U3D3 MCR3UI

Vertical and Horizontal Translations of Functions

Vertical Translations

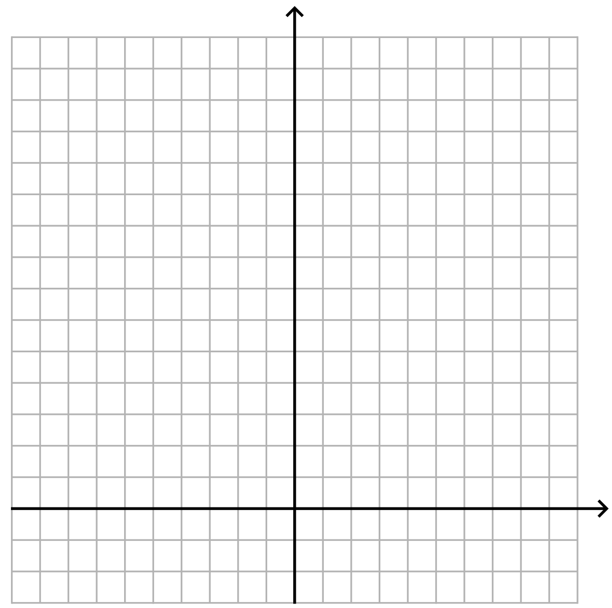
How do the graphs of $f(x) = x^2$ and $y = x^2 + 3$ compare? (Sketch, state domain and range):

$f(x) = x^2$

x	f(x)

$y = x^2 + 3$

x	y



D: { } D: { }

R: { } R: { }

The second graph is a ___________________ translation of 3 units ___________

from the first graph. (All y-values in f(x) have been translated _________).

To write the second graph in function notation, we write_____________________

2. Describe the graph of $y = \sqrt{x} - 3$.

The graph of $y = \sqrt{x} - 3$ is a ______________ translation of 3 units _____________ from the graph of g(x) = ______. $y = \sqrt{x} - 3$ is ________________ in function notation.

State the Domain and Range of each graph in the description above:

g(x) = ______ y = ______

D: { } D: { }

R: { } R: { }

The graph of y = f(x) + k is congruent to y = f(x).
If k > 0, translate the graph of f(x) k-units up.
If k < 0, translate the graph of f(x) k-units down.

U3D3 MCR3UI

Horizontal Translations

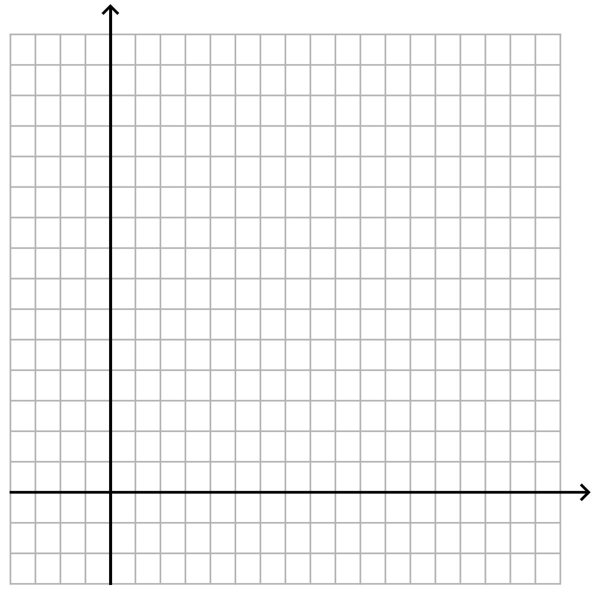
How do the graphs of $h(x) = \sqrt{x}$ and $y = \sqrt{x+2}$ compare? (Sketch, state domain and range)

$h(x) = \sqrt{x}$

x	h(x)
0	
1	
4	
9	
16	

$y = \sqrt{x+2}$

x	y
-2	
-1	
2	
7	
14	



D: {   }   D:{   }

R: {   }   R:{   }

The graph of $y = \sqrt{x+2}$ is a ________________ translation of 2 units to the __________ of the graph $h(x) = \sqrt{x}$. In function notation, y =

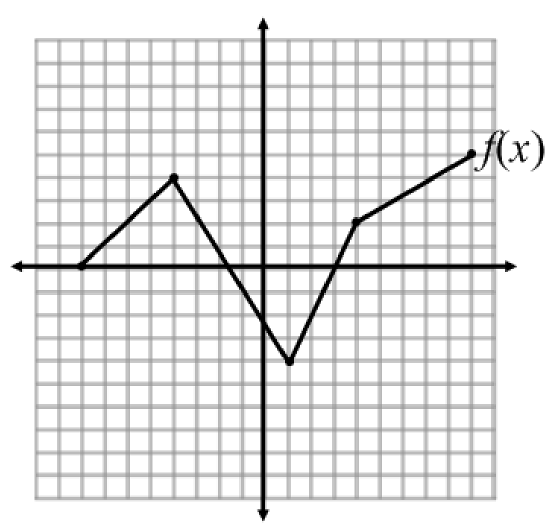
The graph of y = f(x-h) is congruent to the graph of y = f(x).
If h > 0, translate the graph of f(x) to the right h-units.
If h < 0, translate the graph of f(x) to the left h-units.

Note: ***Remember, for horizontal shifts, it is opposite of what you see in the brackets.***

Examples:

1. Describe the graph of $y = (x+4)^2 - 5$.

2. For the function shown, $f(x)$,
   i) describe how the graph of $y = f(x - 2) + 3$ can be obtained from the graph of $y = f(x)$



   ii) graph $y = f(x - 2) + 3$

3. Given $j(x) = \frac{1}{x}$. Determine the equation of $y = j(x - 5) + 3$. Describe the graph of the second function.

4. Given $h(x) = \sqrt{x}$.

a) Use function notation to describe the graph of h(x), shifted left 11 units and up 5 units.

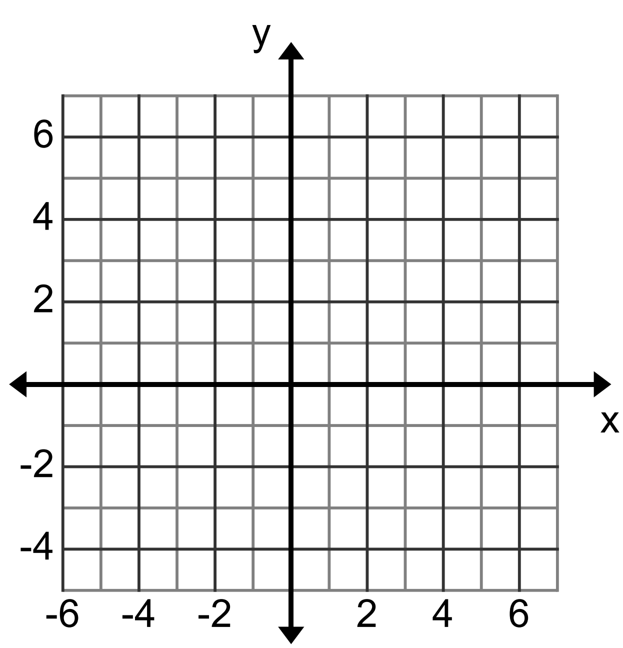
b) Write the equation of the translated function described in part (a).

5. Given $m(x) = \frac{1}{x+3}$.

a) Write the image equation for the transformation $y = m(x - 7) + 2$.

b) State the Domain and Range of each function.

c) Graph both functions on the same grid.



p. 189 #1,2,3,4i,5(no check), 7, 15, 16, **10, 13, 17**