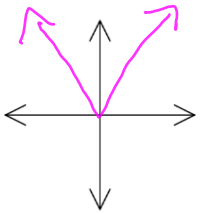
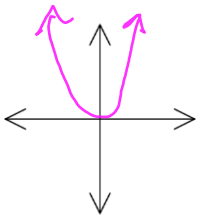
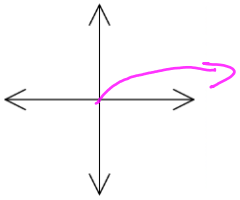
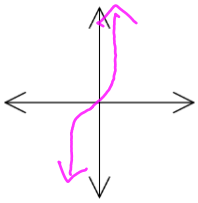
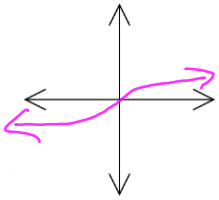
2.3

Date: 9/12/23

Objective: I can identify transformations from equations and graphs.

A. Review Parent Functions

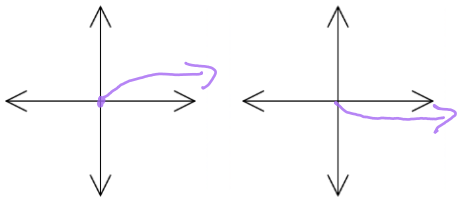
1) Draw a sketch of each parent function.

Absolute Value $f(x)=\lvert x\rvert$ 	**Quadratic** $f(x)=x^2$ 	**Square Root** $f(x)=\sqrt{x}$ 
	Cubic $f(x)=x^3$ 	**Cube Root** $f(x)=\sqrt[3]{x}$ 

B. Transformations $a\sqrt{b(x-h)}+k$

Graph the following functions and answer the questions.

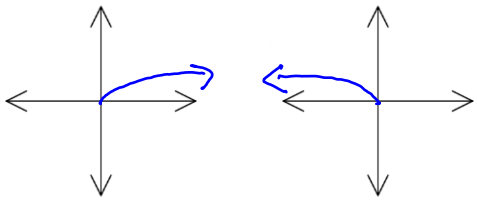
1) $f(x)=\sqrt{x}$, $f(x)=-\sqrt{x}$



What does the negative in front of the entire function $f(x)$ do? reflect over x-axis

reflect vert reflect down

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



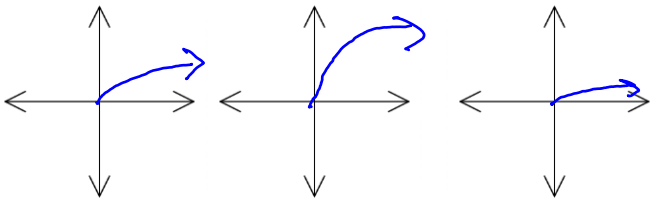
What does the negative in front of x do?

reflect over y-axis

reflect hor. reflect left

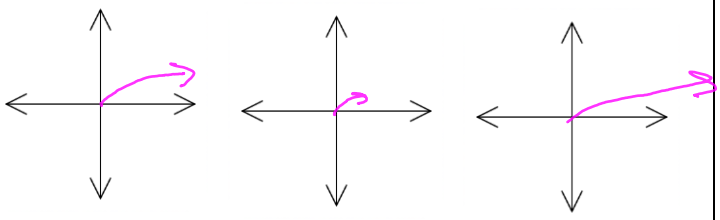
$a\sqrt{b(x-h)}+k$

3) $f(x)=\sqrt{x},\ f(x)=2\sqrt{x},\ f(x)=\frac{1}{2}\sqrt{x}$



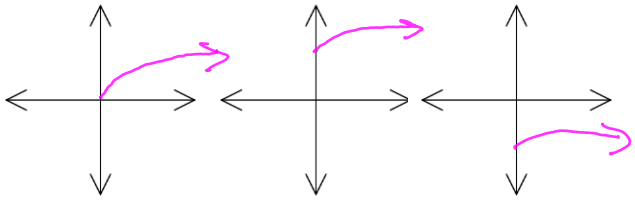
What does the *a* do? vert stretch

4) $f(x)=\sqrt{x},\ f(x)=\sqrt{2x},\ f(x)=\sqrt{\frac{1}{2}x}$



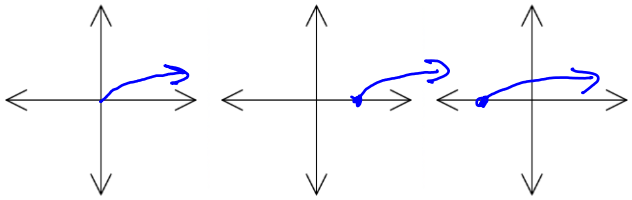
What does the *b* do? hor stretch but do opp

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



What does the *k* do? translate up & down

6) $f(x)=\sqrt{x},\ f(x)=\sqrt{x-5},\ f(x)=\sqrt{x+5}$



What does the *h* do? translate right & left but opp.

C. Write an equation. reflect, stretch, translation

Given the parent function and a list of transformations, write an equation for the function.

$a(b(x-h))^2+k$

1) **Parent function:** $f(x)=x^2$

Transformations: reflect over x-axis, translate up 3 $a=-1$ $k=3$

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

$a\sqrt[3]{b(x-h)}+k$

2) **Parent function:** $f(x)=\sqrt[3]{x}$

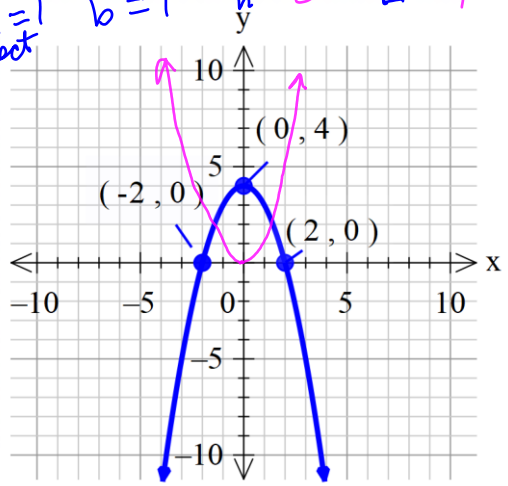
Transformations: Vertical shrink of $\frac{1}{3}$, translate left 3 and down 6 $a=\frac{1}{3}$ $h=-3$ $k=-6$

$g(x)=\frac{1}{3}\sqrt[3]{(x+3)}-6$

Determine the transformations used to change the given parent function to the function that is graphed. Then write an equation for the function graphed.

1) quadratic x^2 a=1 b=1 h=0 k=4

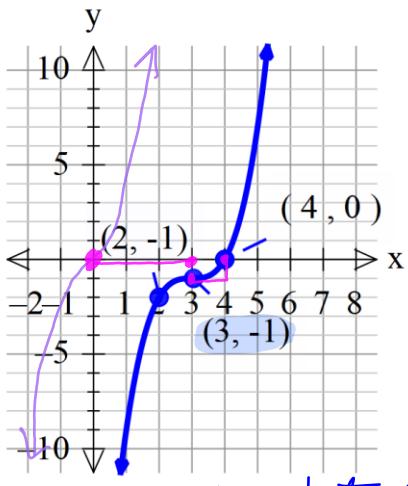
a=1 reflect



Transformations: reflect over x-axis
translate up 4

Equation: $f(x) = -x^2 + 4$

2) cubic x^3 a=1 b=1 h=3 k=-1



Transformations: translate right 3, down 1

Equation: $g(x) = (x-3)^3 - 1$

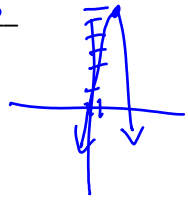
Determine the transformations used to change the given parent function to the new function.

1. $f(x) = -2(x-1)^2 + 6$

Parent function: quadratic

a = 2 (reflect) b = 1 h = 1 k = 6

Transformations:
- reflect over x-axis
- vert stretch of 2
- translate right 1, up 6



2. $f(x) = \sqrt[3]{3(x+8)} - 2$

Parent function: cube root $\sqrt[3]{x}$

a = 1 b = $\frac{1}{3}$ h = -8 k = -2

Transformations:
hor stretch of $\frac{1}{3}$
translate left 8, down 2

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

Parent function: _____

a = ____ b = ____ h = ____ k = ____

Transformations:

4. $f(x) = 3\sqrt{-(x+1)} - 5$

Parent function: square root

a = 3 b = 1 (reflect) h = -1 k = -5

Transformations:
- hor reflect or reflect over y-axis
- vert stretch of 3
- translate left 1, down 5