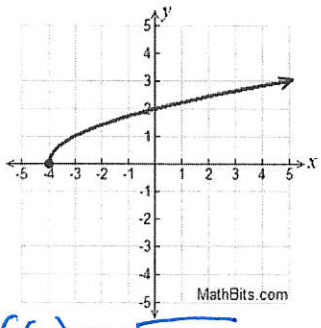
Name: Key

Sec. 4.2
Transformations in Function Notation

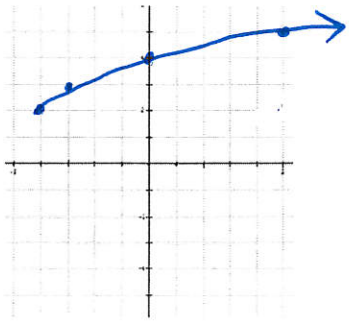
Let $f(x)$ be the function represented by the graph below. Perform each indicated transformation and graph the new function on the graph provided.



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

1. $g(x) = f(x) + 2$

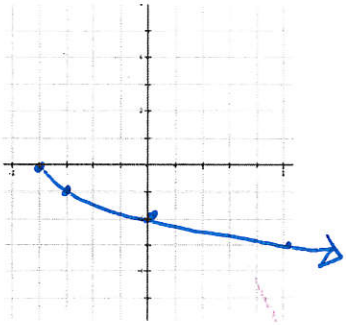
$g(x) = \sqrt{y+4} + 2$ up 2



2. $h(x) = -f(x)$

$h(x) = -\sqrt{y+4}$

flip over x-axis



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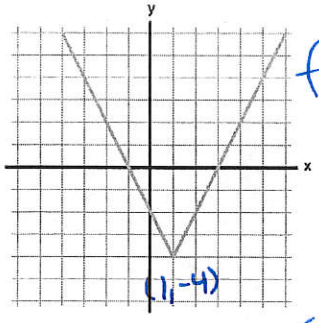
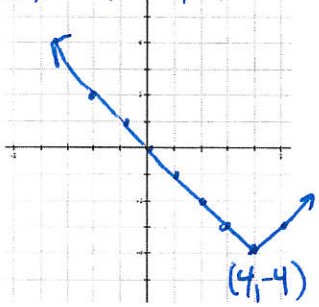


$f(x) = 2|x-1| - 4$

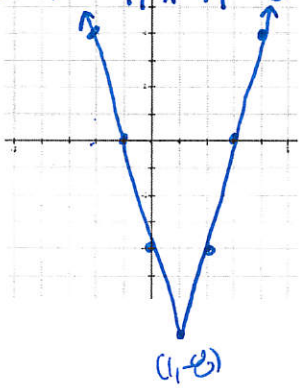
3. $k(x) = f(x-3)$ ← right 3

$k(x) = 2|x-4| - 4$



4. $m(x) = 2f(x)$ times by 2

$m(x) = 4|x-1| - 8$

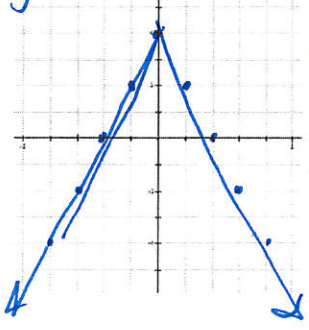


5. $j(x) = -f(x+1)$

$-[2|x-1+1|+4]$

$j(x) = -2|x-1+1|+4$

$j(x) = -2|x|+4$



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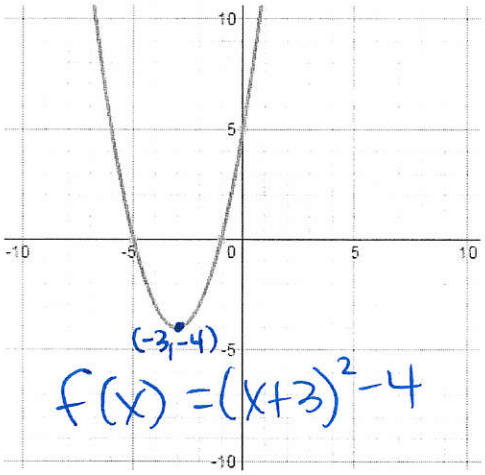
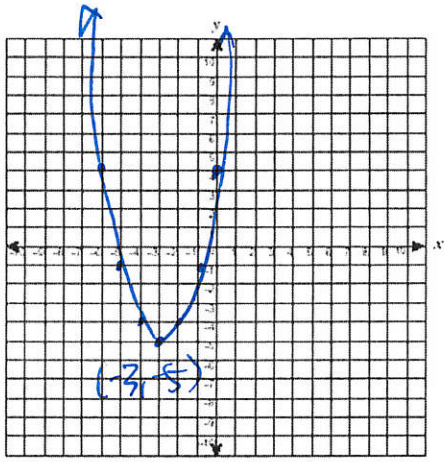


$f(x) = (x+3)^2 - 4$

6. $g(x) = f(x) - 1$ down 1

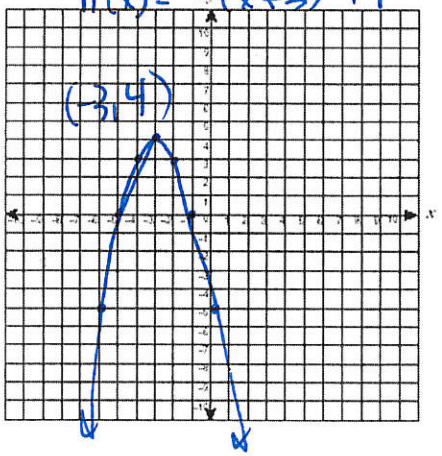
$g(x) = (x+3)^2 - 4 - 1$

$g(x) = (x+3)^2 - 5$



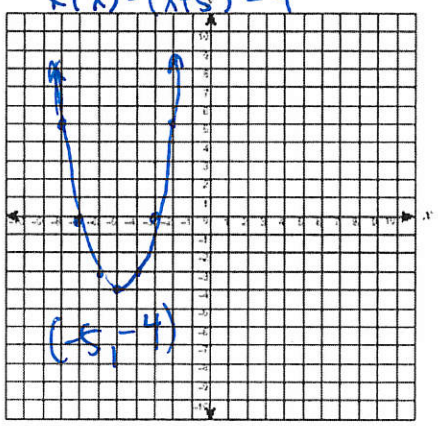
7. $h(x) = -f(x)$

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



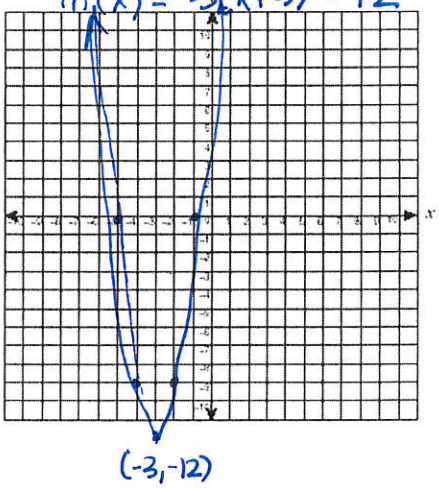
8. $k(x) = f(x+2)$ left 2

$k(x) = (x+5)^2 - 4$

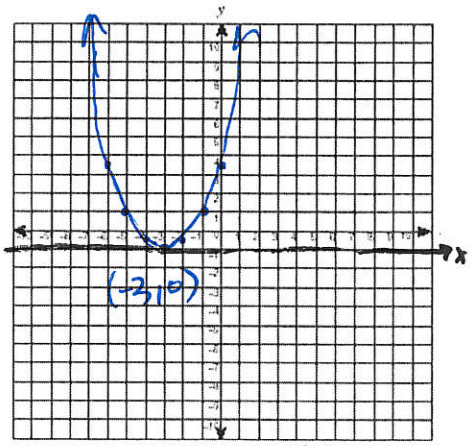


9. $m(x) = 3f(x)$

$m(x) = 3(x+3)^2 - 12$



10. $j(x) = \frac{1}{2}f(x) + 2$



$\frac{1}{2}[(x+3)^2 - 4] + 2 = \frac{1}{2}(x+3)^2 - 2 + 2$

$j(x) = \frac{1}{2}(x+3)^2$

Using the functions above evaluate them for the given values.

11. Find $h(-1)$ = 0

$-(-1+3)^2 + 4 = -(2)^2 + 4 = -4 + 4 = 0$

12. Find $k(-5)$ = -4

$(-5+5)^2 - 4 = 0^2 - 4 = 0 - 4 = -4$

13. Find $m(0)$ = 15

$3(0+3)^2 - 12$

$= 3(3)^2 - 12 = 3 \cdot 9 - 12 = 27 - 12 = 15$

14. Using full sentences, explain the process of transforming $f(x)$ to $g(x)$ if $g(x) = -3f(x-2) + 1$.

shift right 2, up 1, over x-axis, vertical stretch

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

15. A quadratic function: Reflection across the x-axis, horizontal shift right 3, vertical shift down 4

$f(x) = -(x-3)^2 - 4$

16. A square root function: Reflection across the y-axis, horizontal shift left 2

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

17. An absolute value function: Vertical compression by a factor of $\frac{1}{2}$, vertical shift down 6

$f(x) = \frac{1}{2}|x| - 6$

18. A square root function: Horizontal shift left 7, vertical shift up 3

$f(x) = \sqrt{x+7} + 3$

19. A quadratic function: Vertical stretch by a factor of 2, reflection across the y-axis, vertical shift down 5

$f(x) = 2(-x)^2 - 5$

20. An absolute value function: Reflection across the x-axis, horizontal shift left 3, vertical shift up 8

$f(x) = -|x+3| + 8$

21. A quadratic function: Vertical compression by a factor of $\frac{1}{5}$, reflection across the x-axis, vertical shift up 2

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

22. A square root function: Reflection across the y-axis, vertical stretch by a factor of 4, horizontal shift right 5, vertical shift down 3

$f(x) = 4\sqrt{-x-5} - 3$