

General function transformation rules

Let $f(x)$ be some function, then determine what you think that each of the following transformations does.

$g(x) = f(x) + 4$	$j(x) = f(x) - 5$	$k(x) = f(x - 6)$	$p(x) = f(x + 3)$
If you add a constant to a function, Then	If you subtract a constant from a function, Then	If you subtract a number from each of the input of a function, Then	If you add a number to each of the input of a function, Then

This is $f(x) = x^3$

x	-2	-1	0	1	2
f(x)	-8	-1	0	1	8

Sketch $j(x) = f(x) - 5$ and complete the table below.

x	-2	-1	0	1	2
j(x)					

Sketch $k(x) = f(x - 6)$ and complete the table below.

x	-2	-1	0	1	2
k(x)					

Answer these questions based on your sketches and your tables.

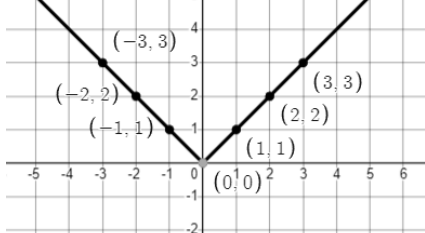
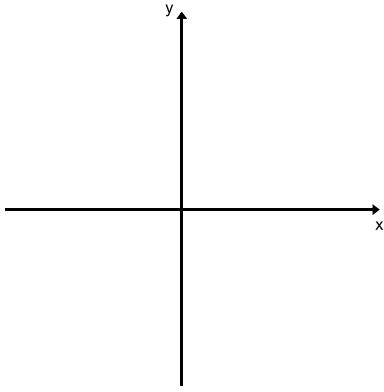
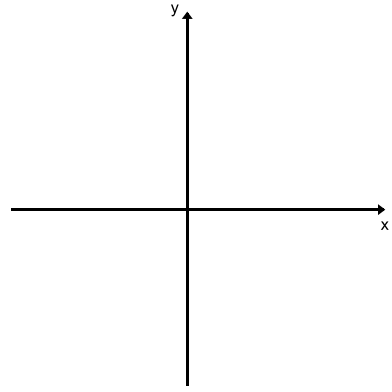
$j(x) = f(x) - 5$ is a _____ translation (horizontal/vertical) because it moved its point of inflection and all its other points _____ (horizontally/vertically)

$k(x) = f(x - 6)$ is a _____ translation (horizontal/vertical) because it moved its point of inflection and all its other points _____ (horizontally/vertically)

$g(x) = f(x) + 4$	$j(x) = f(x) - 5$	$k(x) = f(x - 6)$	$p(x) = f(x + 3)$
State the new point of inflection. (____, ____)	State the new point of inflection. (____, ____)	State the new point of inflection. (____, ____)	State the new point of inflection. (____, ____)
State the new y intercept. (____, ____)	State the new y intercept. (____, ____)	State the new y intercept. (____, ____)	State the new y intercept. (____, ____)

Let $f(x)$ be some function, then determine what you think that each of the following transformations does.

$g(x) = f(x + 2) + 4$	$j(x) = f(x - 1) - 5$	$k(x) = f(x - 6) + 7$	$p(x) = f(x + 3) - 8$
If you add a constant to a function and add a number to each of the input of a function, Then	If you subtract a constant from a function and subtract a number from each of the input of a function, Then	If you subtract a number from each of the input of a function and subtract a constant from the function, Then	If you add a number to each of the input of a function and subtract a constant from the function, Then

 <p>This is $f(x) = x$</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>f(x)</td> <td>2</td> <td>1</td> <td>0</td> <td>1</td> <td>2</td> </tr> </table>	x	-2	-1	0	1	2	f(x)	2	1	0	1	2	<p>Sketch $g(x) = f(x + 2) + 4$ and complete the table below.</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>g(x)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	x	-2	-1	0	1	2	g(x)						<p>Sketch $p(x) = f(x + 3) - 8$ and complete the table below.</p>  <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>p(x)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	x	-2	-1	0	1	2	p(x)					
x	-2	-1	0	1	2																																	
f(x)	2	1	0	1	2																																	
x	-2	-1	0	1	2																																	
g(x)																																						
x	-2	-1	0	1	2																																	
p(x)																																						

Answer these questions based on your sketches and your tables.

$g(x) = f(x + 2) + 4$ shifted its points _____ and _____ its vertex is located at _____

$j(x) = f(x - 1) - 5$ shifted its points _____ and _____ its vertex is located at _____

$k(x) = f(x - 6) + 7$ shifted its points _____ and _____ its vertex is located at _____

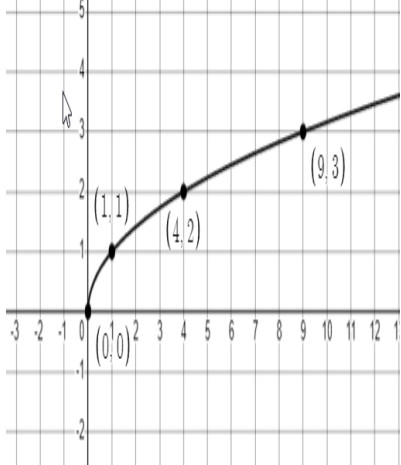
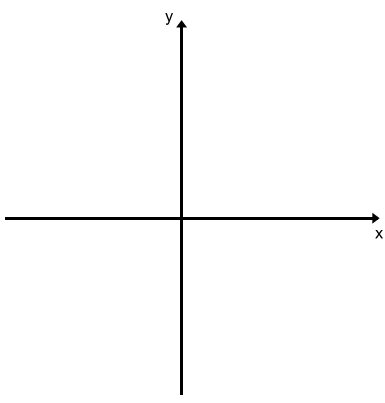
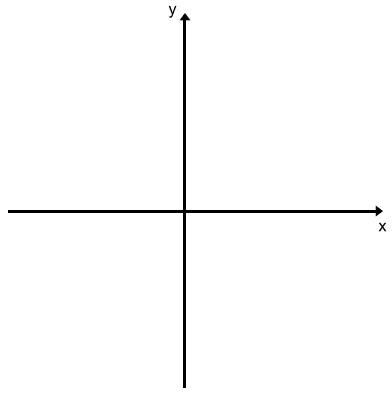
$p(x) = f(x + 3) - 8$ shifted its points _____ and _____ its vertex is located at _____

Use the ZERO feature on the TI Nspire to find the x intercepts of each of the functions or state why this is impossible.

State the x intercepts of $g(x) = f(x + 2) + 4$	State the x intercepts of $j(x) = f(x - 1) - 5$	State the x intercepts of $k(x) = f(x - 6) + 7$	State the x intercepts of $p(x) = f(x + 3) - 8$
--	--	--	--

Let $f(x)$ be some function, then determine what you think that each of the following transformations does.

$g(x) = -1f(x)$	$j(x) = f(-1x)$	$k(x) = \frac{1}{2}f(x)$	$p(x) = -3f(x)$
If you multiply a function by -1, Then	If you multiply a function's input by -1, Then	If you multiply a function by a positive number between 0 and 1, Then	If you multiply a function by a negative number that is smaller than -1, Then

 <p>This is $f(x) = \sqrt{x}$</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>x</td> <td>-4</td> <td>-1</td> <td>0</td> <td>1</td> <td>4</td> </tr> <tr> <td>f(x)</td> <td>und</td> <td>und</td> <td>0</td> <td>1</td> <td>2</td> </tr> </table>	x	-4	-1	0	1	4	f(x)	und	und	0	1	2	<p>Sketch $g(x) = -1f(x)$ and complete the table below.</p> <div style="text-align: center;">  </div> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>x</td> <td>-4</td> <td>-1</td> <td>0</td> <td>1</td> <td>4</td> </tr> <tr> <td>g(x)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	x	-4	-1	0	1	4	g(x)						<p>Sketch $k(x) = \frac{1}{2}f(x)$ and complete the table below.</p> <div style="text-align: center;">  </div> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>x</td> <td>-4</td> <td>-1</td> <td>0</td> <td>1</td> <td>4</td> </tr> <tr> <td>k(x)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	x	-4	-1	0	1	4	k(x)					
x	-4	-1	0	1	4																																	
f(x)	und	und	0	1	2																																	
x	-4	-1	0	1	4																																	
g(x)																																						
x	-4	-1	0	1	4																																	
k(x)																																						

Answer these questions based on your sketches and your tables.

Use these words: **vertically stretched, vertically compressed, vertically reflected, or horizontally reflected.**

If we multiply a function by a number between 0 and 1, then the function is said to have been _____

If we multiply a function by a number between -1 and 0, then the function is said to have been _____ & _____

If we multiply a function by a number greater than 1, then the function is said to have been _____

If we multiply a function by a number less than -1, then the function is said to have been _____ & _____

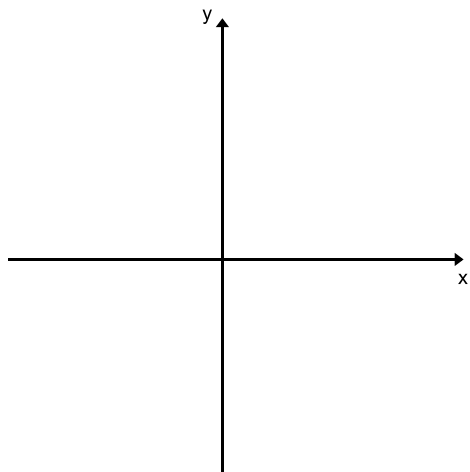
If we multiply a function by ANY negative number, then the function is said to have been _____

SPECIAL CASE

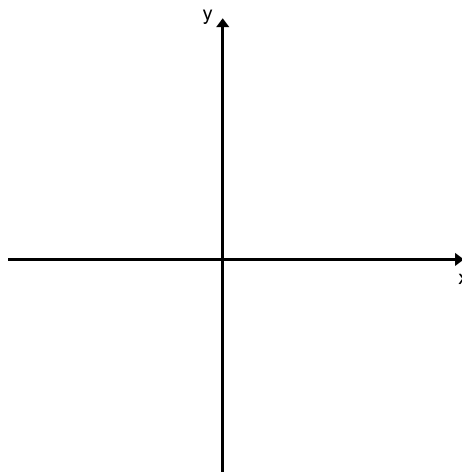
If we multiply a function's input values by -1, then the function is said to have been _____

- Sketch each of the following transformations and label each of the following when present: (vertex, vertical asymptote, horizontal asymptote, point of inflection, local extreme, y intercept, or x intercept)
- Circle the types of transformations present.

$$f(x) = -1x^3 + 4$$



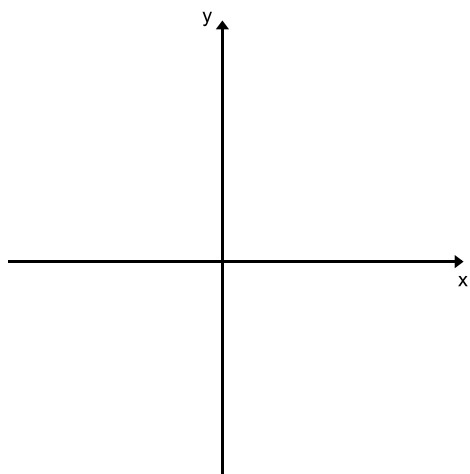
$$g(x) = 2(x - 3)^2 + 4$$



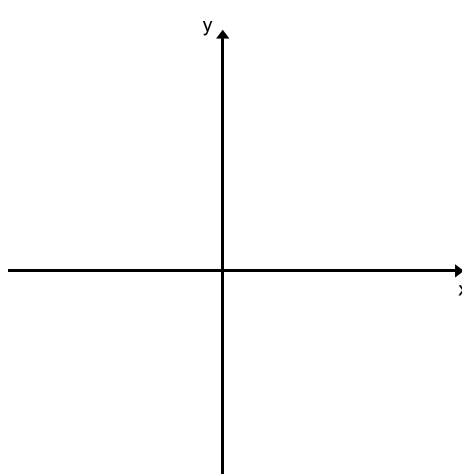
Translations	Shift LEFT	Shift RIGHT	Shift UP	Shift DOWN
Reflection	Horizontal	Vertical	NO Reflection	
Stretch	Horizontal	Vertical	NO Stretch	
Compression	Horizontal	Vertical	NO Compression	

Translations	Shift LEFT	Shift RIGHT	Shift UP	Shift DOWN
Reflection	Horizontal	Vertical	NO Reflection	
Stretch	Horizontal	Vertical	NO Stretch	
Compression	Horizontal	Vertical	NO Compression	

$$j(x) = \frac{-3}{2} \ln(x) - 2$$



$$p(x) = \sqrt[3]{8x} - 6$$



Translations	Shift LEFT	Shift RIGHT	Shift UP	Shift DOWN
Reflection	Horizontal	Vertical	NO Reflection	
Stretch	Horizontal	Vertical	NO Stretch	
Compression	Horizontal	Vertical	NO Compression	

Translations	Shift LEFT	Shift RIGHT	Shift UP	Shift DOWN
Reflection	Horizontal	Vertical	NO Reflection	
Stretch	Horizontal	Vertical	NO Stretch	
Compression	Horizontal	Vertical	NO Compression	