

Sec. 4.1

Translations and Transformations

Ready: For each function below, identify the transformations made to the parent function.

1.  $f(x) = \sqrt{x} - 3$

down 3

2.  $f(x) = |x + 2|$

left 2

3.  $f(x) = x^2 + 5$

up 5

4.  $f(x) = (x - 4)^2$

right 4

5.  $f(x) = |x - 3| + 1$

right 3  
up 1

6.  $f(x) = -4\sqrt{x+1} + 2$

left 1, up 2  
reflect down, vertical stretch by a factor of 4.

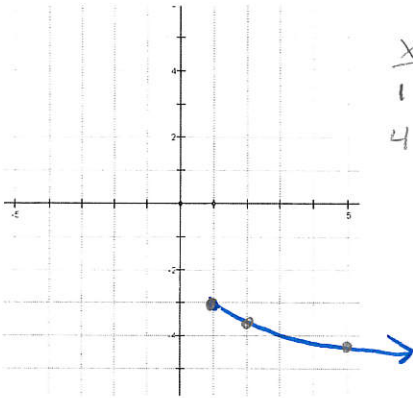
Set: Identify the transformations for each function then Sketch a graph of the function. (No Calculator)

7.  $f(x) = -\frac{2}{3}\sqrt{x-1} - 3$

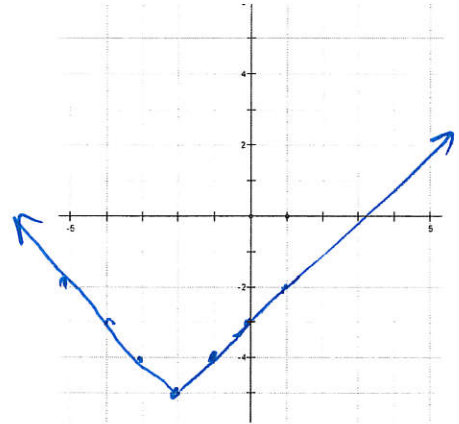
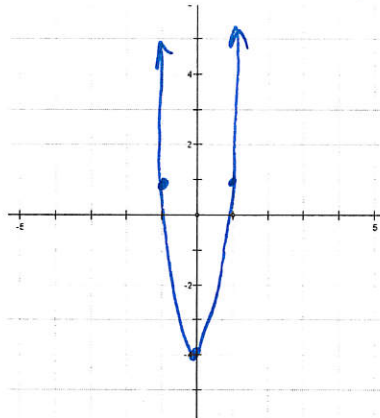
V: (1, -3)

8.  $f(x) = 5x^2 - 4$  (0, -4)

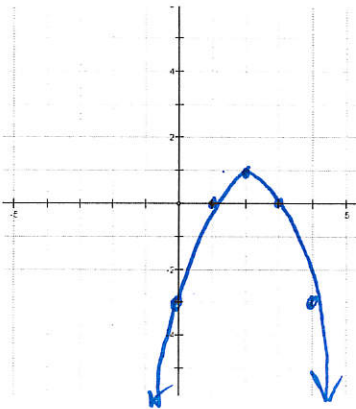
9.  $f(x) = |x + 2| - 5$  (-2, -5)



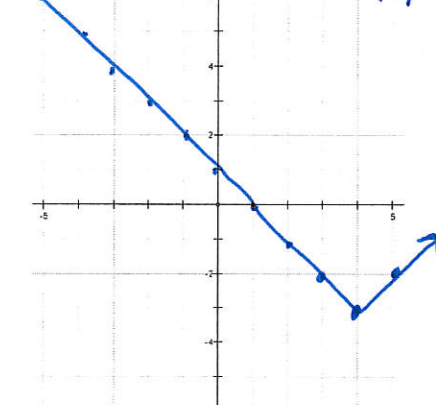
x	y
1	-2/3
4	-4/3



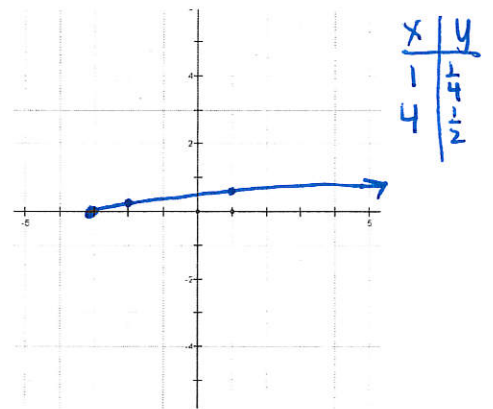
10.  $f(x) = -(x-2)^2 + 1$  (2, 1)



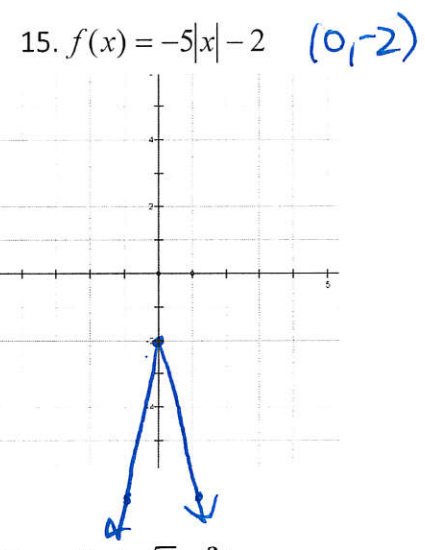
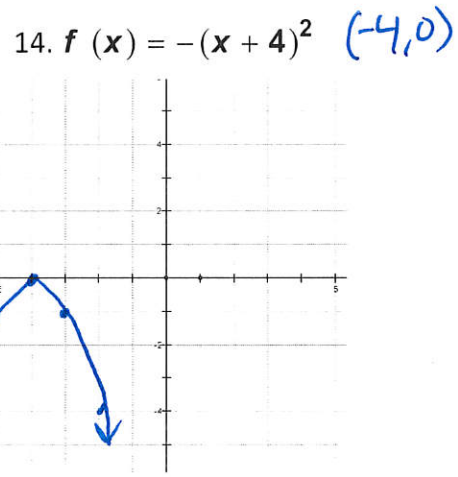
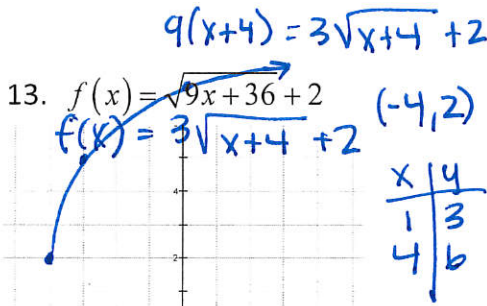
11.  $f(x) = |x - 4| - 3$  (4, -3)



12.  $f(x) = \frac{1}{4}\sqrt{x+3}$  (-3, 0)



x	y
1	1/4
4	1/2



Write the function with the indicated transformations. Use the given parent functions ( $|x|, \sqrt{x}, x^2$ )

16. An absolute value function. Vertical stretch by a factor of 3, horizontal shift left 5

$f(x) = 3|x+5|$

17. A square root function. Reflection across the x-axis, horizontal shift right 2

$f(x) = -\sqrt{x-2}$

18. A quadratic function. Vertical compression by a factor of 1/3, vertical shift down 5

$f(x) = \frac{1}{3}x^2 - 5$

19. A square root function. Vertical stretch by a factor of 4, horizontal shift left 3, vertical shift up 6

$f(x) = 4\sqrt{x+3} + 6$

20. An absolute value function. Reflection across the x axis, horizontal shift right 1, vertical shift down 4

$f(x) = -|x-1| - 4$

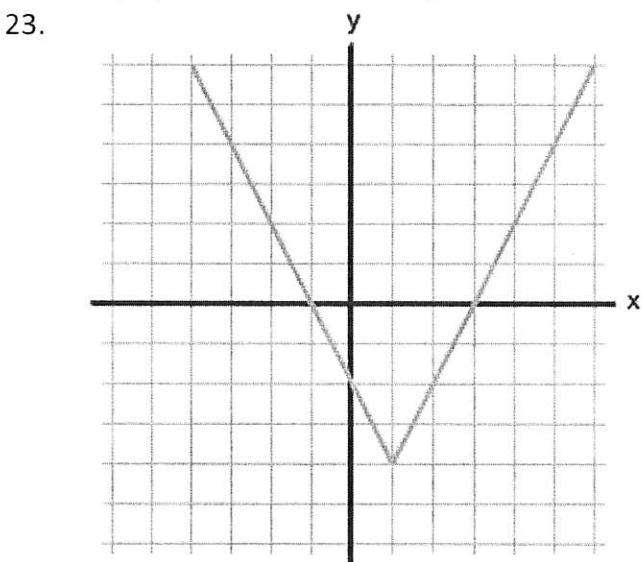
21. A quadratic function with a vertical compression by a factor 1/2, a reflection across the y axis, vertical shift up 2.

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

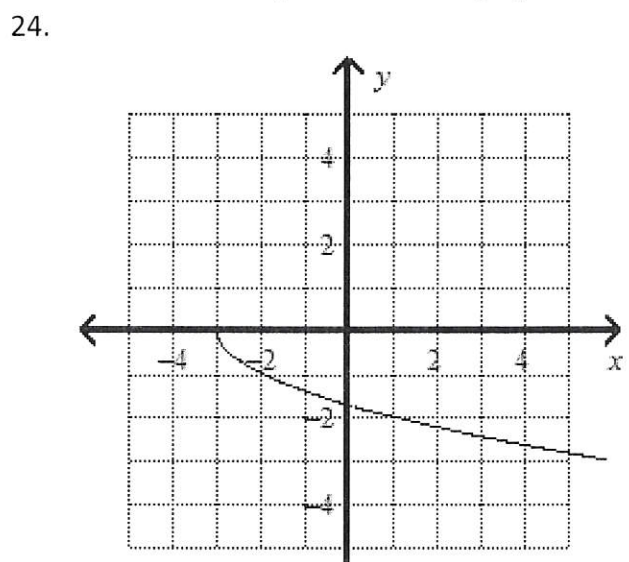
22. Simplify the square root to reveal the transformation. Then describe it  $f(x) = \sqrt{4x-16} - 1$ .

$f(x) = 2\sqrt{x-4} - 1$  right 4, down 1 stretch by factor of 2  $f(x) = 2\sqrt{x-4} - 1$

Use the graphs below to identify each function. Write the function that corresponds to each graph.



$f(x) = 2|x-1| - 4$



$f(x) = -\sqrt{x+3}$