1.1 – Relations and Functions

Definitions:

domain

the set of all values of the independent variable of a relation

range

the set of all values of the dependent variable of a relation

relation

a set of ordered pairs; values of the independent variable are paired with values of the dependent variable

function

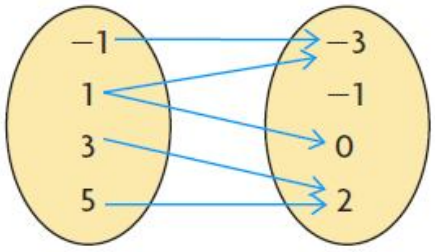
a relation where each value of the independent variable corresponds with only one value of the dependent variable

From your text: pg 10 #1.

State the domain, range and whether it is a function.

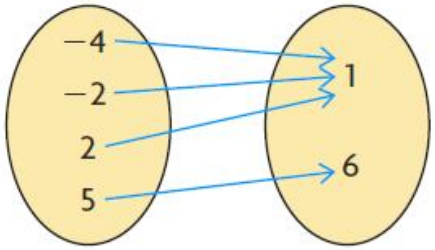
a) $\{(-5, 1), (-3, 2), (-1, 3), (1, 2)\}$

b)



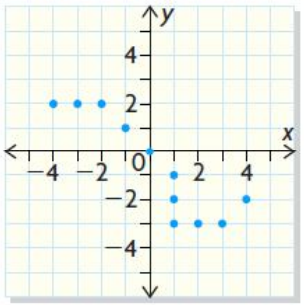
c) $\{(0, 4), (3, 5), (5, -2), (0, 1)\}$

d)

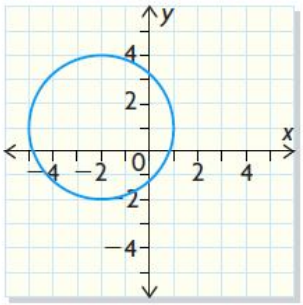


2. Use a ruler and the vertical-line test to determine which graphs are functions.

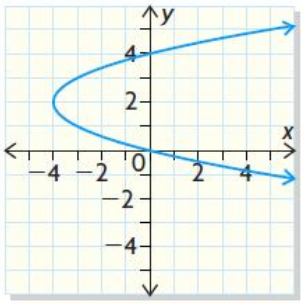
a)



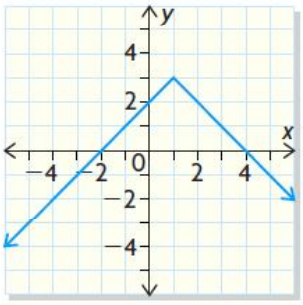
d)



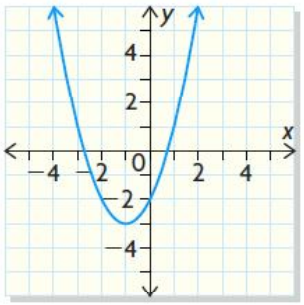
b)



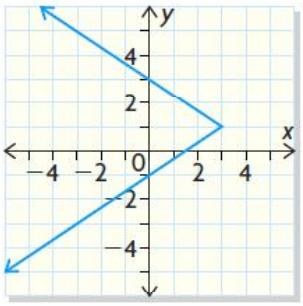
e)



c)



f)



3. Substitute -6 for x in each equation and solve for y. Use your results to explain why $y = x^2 - 5x$ is a function but $x = y^2 - 5y$ is not.

1.2 –Function Notation

The key word in “function notation” is notation. Today we are looking at a different way of doing what we have already done in the past, but with different notation.

$h(t) = t^2 + 2t$; Find $h(-8)$

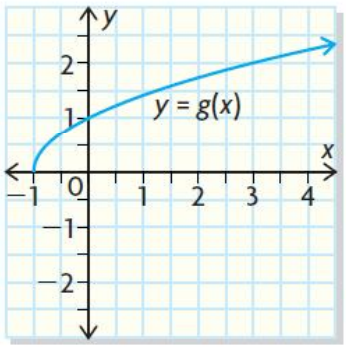
$w(t) = 3t^3 + 3$; Find $w(2)$

$g(x) = x^2 + 2x$
$h(x) = 3x$
Find $g(-3) - h(-3)$

$g(t) = -t - 3$
$f(t) = 2t + 4$
Find $(g + f)(7)$

For the function shown in the graph, determine each value.

a) $g(3)$
b) $g(-1)$
c) x if $g(x) = 1$
d) the domain and range of $g(x)$

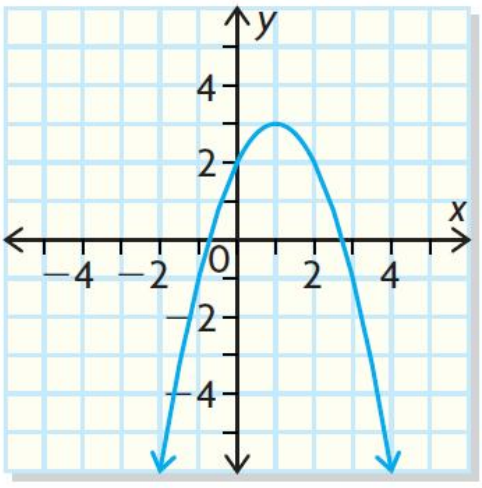


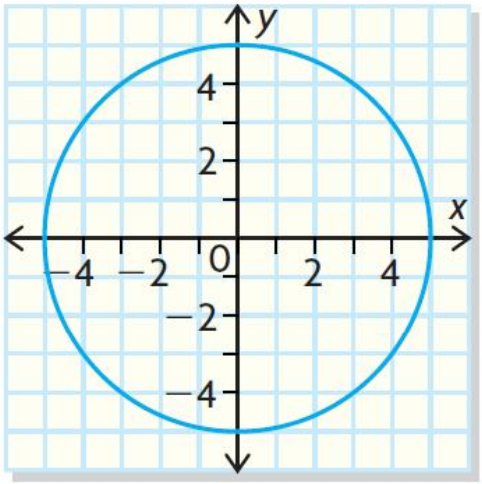
1.3 – Parent Functions
1.4 –Domain and Range Part 1

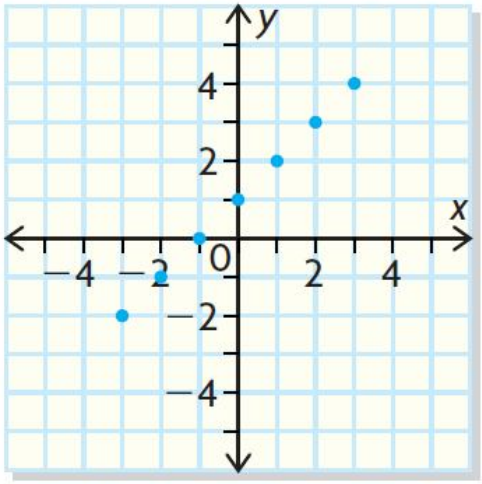
- Domain: the set of all possible x-values or inputs
  - restrictions

- Range: the set of all possible y-values or outputs
  - values that cannot be produced

Fancy Schmancy Notation




y
4
2
x
−4
−2
0
2
4
−2
−4


y
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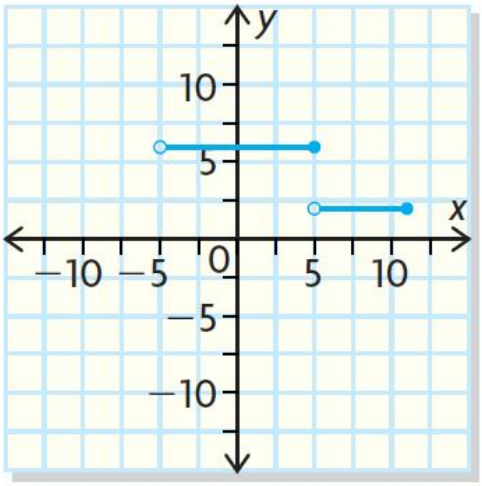
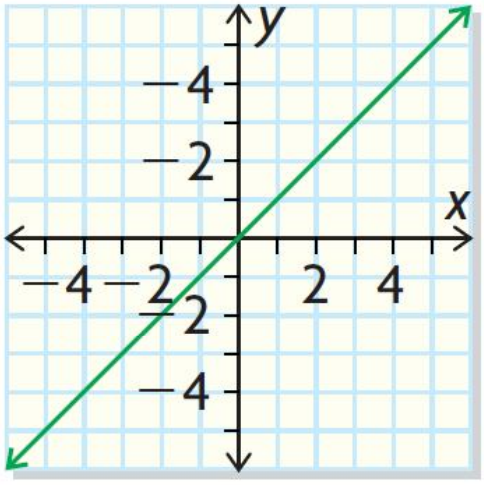
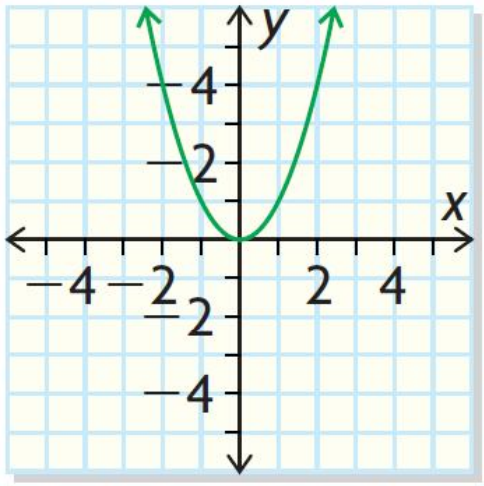
2
x
−4
−2
0
2
4
−2
−4



The 5 Parent Functions

- Parent functions are the base form or stripped down version of a type of function.

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x
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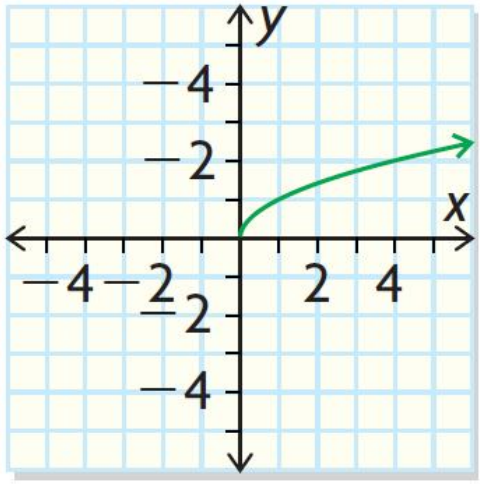
−2
2
4
−2
−4


y
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−2
x
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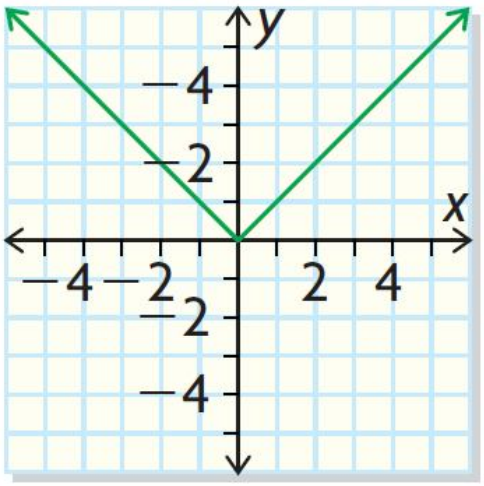
−2
2
4
−2
−4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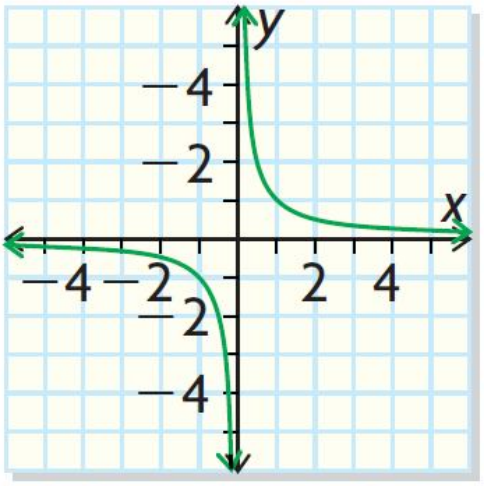
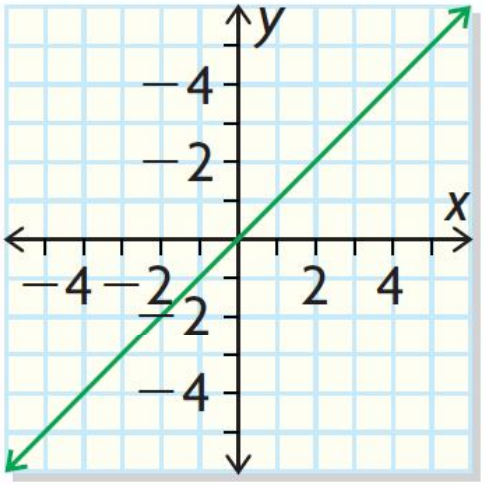
2
x
−4
−2
2
4
−2
−4

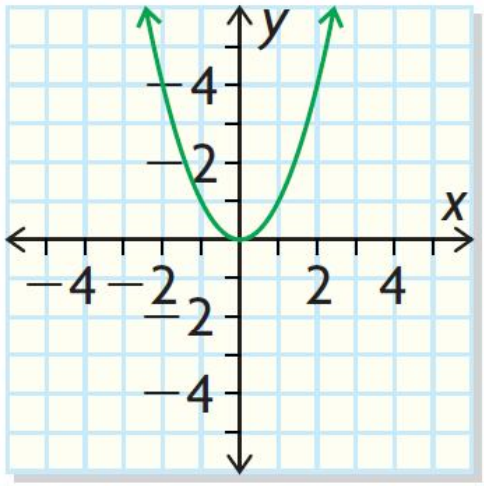

y
4
2
x
−4
−2
2
4
−2
−4

1.4 –Domain and Range Part 2

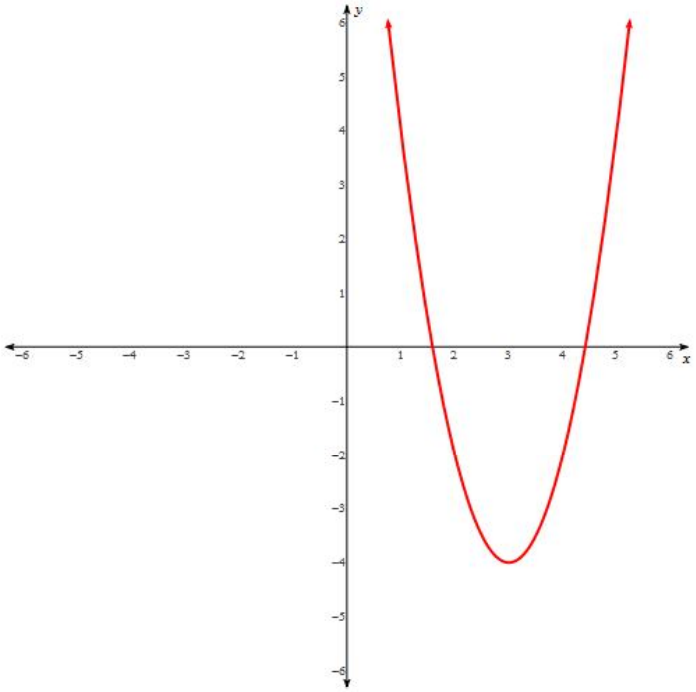
- Domain: the set of all possible x-values or inputs
  - restrictions

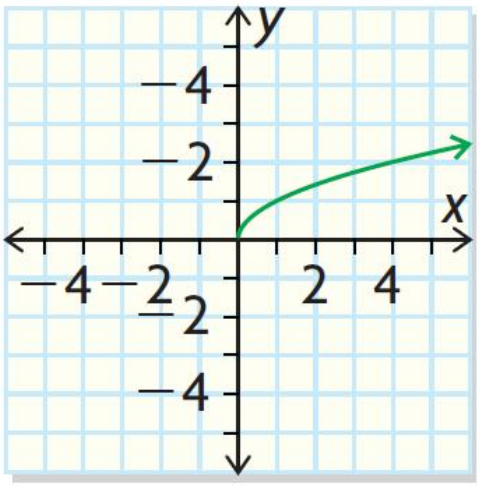
- Range: the set of all possible y-values or outputs
  - values that cannot be produced



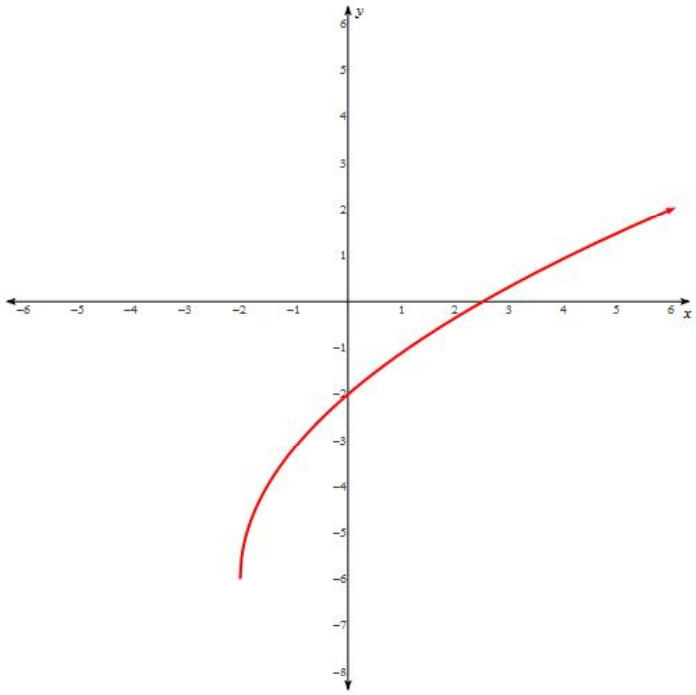


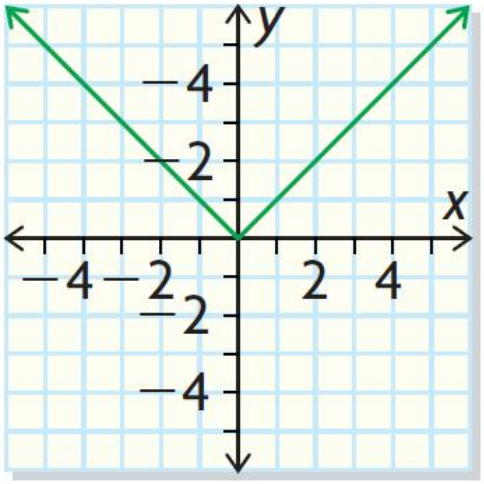
$$f(x) = 2(x-3)^2 - 4$$



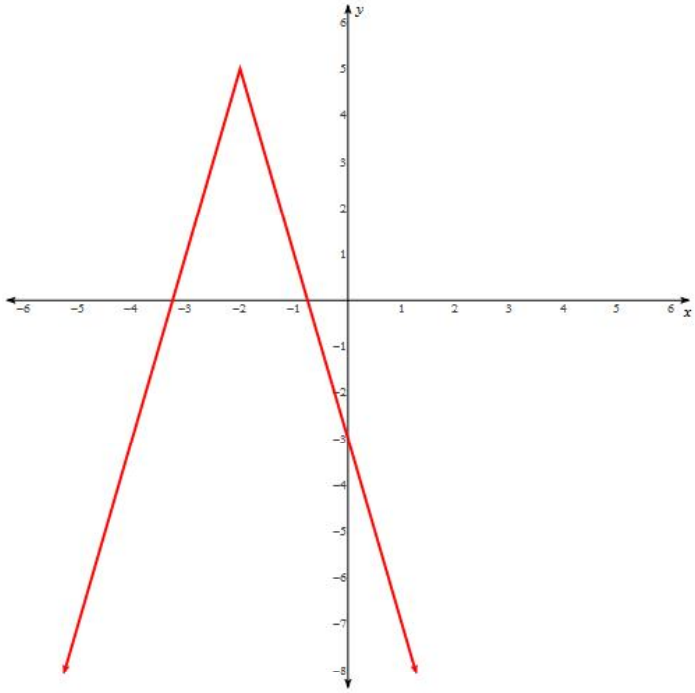


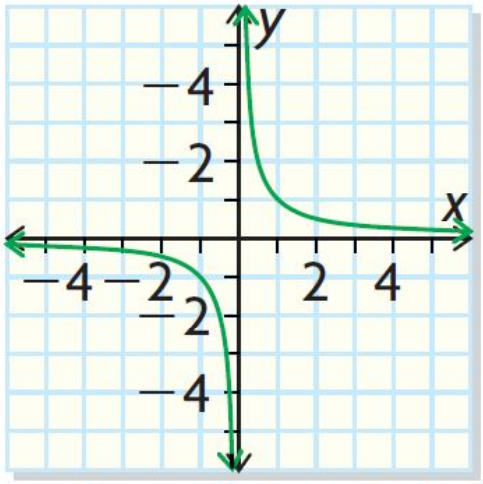
$$f(x) = 2\sqrt{2x+4} - 6$$



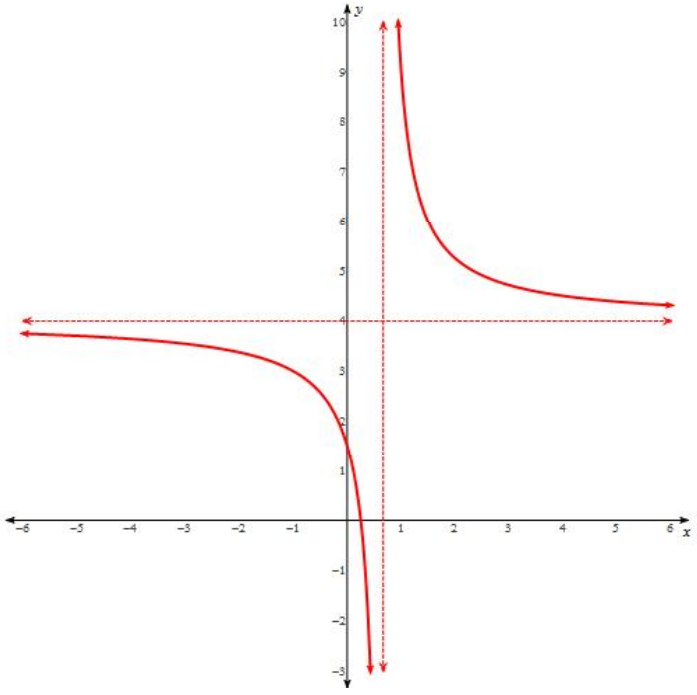


$$f(x) = -4|x+2|+5$$





$$f(x) = \frac{5}{3x-2} + 4$$

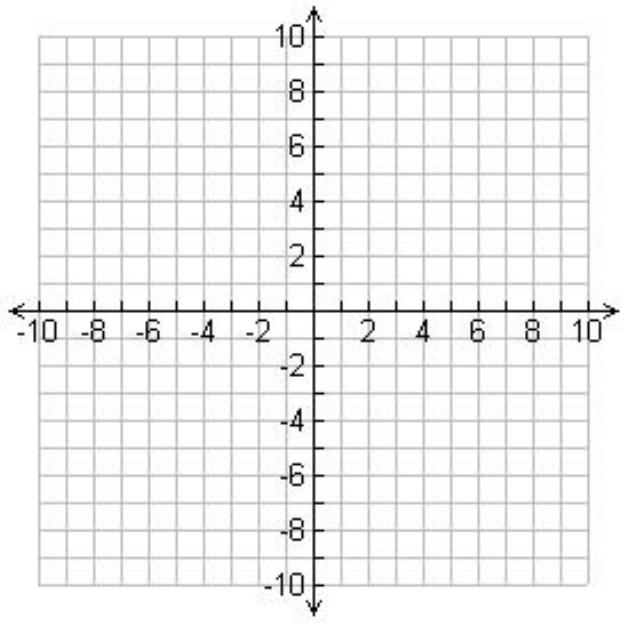


1.8 –Transformations of Parent Functions

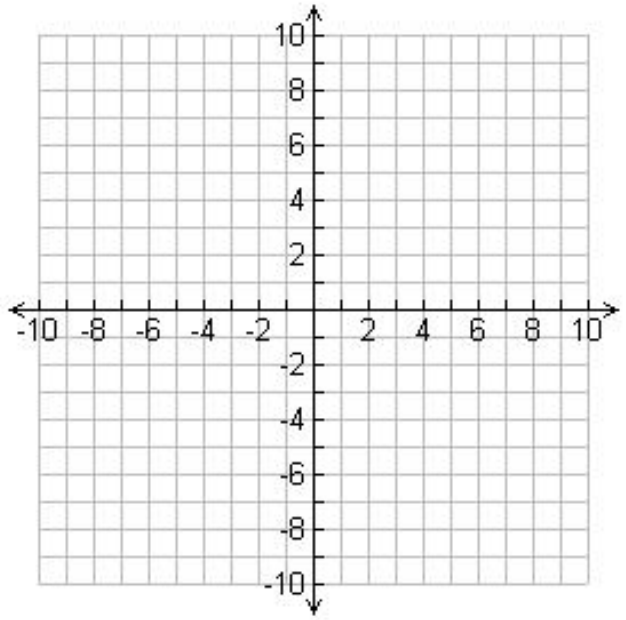
$$f(x)=af[k(x-d)]+c$$

- a = vertical stretch – multiply with f(x) or y
- k = horizontal stretch – divide with x or multiply 1/k with x
- d = horizontal stretch – add/subtract with x (always do opposite)
- c = vertical shift – add/subtract with f(x) or y
- Notes:
  - vertical is outside the "function" while horizontal is inside.
  - k must be factored to get d.

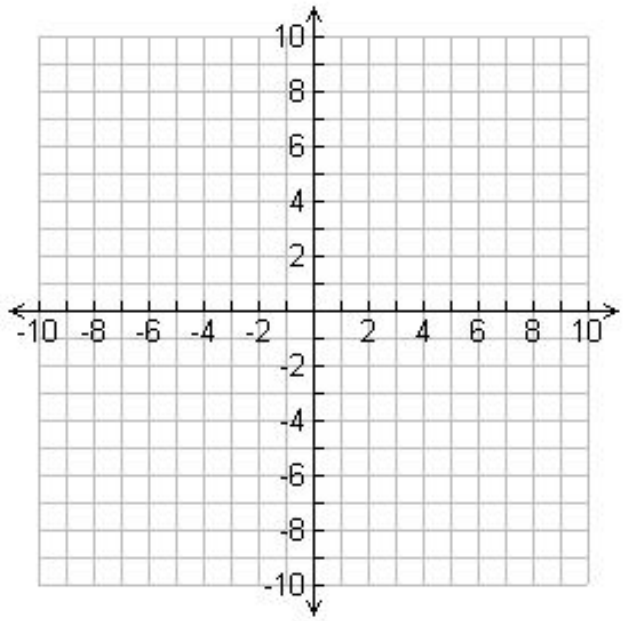
$$f(x) = 2(x-3)^2 - 4$$



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



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



$$f(x) = \frac{5}{3x-2} + 4$$