Algebra 2 1.2 Parent function transformations

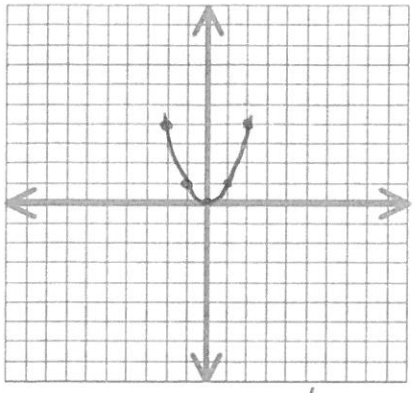
Obj: Identify and graph transformations of parent functions

Graph the following functions from [-2,2]

Ex 1

$y = x^2$

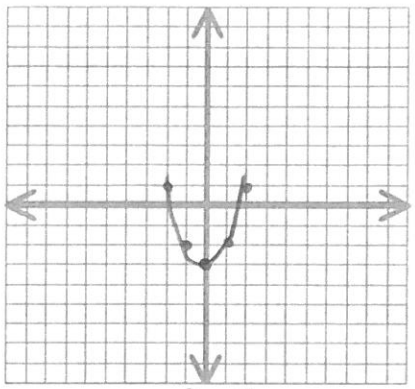
x	y
-2	4
-1	1
0	0
1	1
2	4



origin center.

$y = x^2 - 3$

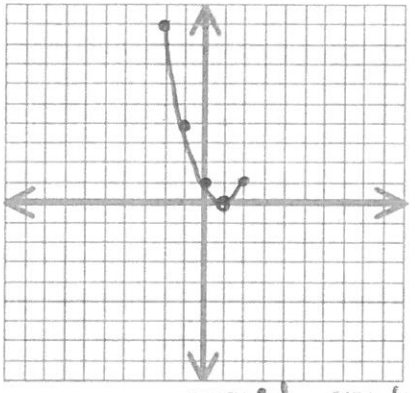
x	y
-2	1
-1	-2
0	-3
1	-2
2	1



↓ 3

$y = (x-1)^2$

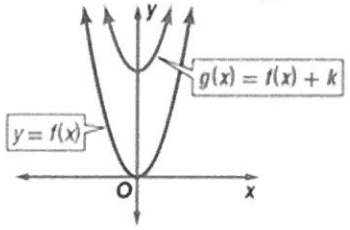
x	y
-2	9
-1	4
0	1
1	0
2	1



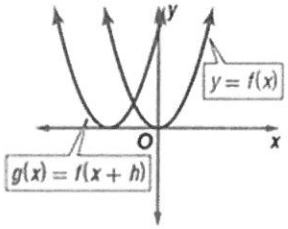
moved right 1

Translations:

f(x)+k up or down directly



f(x-h) left/right opposite direction



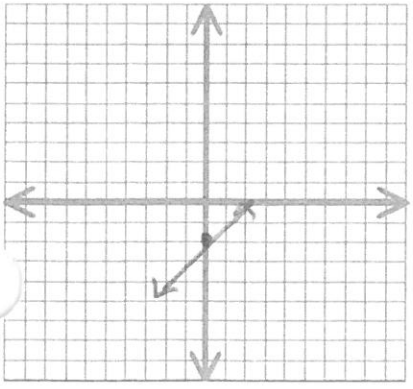
Note: to read the horizontal translations all coefficients of x must be factored out.

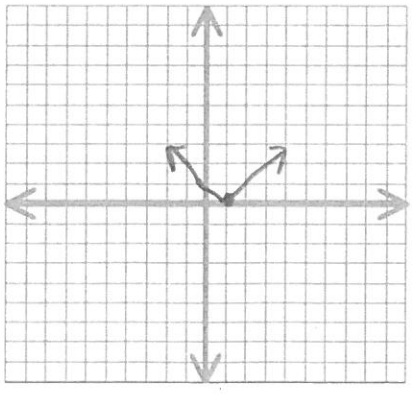
Ex 1. Identify the parent graph $f(x)$ and use it to graph the following. Describe the translation.

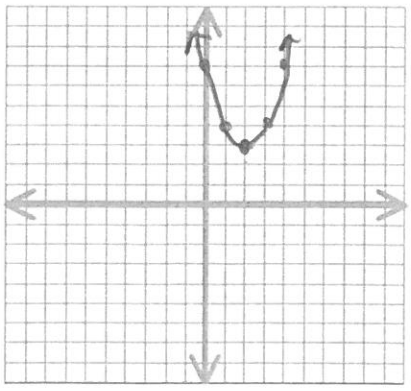
a. $g(x) = x - 2$ line ↓2

b. $g(x) = |x-1|$ V →1

c. $g(x) = (x-2)^2 + 3$ U →2 ↑3







Algebra 2 1.2 Parent function transformations

Flipped ref + stretches from book

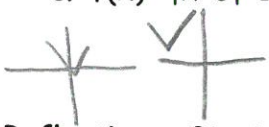
How do translations affect the domain and range?

Ex 2. Describe the translation.

a. $f(x)= |x-2|$ → 2 affects neither

b. $f(x)= |x|+4$ up 4 affects range $[0,\infty)$ $[4,\infty)$

c. $f(x)= |x+6|+1$ ← 6 ↑ 1 range $[1,\infty)$



d. $f(x)= |2x-1|$ $|2(x-\frac{1}{2})|$ → ½ no effect

Reflections, Stretches and Compressions

y=-f(x) reflects over x

y=f(-x) reflects over y

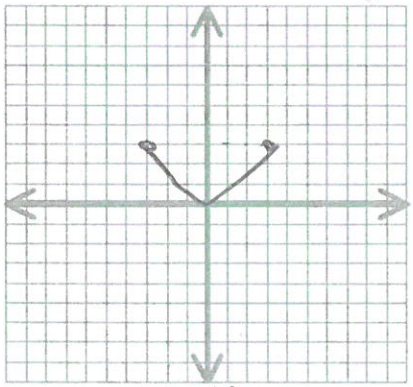
looks same symmetry

y=a·f(x) vertical stretch $|a|>1$ vertical compress $0<|a|<1$

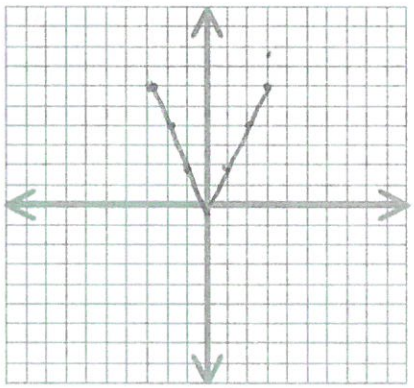
y=f(a(x)) horizontal stretch $0<|a|<1$ horizontal compress $|a|>1$

∴ $|a|>1$ graph is tall/skinny $|a|<1$ graph is shortened/wider

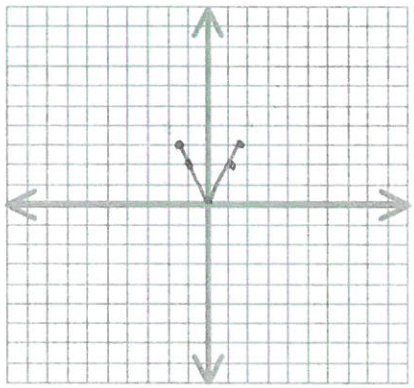
Ex 3. Graph $f(x)=|x|$ on [-3,3] and g(x)= $2 \bullet f(x)$ and h(x) = f(2x). How are the domain and ranges affected? no change to domain/range



x	y
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3



x	y
-3	6
-2	4
-1	2
0	0
1	2
2	4
3	6



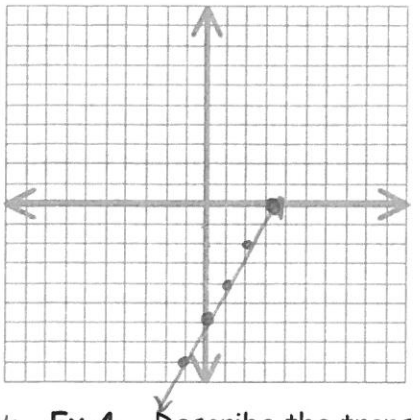
x	y
-1.5	3
-1	2
0	0
1	2
1.5	3

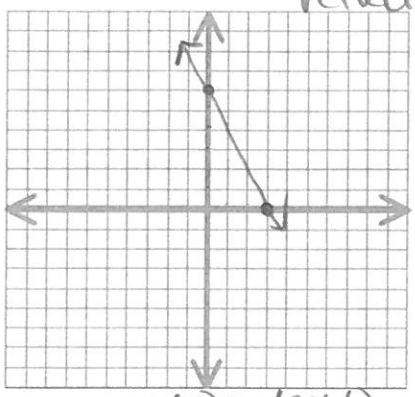
$f(x)=|2x|$

Algebra 2 1.2 Parent function transformations

Ex 2 book

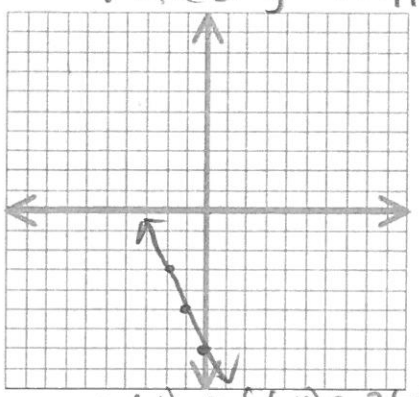
You try. Graph parent function $f(x)=2x-6$ of $g(x) = -f(x)$, and $h(x)=f(-x)$ and describe how the graphs of $g(x)$, $h(x)$ and $f(x)$ are related.





reflect x
mlt
b
opp.

$g(x) = -(2x-6)$



reflect y m opp.

$h(x) = f(-x) = 2(-x)-6$

Ex 4. Describe the translations.

a. $g(x) = 3x^2 + 4$ up 4 vstretch 3

b. $g(x)=3(x-2)^2+5$ rt 2 up 5 v stretch 3

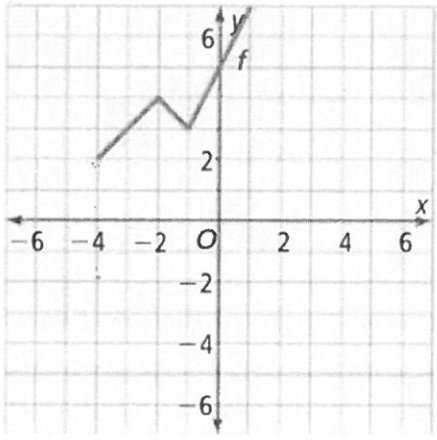
c. $g(x)=-4(6+3x)^2+1$ (hint factor inside with 3)

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

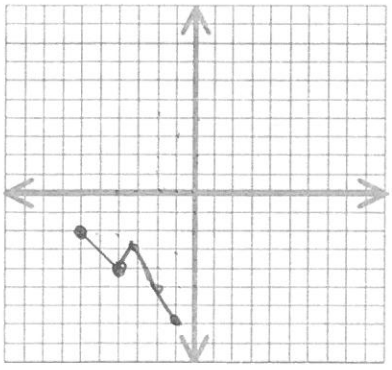
reflect x, v stretch 4, horiz. compress 3, up 1

Ex 4 book

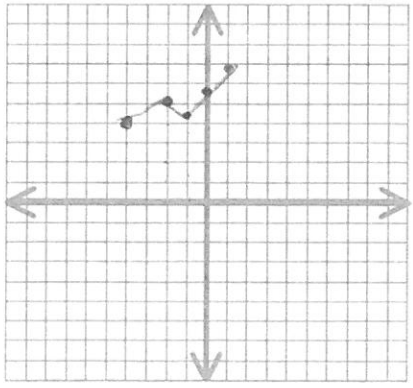
Ex 5. Use the given graph of f(x) to graph the following.



a. $y=-f(x+2)$ left 2 reflect



b. $y=\frac{1}{2}f(x)+3$ shrink ↑ up



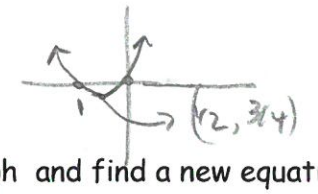
x	y
-4	2
-2	4
-1	3
0	5
1	7

½ then up 3

Look at ex 6 in book.

Algebra 2 1.2 Parent function transformations

$x^2 + x$



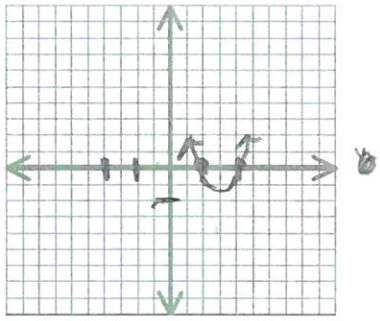
Summary. Let $f(x) = x^2 + x$. Describe the translations, graph and find a new equation.

a. g(x) =f(x-2) rt 2

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

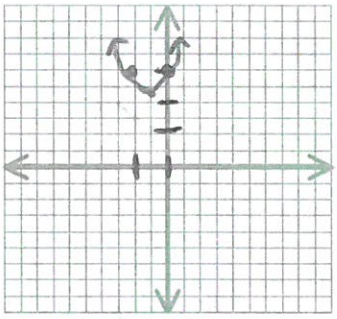
$= x^2 - 2x - 2x + 4 + x - 2$

$= x^2 - 3x + 2$



b. h(x)=f(x)+3 ↑ up 3

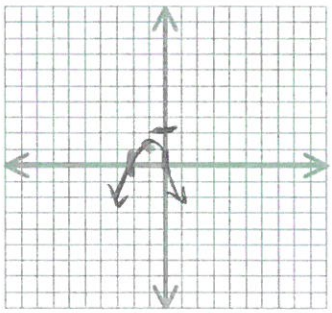
$h(x) = x^2 + x + 3$



c. j(x)=-f(x) reflect x

$j(x) = -(x^2 + x)$

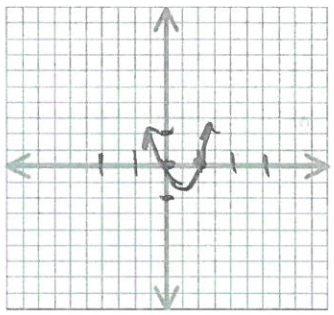
$= -x^2 - x$



d. k(x)=f(-x) reflect y

$f(-x) = K(x) = (-x)^2 + (-x)$

$= x^2 - x$



e. m(x)=f(.5x) horiz. ∞ stretch

$m(x) = (.5x)^2 + .5x$

$= .25x^2 + .5x = \frac{1}{4}x^2 + \frac{1}{2}x$

$.5x(.5x + 1)$