

## All Transformations Note Sheet

$$f(x) = \underline{a} \cdot \underline{b}(x - \underline{h}) + \underline{k}$$

$$g(x) = \underline{a} \cdot (\underline{b}(x - \underline{h}))^2 + \underline{k}$$

a: vertical dilation  $\rightarrow$  multiply y-values by a  
 ex:  $y = 5x^2 \rightarrow$  VD5      a is  $\ominus$  reflect over x-axis

\* b: horizontal dilation  $\rightarrow$  multiply x-values  
 ex:  $y = (4x)^2 \rightarrow$  HD 1/4      b is  $\ominus$  reflect over y-axis

h: left & right movement  
 ex:  $y = |x - 4| \rightarrow R4$

k: up & down movement  
 ex:  $y = x^2 + 7 \rightarrow U7$

### Writing Equations Given Transformations

Parent Function	$y = x^2$	$y =  x $	$f(x)$
Translations -Left 2 units -Down 3 units			
Reflection across the x-axis			
Reflection across the y-axis			
Vertical Dilation by a factor of 4			
Horizontal Dilation by a factor of 3			

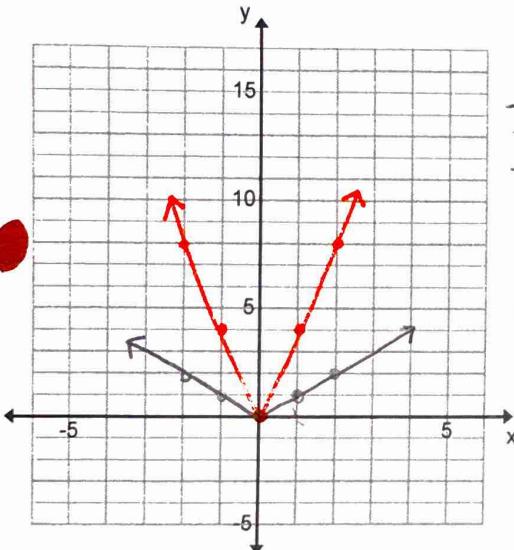
## Dilations & Full Transformations

**Overall Notes:**

always reflect/dilate 1st!

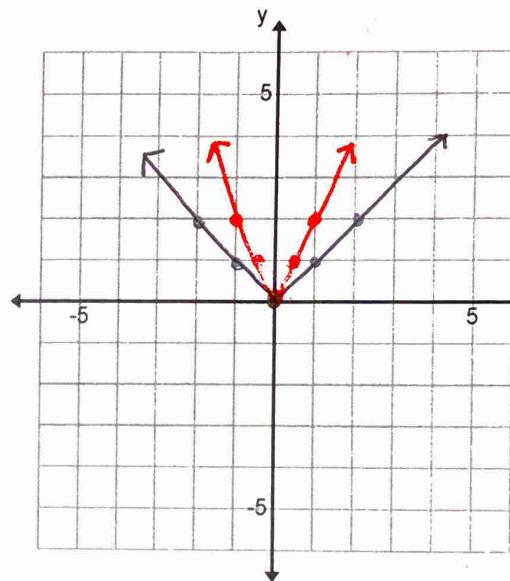
Examples:

1.  $y = 4|x|$  → VD4 (·y's by 4)



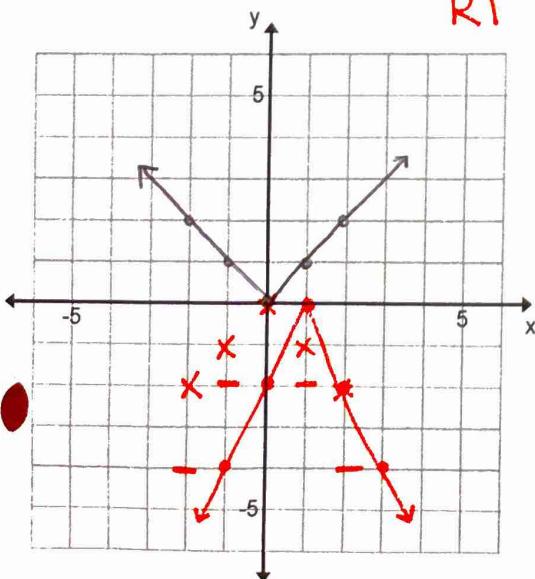
X	Y	4Y
-2	2	8
-1	1	4
0	0	0
1	-1	-4
2	-2	-8

2.  $y = |2x|$  → HD 1/2 (·x's by 1/2)

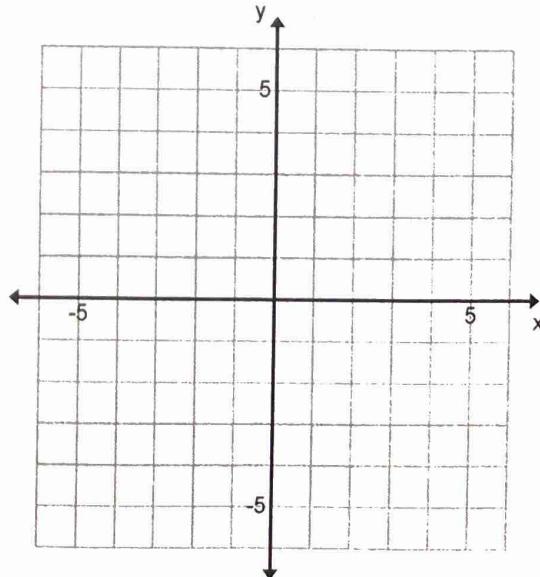


$\frac{1}{2}x$	X	Y
-1	-2	2
-1/2	-1	1
0	0	0
1/2	1	1
1	2	2

3.  $f(x) = -2|x - 1|$  Over x-axis  
VD2  
R1



4.  $f(x) = \frac{1}{4}(x + 1)^2 - 2$



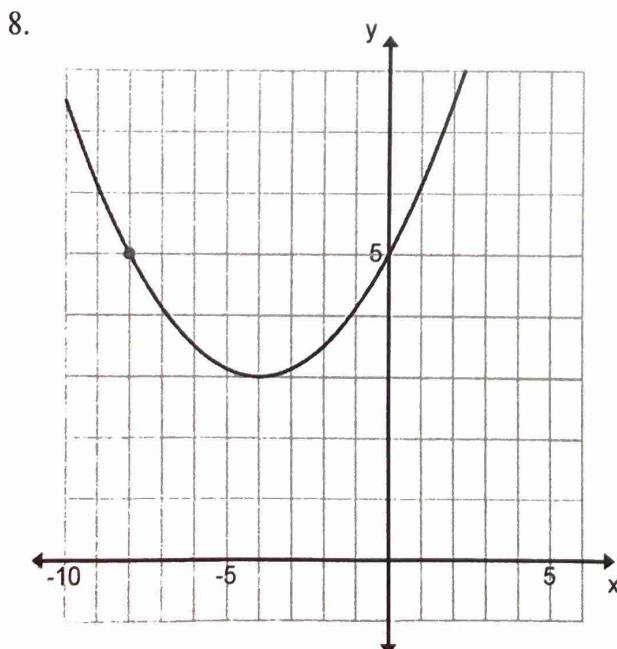
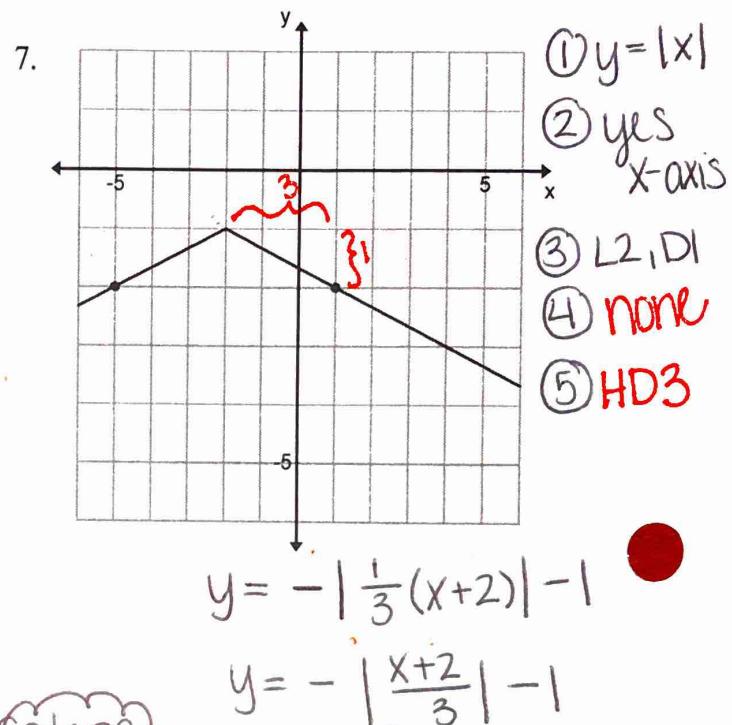
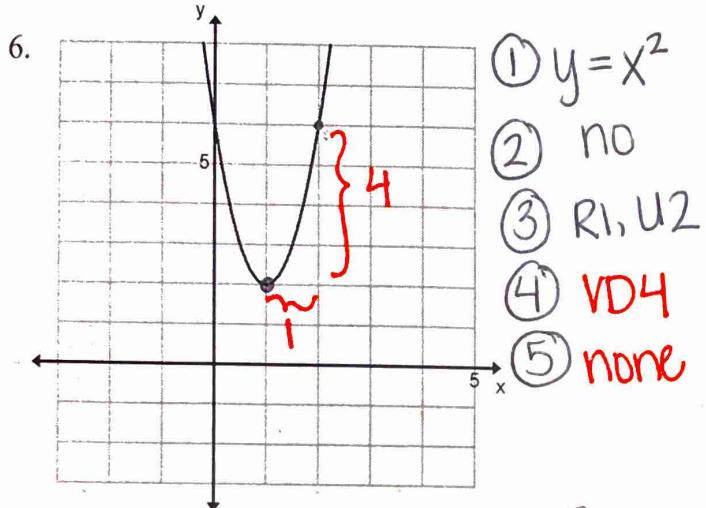
5. Write the equation of the graph given the transformations.

a. the graph  $f(x) = x^2$  moved up 2 and vertically dilated by 5

b. the graph  $f(x)$  moved left 4, horizontally dilated by 3 and reflected over the x-axis

c. the graph of  $f(x) = |x|$  reflected over the y-axis, moved down 4 and vertically dilated by  $\frac{1}{2}$

Given the graphs list the transformations & find the equation.



- Steps
- ① parent function
  - ② reflection?
  - ③ movement (L/R & U/D)  
 → look at vertex, should be (0,0)
  - ④ vertical dilation  
 → look at spaces vertically btwn vertex & next point
  - ⑤ horizontal dilation  
 → look at spaces horizontally btwn vertex & next point