. \_\_\_\_\_



14. \_\_\_\_\_



15. \_\_\_\_\_

