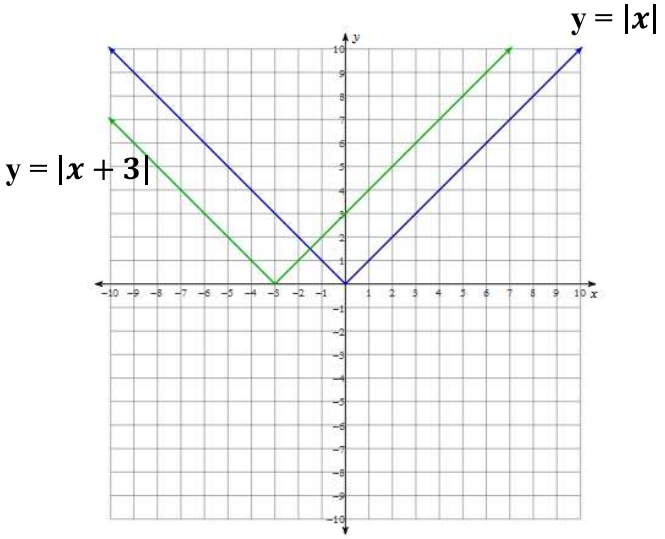
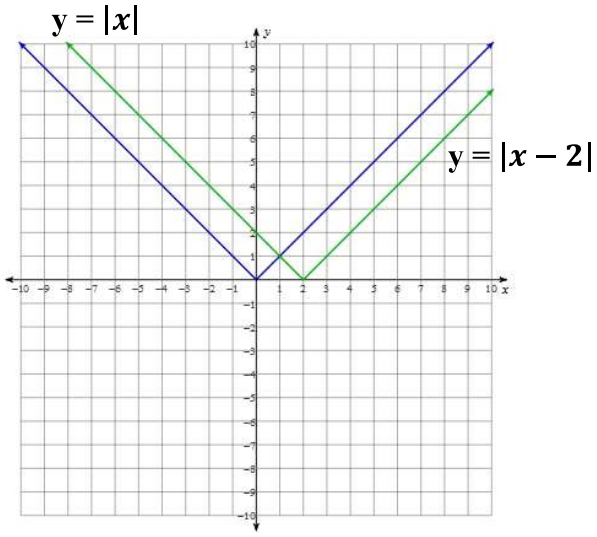
Exercise 1: Compare the graph of the function $y = |x + 3|$ and $y = |x - 2|$ to the graph of the parent function $\boldsymbol{y = |x|}$



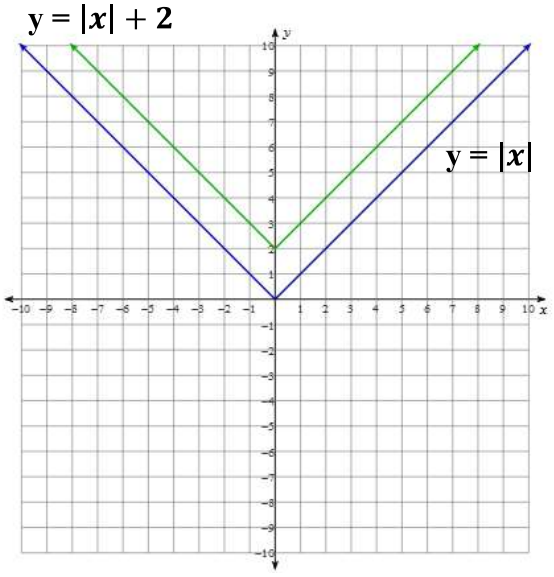


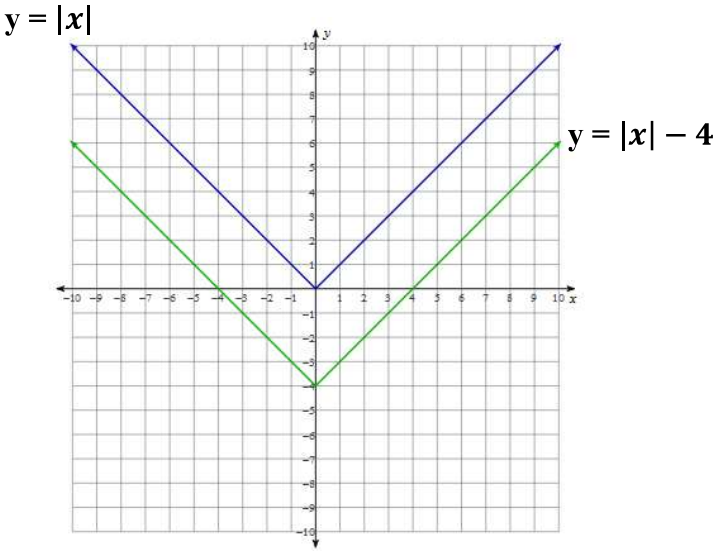
SUMMARY

When $y=|x + h|$ the graph is shifted _____

When $y=|x - h|$ the graph is shifted _____

Exercise #2: Compare the graph of the function $y = |x| + 2$ and $y = |x| - 4$ to the graph of the parent function $\boldsymbol{y = |x|}$





SUMMARY

When $y=|x| + k$ the graph is shifted _____

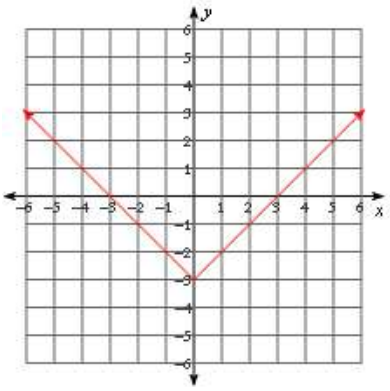
When $y=|x| - k$ the graph is shifted _____

A translation is a shift of a graph vertically, horizontally, or both. The resulting graph is the same size and shape as the original but is in a different position in the plane.

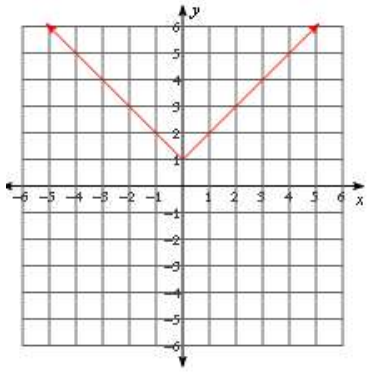
Graphs of Absolute Value Functions
• If $y=\|x+h\|$, the graph translates h units to the _____
• If $y=\|x-h\|$, the graph translates h units to the _____
• If $y=\|x\|+k$, the graph translates k units to the _____
• If $y=\|x\|-k$, the graph translates k units to the _____

Practice: Writing equations of an absolute value finction from its graph.
Write an equation for each translation of $y=|x|$ shown below.

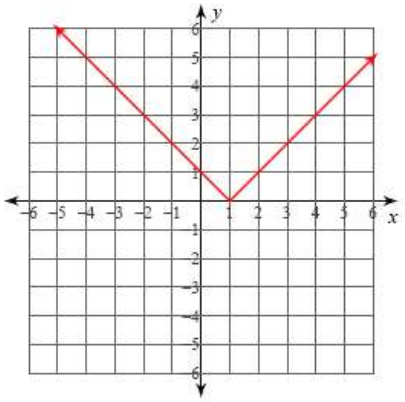
a)



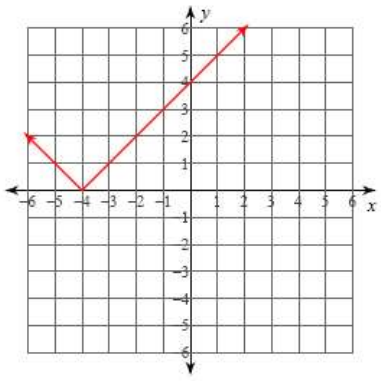
b)



c)



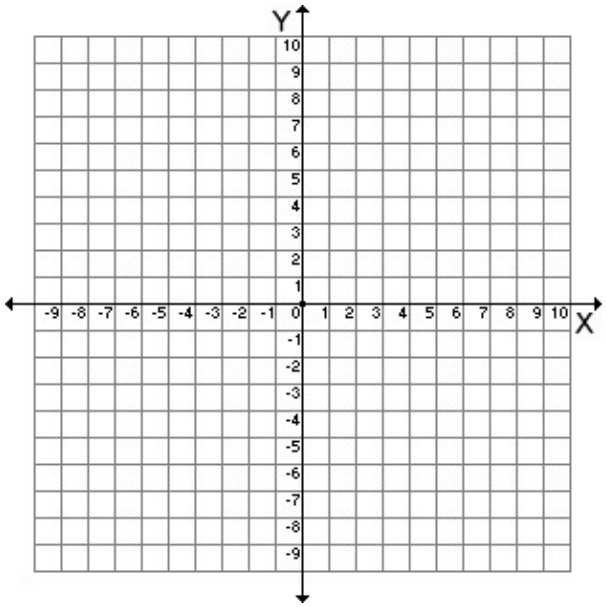
d)



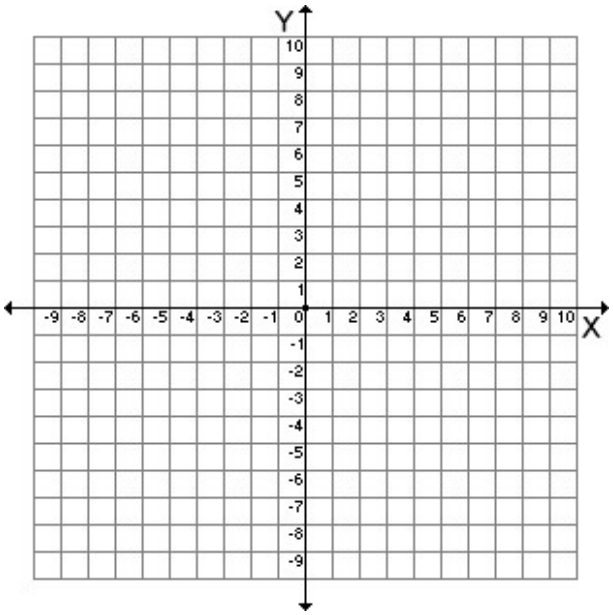
Vertical and Horizontal Translations

Graph each translation.

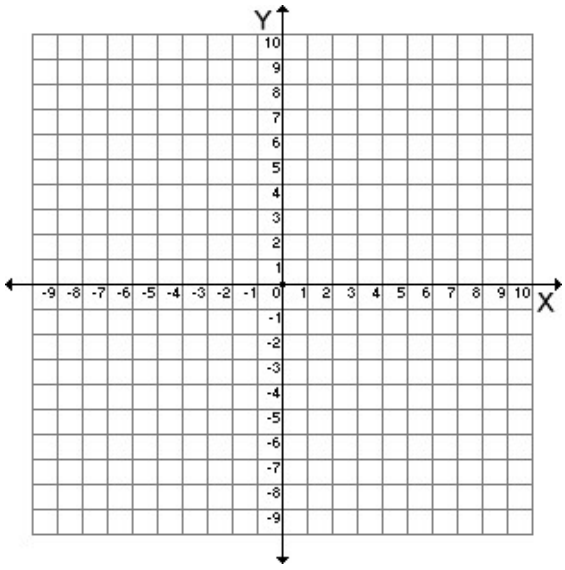
e) $y=|x|+5$



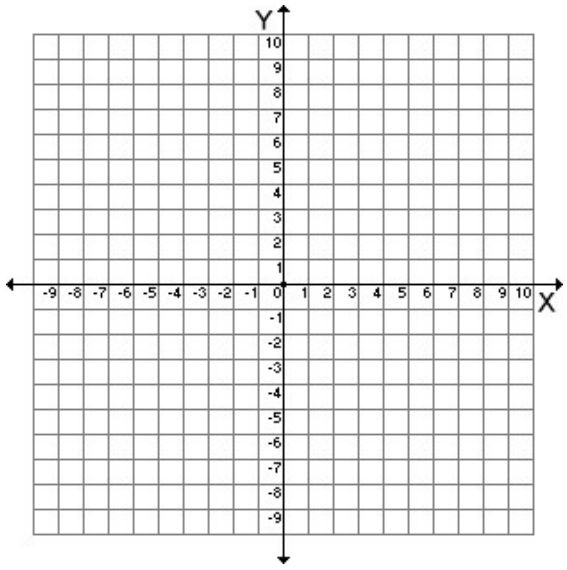
f) $y=|x-4|$



g) $y=|x-6|-2$

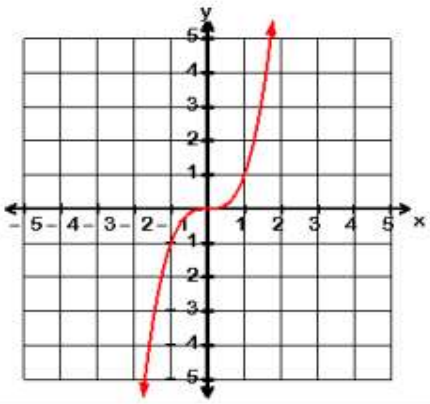


h) $y=|x+8|+3$

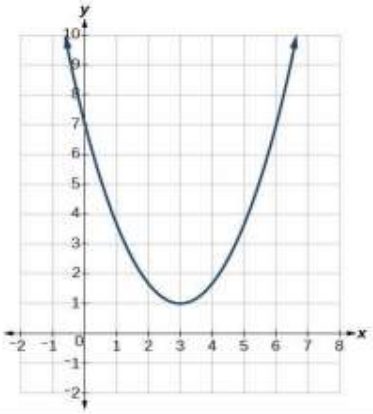


Practice with Translations

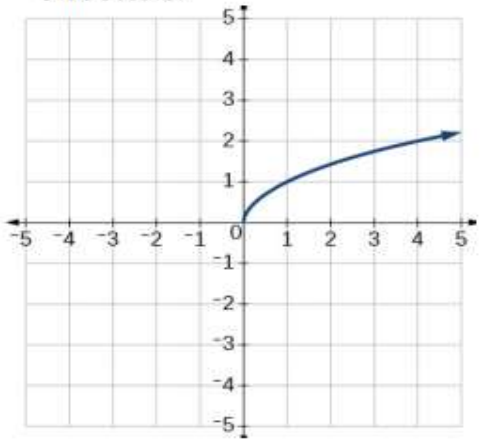
5) Given the graph of $f(x)$ below, graph $g(x) = f(x-5)$ and state the transformation that occurs.



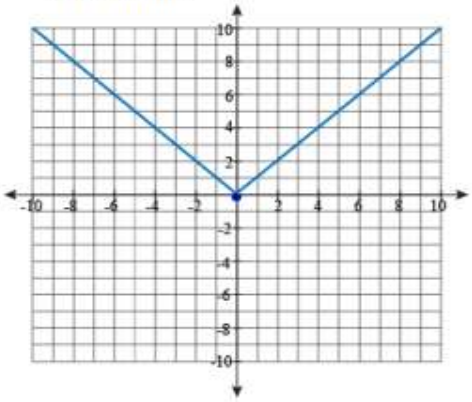
6) Given the graph of $f(x)$ below, graph $g(x) = f(x)-3$ and state the transformation that occurs.



7) Given the graph of $f(x)$ below, graph $g(x) = f(x-1)+3$ and state the transformation that occurs.



8) Given the graph of $f(x)$ below, graph $g(x) = f(x+2)-1$ and state the transformation that occurs.



9)

a. If $g(x) = f(x) - 2$, how is the graph of $f(x)$ translated to form the graph of $g(x)$?

b. If $h(x) = f(x-4)$, how is the graph of $f(x)$ translated to form the graph of $h(x)$?

SUMMARY

A translation is a shift of a graph vertically, horizontally, or both. The resulting graph is the same size and shape as the original but is in a different position in the plane.

Graphs of Absolute Value Functions
• If $y=\|x+h\|$, the graph translates h units to the left
• If $y=\|x-h\|$, the graph translates h units to the right
• If $y=\|x\|+k$, the graph translates k units to the up
• If $y=\|x\|-k$, the graph translates k units to the down

$y = a|x - h| + k$; **Vertex = (h, k)**

Exit Ticket

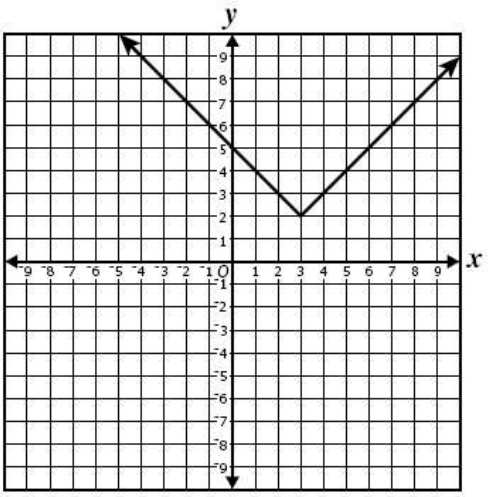
The graph *most* accurately represents which of the following functions?

A $y=|x+3|+2$

B $y=|x-3|+2$

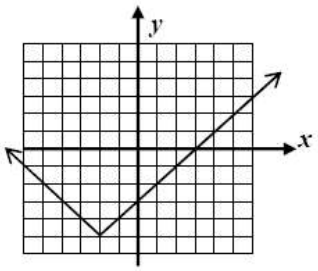
C $y=|x-2|+3$

D $y=|x+2|+3$



Algebra 2: 6-1 Transformation of Absolute Value Functions

1. Which equation describes the graph shown below?

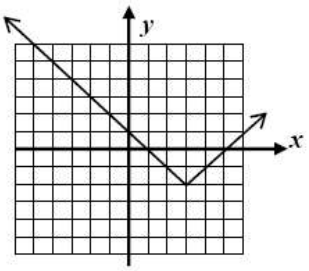


(1) $y=|x+2|-5$ (3) $y=|x-2|-5$

(2) $y=|x+5|+2$ (4) $y=|x-5|-2$

_____

2. Which equation describes the graph shown below?

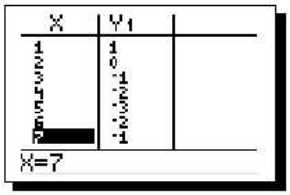


(1) $y=|x+3|-2$ (3) $y=|x-3|-2$

(2) $y=|x-2|-3$ (4) $y=|x+2|+3$

_____

3. Lorraine entered an absolute value function in her graphing calculator and produced the table shown below. What are the coordinates of the turning point of this absolute value function?



(1) $(1,1)$ (3) $(-3,5)$

(2) $(7,-1)$ (4) $(5,-3)$

_____

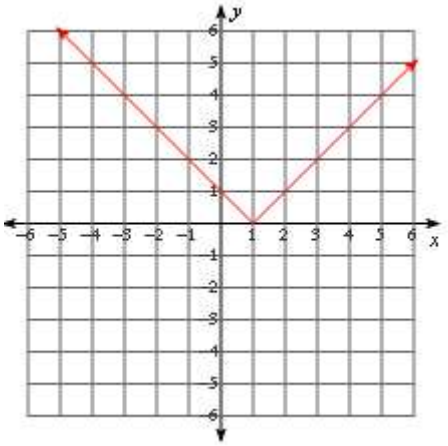
4. If a quadratic function f(x) has a turning point at (-3, 7) then where does the quadratic function *g* defined by $g(x)=f(x+4)+5$ have a turning point?

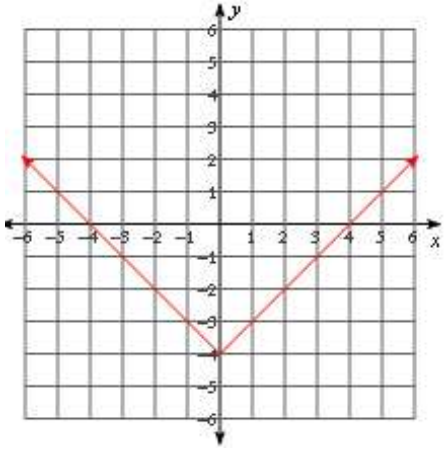
(1) (-7,12) (2) (-4, 5)
(3) (1, 12) (4) (4, 5)

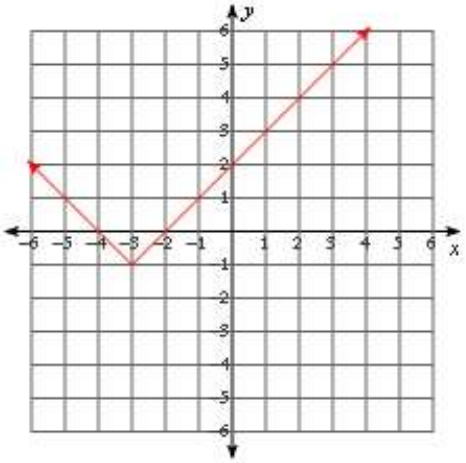
_____

In examples 5 – 13, write an equation for each translation of y = $|x|$.

5. 9 units up _____
6. 6 units down _____
7. right 4 units _____
8. left 12 units _____
9. 8 units up, 10 units left _____
10. 3 units down, 5 units right _____

11.  _____

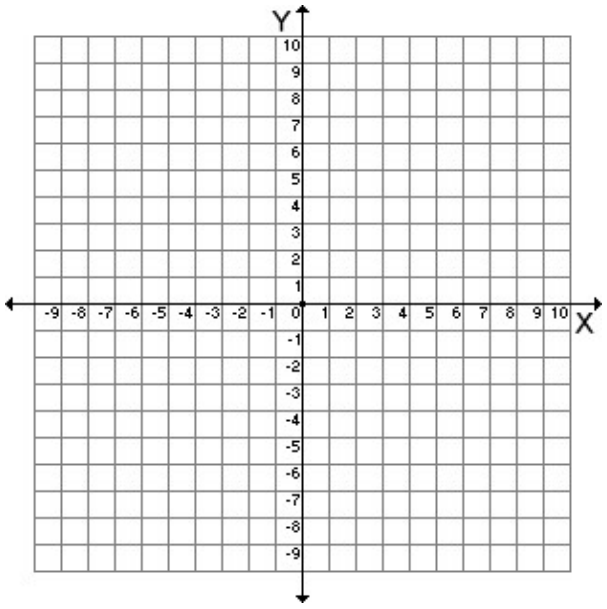
12.  _____

13.  _____

In examples 14 and 15, identify the vertex and graph each.

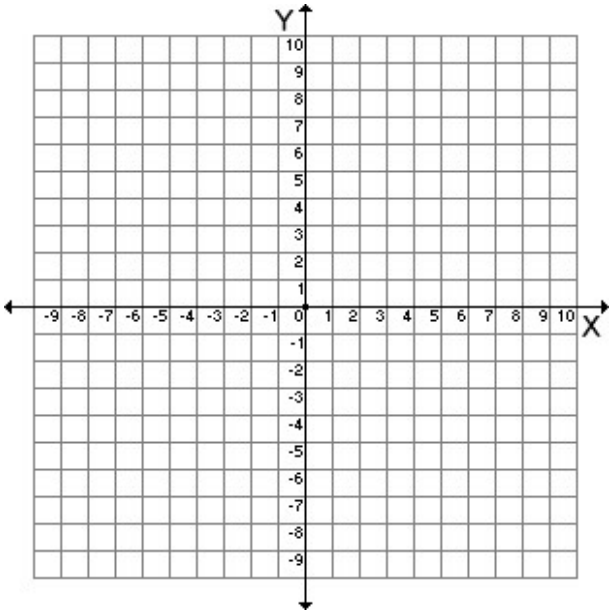
14) $y = |x - 1|$

Vertex: (___, ___)



15) $y = |x + 2| - 7$

Vertex: (___, ___)



16) Given the function f(x) shown below, create a graph for $h(x) = f(x) + 2$. Find the value of $h(2)$.