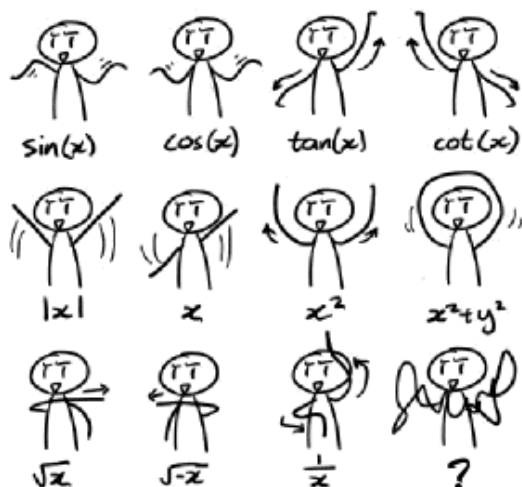


Unit 12 Notes

Nature of and Transformations of Functions



Tentative Schedule

Day	Classwork	Assignment
Wed. 4/29	Finish Transformations of Graphs Activity	Video #12.1 – Vertical and Horizontal Shifts
Thurs. 4/30 Fri. 5/1	P.S. #12.1	Video #12.2 – Reflections over Axes and Vertical Stretches/Compressions
Mon. 5/4	P.S. #12.2	Video #12.3 – Horizontal Stretches/Compressions
Tues. 5/5 Wed. 5/6	P.S. #12.3	Video #12.4 – Systems of Equations (including non-linear equations)
Thurs. 5/7	P.S. #12.4	Finish problem set packet
Fri. 5/8 Mon. 5/11	Review for Test #12	Review for Test #12
Tues. 5/12	Test #12	REVIEW!

Name: _____

Transformations of Graphs

Shifts

For $c > 0$,

to obtain the graph of:

$f(x)+c$	shift the graph of $f(x)$	upward c units
$f(x)-c$	shift the graph of $f(x)$	downward c units
$f(x+c)$	shift the graph of $f(x)$	left c units
$f(x-c)$	shift the graph of $f(x)$	right c units

Stretches and compressions

For $c > 1$,

to obtain the graph of:

$cf(x)$	stretch the graph of $f(x)$	vertically by a factor of c
$(1/c)f(x)$	compress the graph of $f(x)$	vertically by a factor of c
$f(cx)$	compress the graph of $f(x)$	horizontally by a factor of c
$f(x/c)$	stretch the graph of $f(x)$	horizontally by a factor of c

Reflections

To obtain the graph of:

$-f(x)$	reflect the graph of $f(x)$	about the x-axis
$f(-x)$	reflect the graph of $f(x)$	about the y-axis

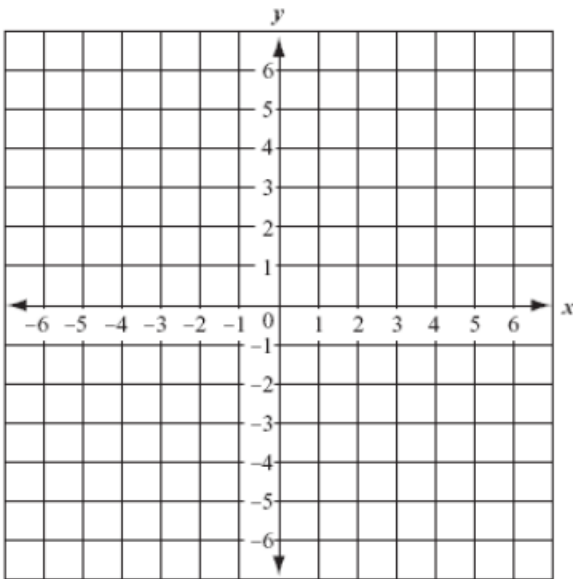
Notes 12.1 - Vertical and Horizontal Shifts

Let's summarize what we have learned in the transformations of graphs activity.

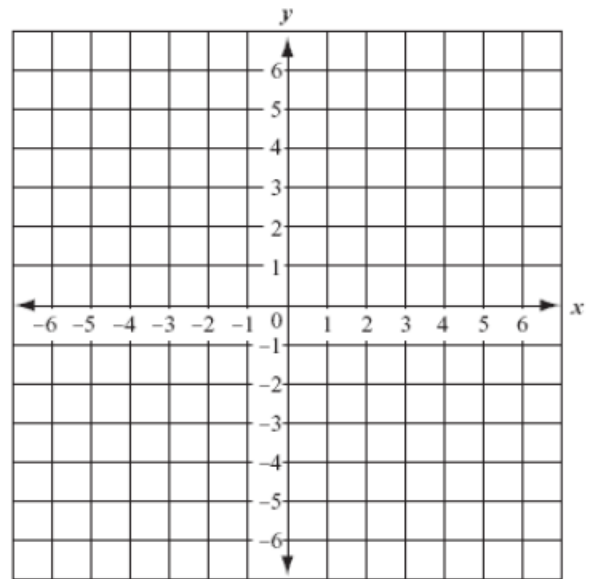
Vertical Shift	Shift Up		Horizontal Shift	Shift Right	
	Shift Down			Shift Left	

Graph the following functions using their parent functions and your knowledge of vertical and horizontal shifts.

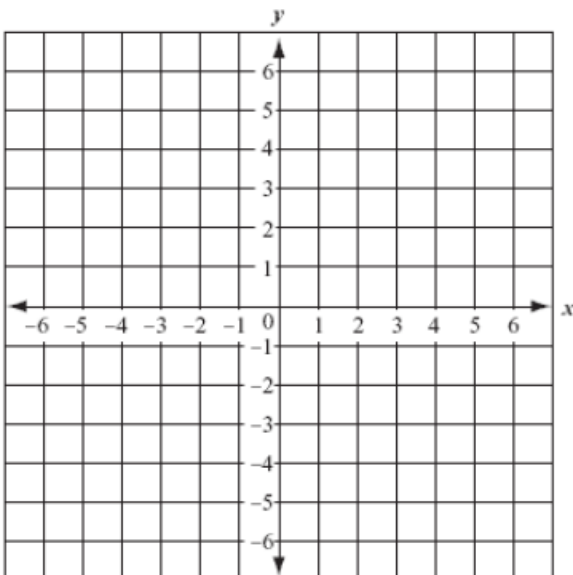
1.) $g(x) = x^2 + 2$



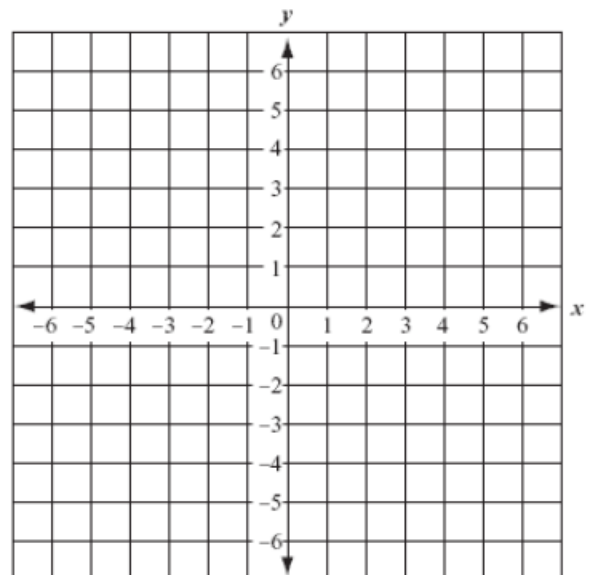
2.) $h(x) = (x + 2)^2$



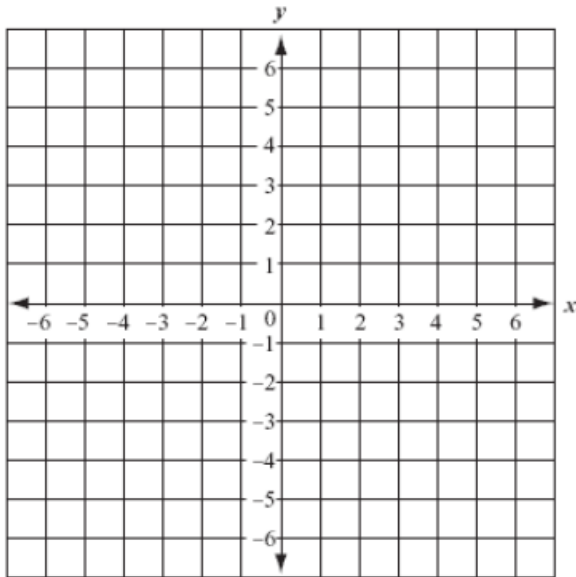
3.) $k(x) = |x| - 3$



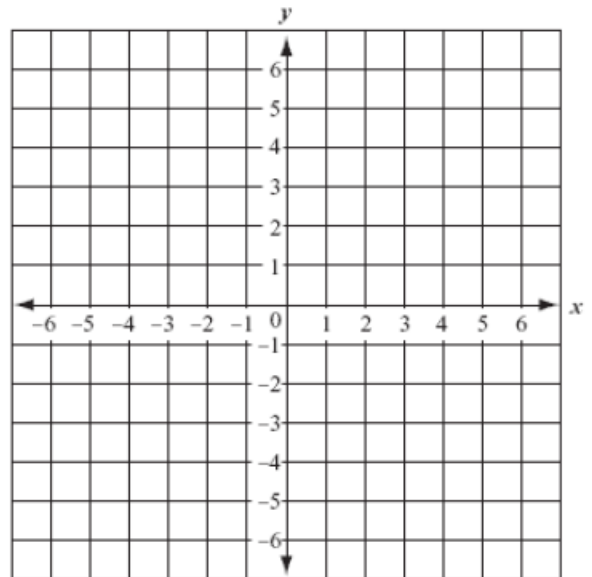
4.) $a(x) = |x - 3|$



5.) $r(x) = 2^{x+3} - 4$



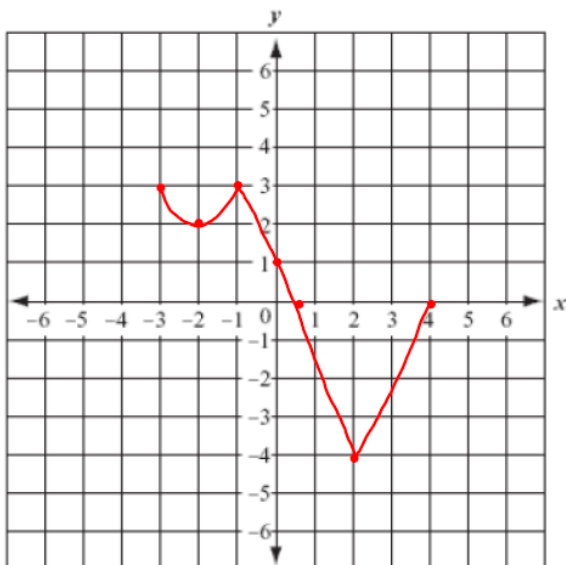
6.) $t(x) = \sqrt{x-1} - 2$



7.) Given the parent function $f(x) = x^3$, find the equation of the function that is the transformation of $f(x)$ when shifted up 7 and right 8.


8.) Given the function $f(x) = 3(x - 5)^2 + 4$, find the equation of the function that is the transformation of $f(x)$ when shifted left 6 and down 2.

9.) The function shown below is $f(x)$. Draw in $g(x)$ if $g(x) = f(x + 2) - 1$



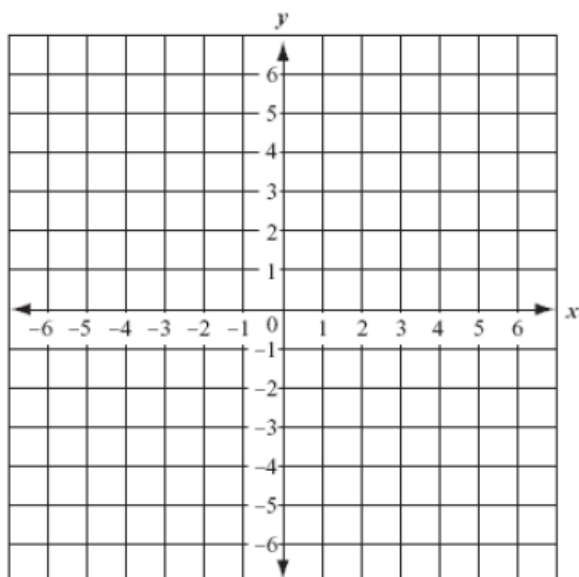
Notes 12.2 - Reflections Over Axes and Vertical Stretches and Compressions

Reminder:

Before Reflection (x, y)		After Reflection in the x -axis: $(x, -y)$
		After Reflection in the y -axis: $(-x, y)$

- 1.) Graph the following function below. Then, graph two reflections: one over the x -axis and one over the y -axis. Determine the equation of each function.


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



Equation after a reflection over the x -axis:

Equation after a reflection over the y -axis:

Summary:

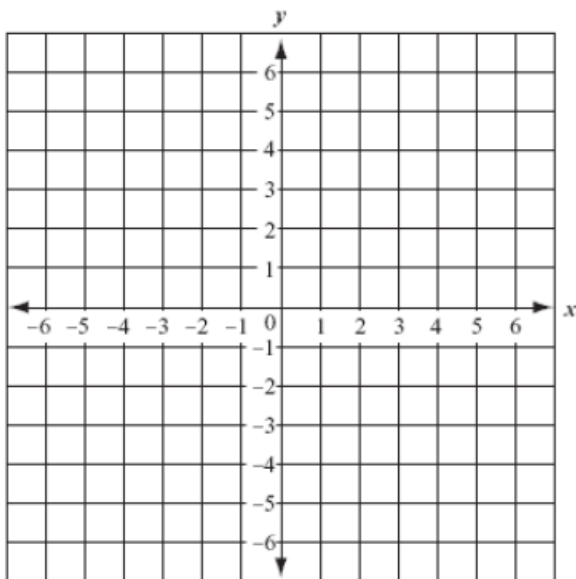
Before Reflection $f(x)$		After Reflection in the x -axis:
		After Reflection in the y -axis:

Vertical Dilation	Vertical Stretch	
	Vertical Compression	

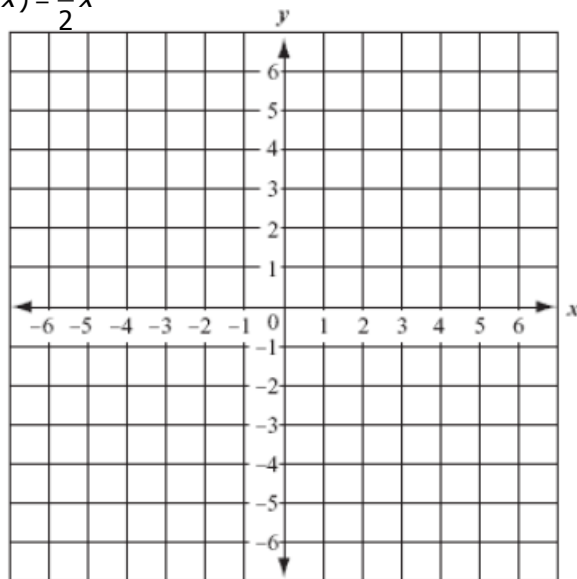
Horizontal Dilation	Horizontal Stretch	
	Horizontal Compression	

Graph the following functions using their parent functions and your knowledge of vertical stretches and compressions.

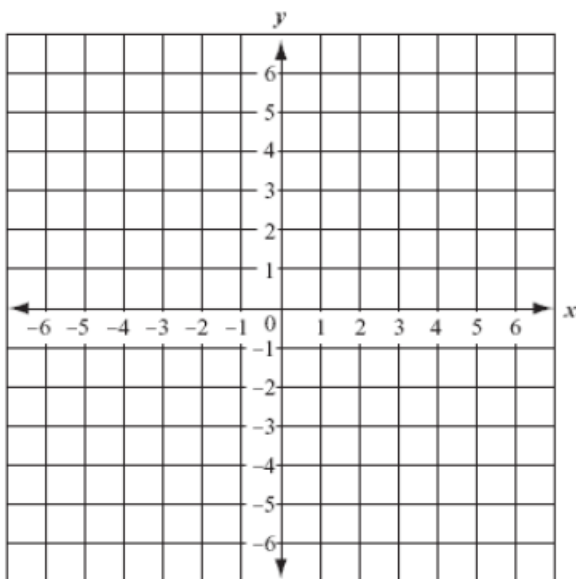
2.) $g(x) = 2x^2$



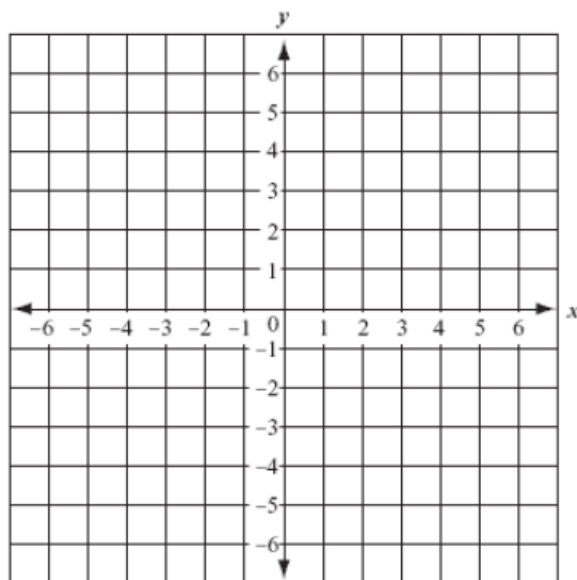
3.) $h(x) = \frac{1}{2}x^2$



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



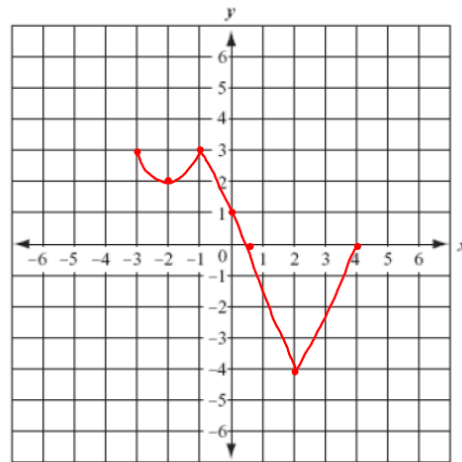
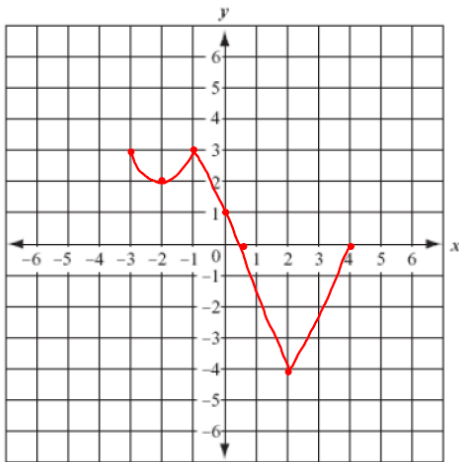
5.) $h(x) = 2^{-x}$



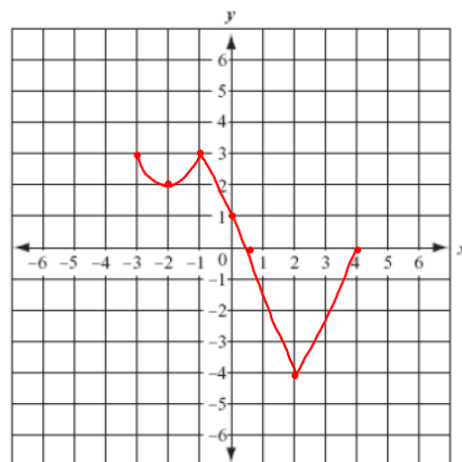
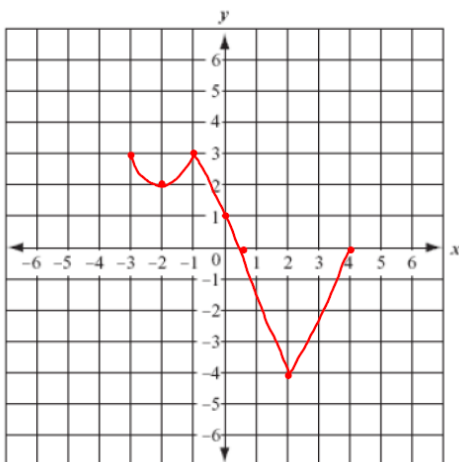
Notes 12.3 - Horizontal Compressions

Vertical Dilation	Vertical Stretch	$k \cdot f(x), k > 1$	Horizontal Dilation	Horizontal Stretch	
	Vertical Compression	$k \cdot f(x), 0 < k < 1$		Horizontal Compression	

- 1.) Consider the graph of $f(x)$ below. Graph $g(x) = 2 \cdot f(x)$ and $h(x) = 0.5f(x)$. Describe each transformation.

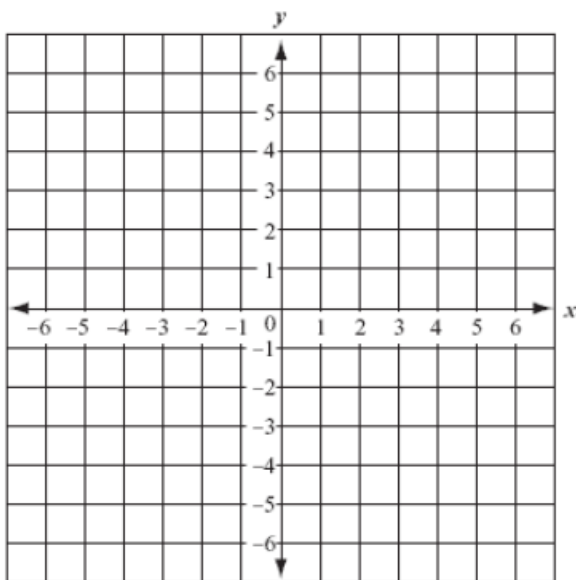


- 2.) Consider the graph of $f(x)$ below. Graph $a(x) = f(2x)$ and $b(x) = f(0.5x)$. Describe each transformation.

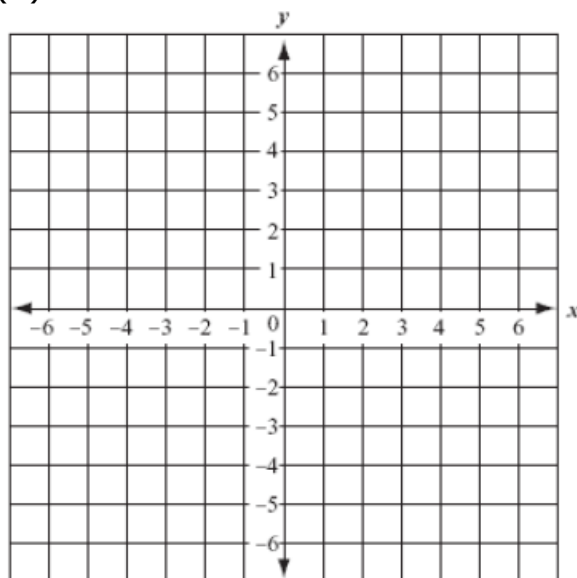


Graph the following functions using their parent functions and your knowledge of vertical and horizontal stretches and compressions.

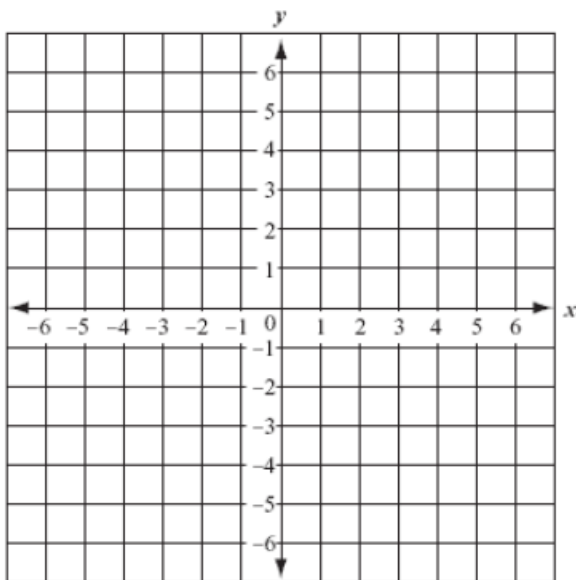
3.) $g(x) = 2^{3x}$



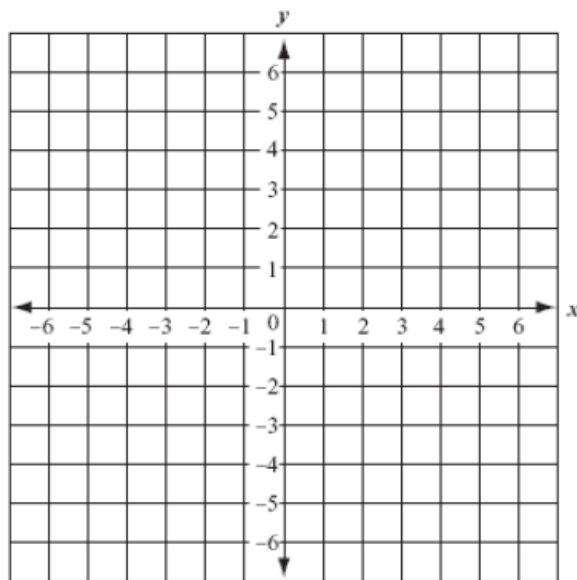
4.) $g(x) = 3 \cdot 2^x$



5.) $g(x) = 2|x|$



6.) $g(x) = |2x|$

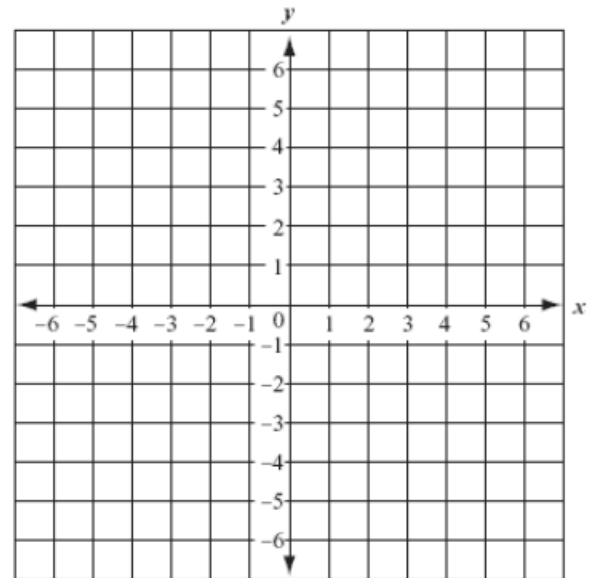


Notes 12.4 - Systems of Equations

- 1.) Solve the following system of equations graphically.

$$y = x^2 - 6x + 3$$

$$y = -2x + 3$$



- 2.) Solve the following system of equations algebraically.

$$y = x^2 - 6x + 3$$

$$y = -2x + 3$$

3.) Solve the following system of equations algebraically.

$$(x - 2)^2 + (y - 1)^2 = 4$$

$$x + y = 1$$