Functions and Relations

Name: ANSWERS!

Date: _____

The Function: Linear

The Base Function	$y = x$
A Transformed Function	$y = -\frac{3}{4}x + 2$

Base	
x	y
-2	-2
-1	-1
0	0
1	1
2	2

Transformed	
x	y
-2	3·5
-1	2·75
0	2
1	1·25
2	0·5

he Function: Quadratic

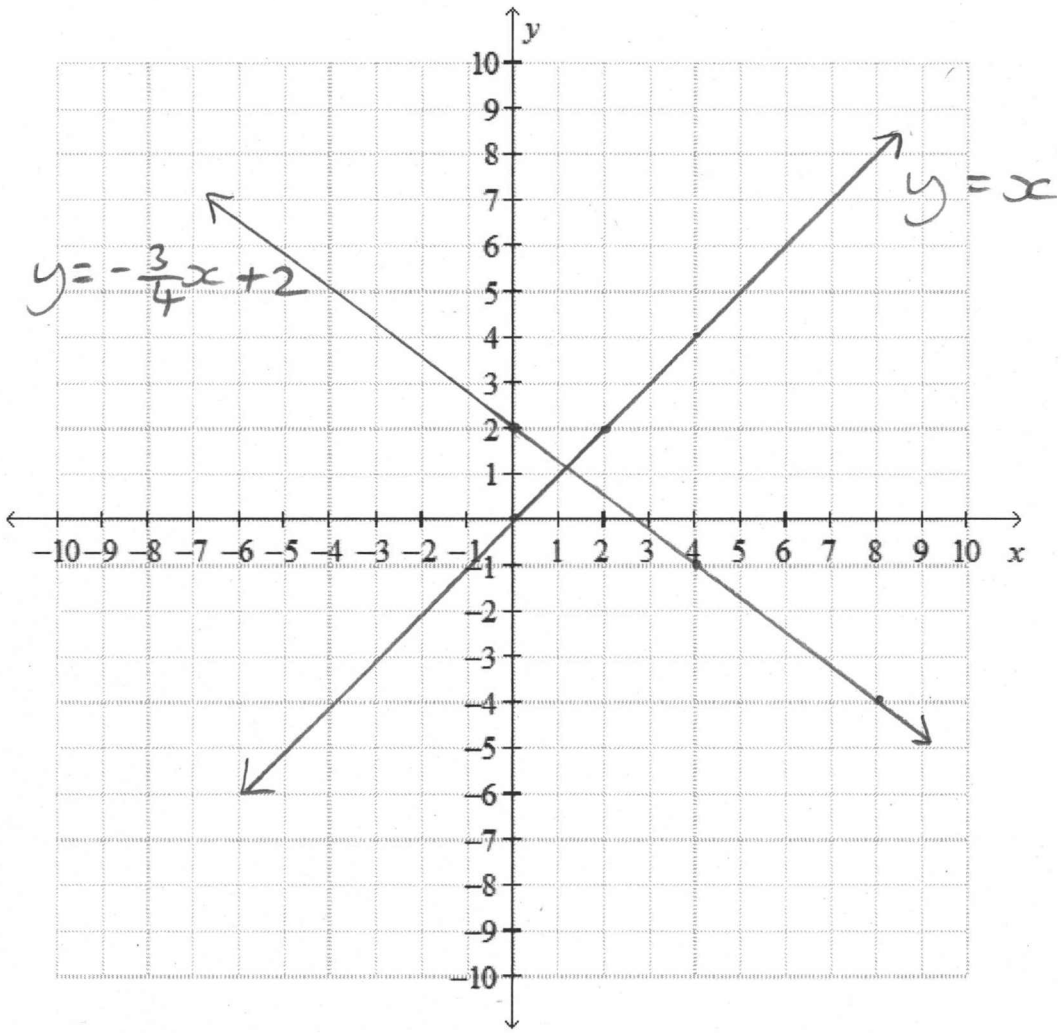
The Base Function	$y = x^2$
A Transformed Function	$y = -2(x - 4)^2 + 3$

Base	
x	y
-2	4
-1	1
0	0
1	1
2	4

Transformed	
x	y
2	-5
3	1
4	3
5	1
6	-5

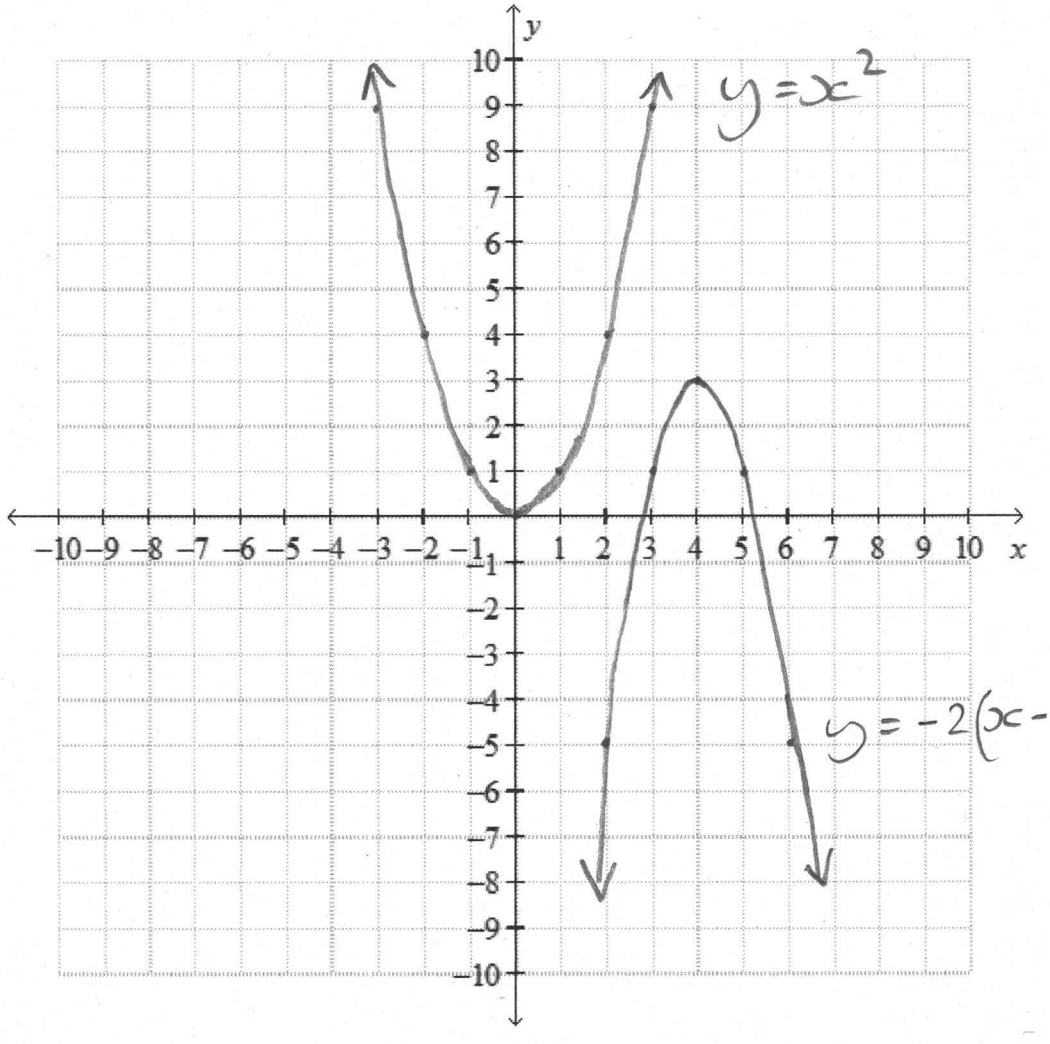
The Function: LINEAR

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	NO	NO
Does this graph have a lowest point? If so, what is it?	NO	NO
Does this graph have a furthest point to the left? If so, what is it?	NO	NO
Does this graph have a furthest point to the right? If so, what is it?	NO	NO
Describe the shape of this graph	STRAIGHT LINE	STRAIGHT LINE



The Function: QUADRATIC

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	NO	YES (4,3)
Does this graph have a lowest point? If so, what is it?	YES (0,0)	NO
Does this graph have a furthest point to the left? If so, what is it?	NO	NO
Does this graph have a furthest point to the right? If so, what is it?	NO	NO
Describe the shape of this graph	PARABOLA, OPENS UP	PARABOLA, OPENS DOWN



The Relation: Circle

The Base Function	$x^2 + y^2 = r^2$ (we will use r=5) $y = \pm\sqrt{5^2 - x^2}$
A Transformed Function	$(x-2)^2 + (y+3)^2 = 5^2$ $y = \pm\sqrt{5^2 - (x-2)^2} - 3$

Use for calculations

Base		
x	y	y
-5	0	0
-1	4.9	-4.9
0	5	-5
1	4.9	-4.9
5	0	0

Transformed		
x	y	y
-3	-3	-3
1	1.9	-7.9
2	2	-8
3	1.9	-7.9
7	-3	-3

The Function: Root

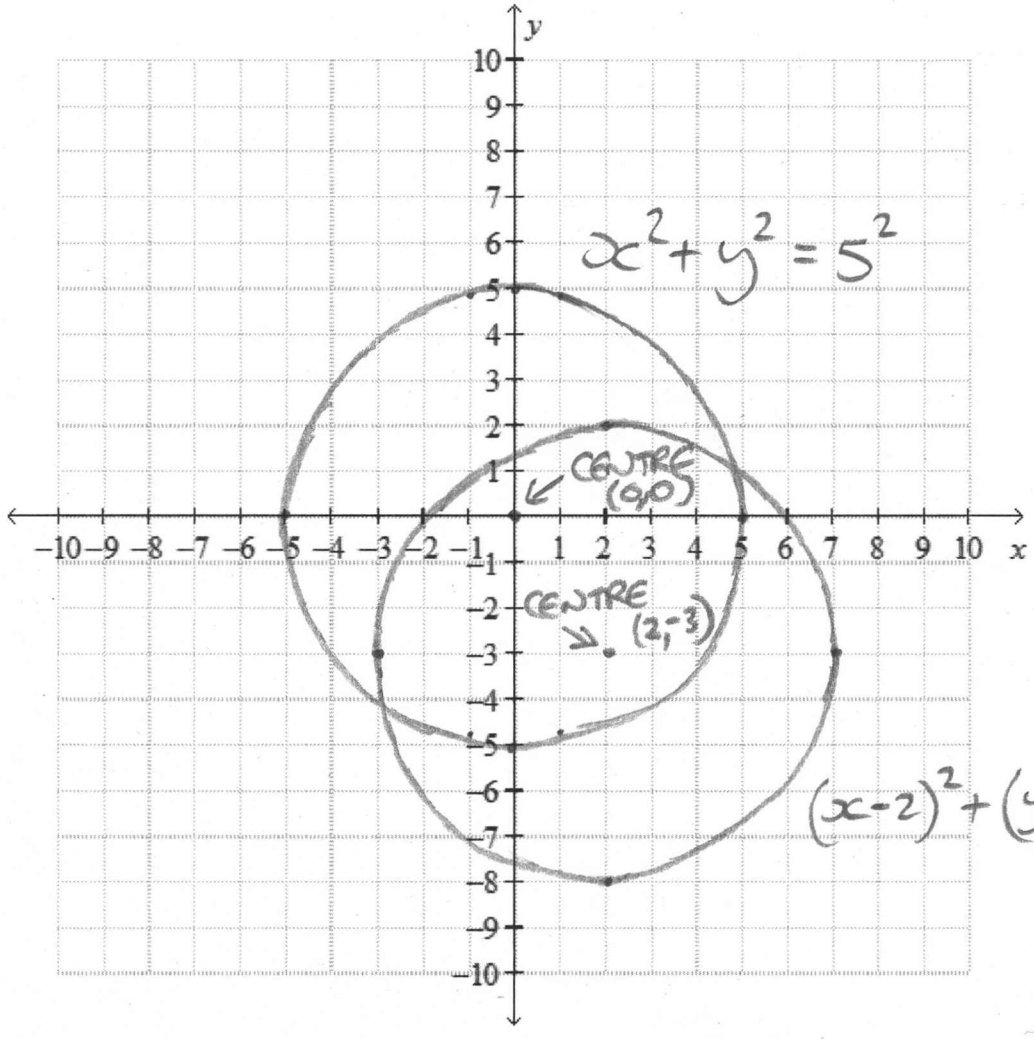
The Base Function	$y = \sqrt{x}$
A Transformed Function	$y = -2\sqrt{x+3} + 4$

Base	
x	y
0	0
1	1
4	2
9	3

Transformed	
x	y
-3	4
-2	2
1	0
6	-2

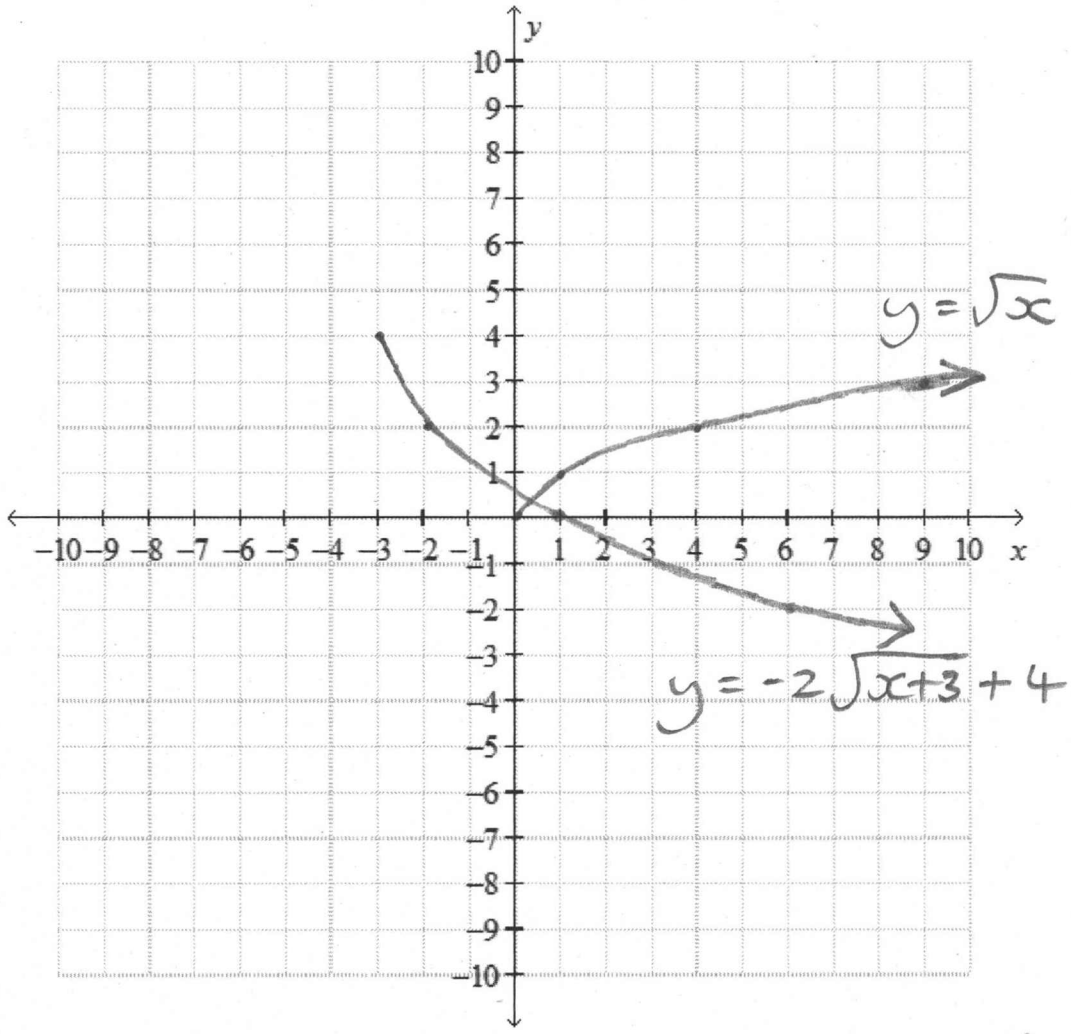
The ~~Function~~ RELATION: CIRCLE

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	YES (0,5)	YES (2,2)
Does this graph have a lowest point? If so, what is it?	YES (0,-5)	YES (2,-8)
Does this graph have a furthest point to the left? If so, what is it?	YES (-5,0)	YES (-3,-3)
Does this graph have a furthest point to the right? If so, what is it?	YES (0,5)	YES (7,-3)
Describe the shape of this graph	CIRCLE, CENTRE (0,0)	CIRCLE, CENTRE (2,-3)



The Function: ROOT

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	NO	YES (-3, 4)
Does this graph have a lowest point? If so, what is it?	YES (0,0)	NO
Does this graph have a furthest point to the left? If so, what is it?	YES (0,0)	YES (-3,4)
Does this graph have a furthest point to the right? If so, what is it?	NO	NO
Describe the shape of this graph	INCREASING AT A DECREASING RATE	DECREASING AT A DECREASING RATE



The Function: Cubic

The Base Function	$y = x^3$
A Transformed Function	$y = \frac{1}{2}(x-2)^3 - 4$

Base	
x	y
-2	-8
-1	-1
0	0
1	1
2	8

Transformed	
x	y
0	-8
1	-4.5
2	-4
3	-3.5
4	0

The Function: Absolute Value

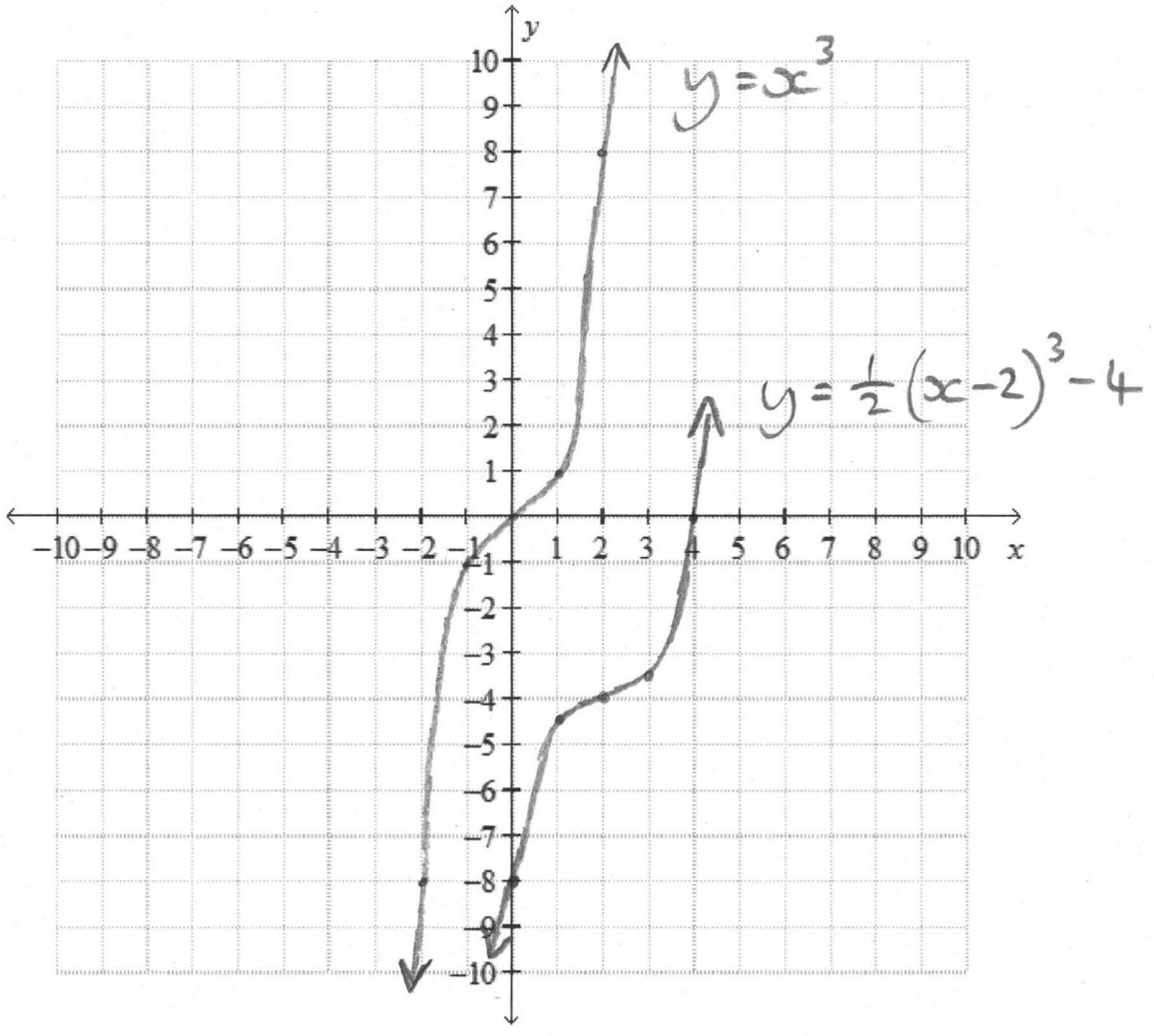
The Base Function	$y = \|x\|$
A Transformed Function	$y = -3\|x-2\| - 5$

Base	
x	y
-2	2
-1	1
0	0
1	1
2	2

Transformed	
x	y
0	-11
1	-8
2	-5
3	-8
4	-11

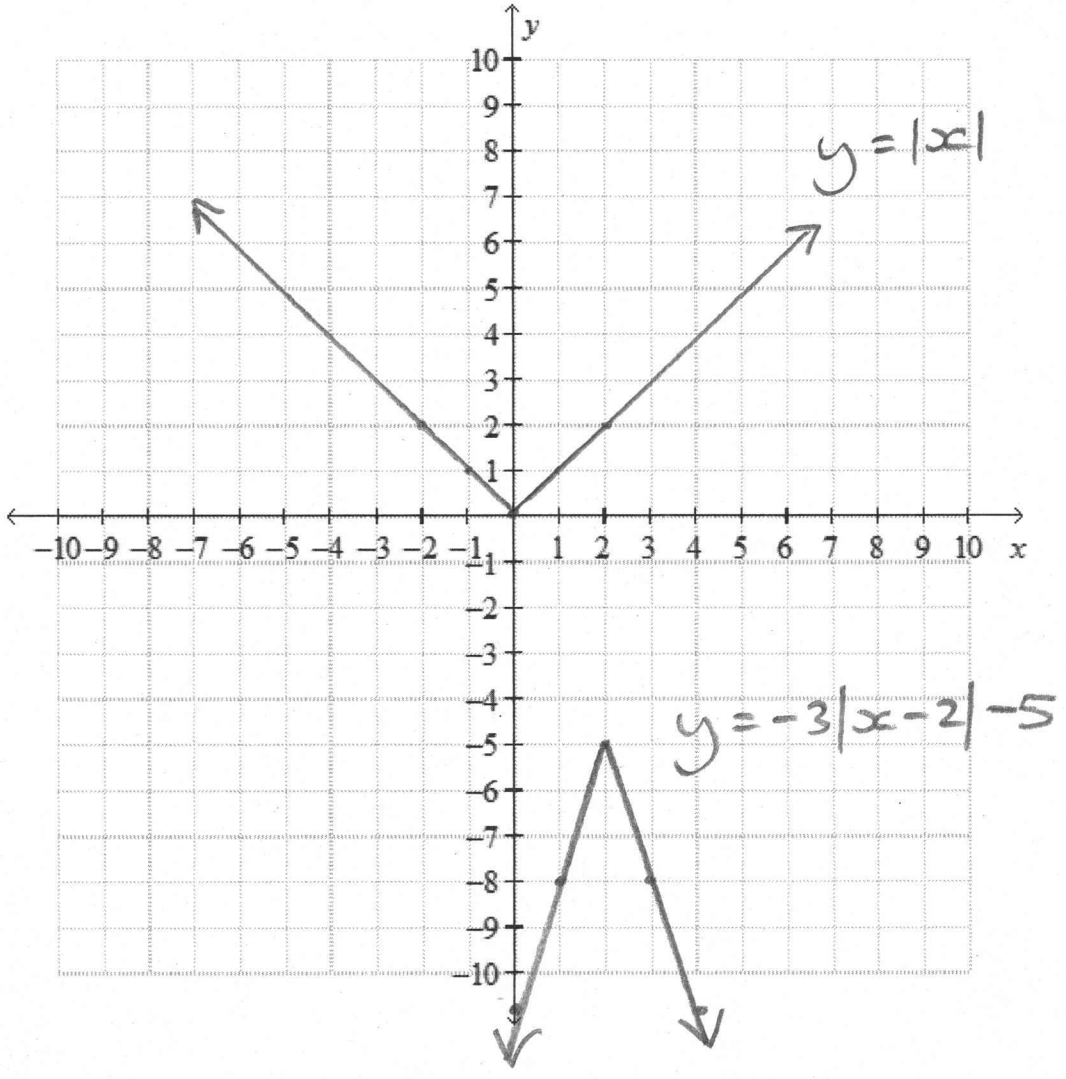
The Function: CUBIC

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	NO	NO
Does this graph have a lowest point? If so, what is it?	NO	NO
Does this graph have a furthest point to the left? If so, what is it?	NO	NO
Does this graph have a furthest point to the right? If so, what is it?	NO	NO
Describe the shape of this graph	INCREASING WITH A "STEP" AT (0,0)	INCREASING WITH A "STEP" AT (2,-4)



The Function: ABSOLUTE VALUE

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	NO	YES (2,-5)
Does this graph have a lowest point? If so, what is it?	YES (0,0)	NO
Does this graph have a furthest point to the left? If so, what is it?	NO	NO
Does this graph have a furthest point to the right? If so, what is it?	NO	NO
Describe the shape of this graph	DECREASING THEN INCREASING WITH A "VERTEX" AT (0,0)	INCREASING THEN DECREASING WITH A "VERTEX" AT (2,-5)



The Function: Reciprocal

The Base Function	$y = \frac{1}{x}$
A Transformed Function	$y = \frac{1}{x+2} - 3$

Base	
x	y
-2.5	-0.4
-2	-0.5
-1.5	$-0.\overline{6}$
-1	-1
-0.5	-2
0	ERROR
0.5	2
1	1
1.5	$0.\overline{6}$
2	0.5
2.5	0.4

Transformed	
x	y
-4.5	-3.4
-4	-3.5
-3.5	$-3.\overline{6}$
-3	-4
-2.5	-5
-2	ERROR
-1.5	-1
-1	-2
-0.5	$-2.\overline{3}$
0	-2.5
0.5	-2.6

The Function: RECIPROCAL

	The Base Equation	A Transformed Equation
Does this graph have a highest point? If so, what is it?	NO	NO
Does this graph have a lowest point? If so, what is it?	NO	NO
Does this graph have a furthest point to the left? If so, what is it?	NO	NO
Does this graph have a furthest point to the right? If so, what is it?	NO	NO
Describe the shape of this graph	DECREASING WITH ASYMPTOTES AT $x=0$ AND $y=0$	DECREASING WITH ASYMPTOTES AT $x=-2$ AND $y=-3$