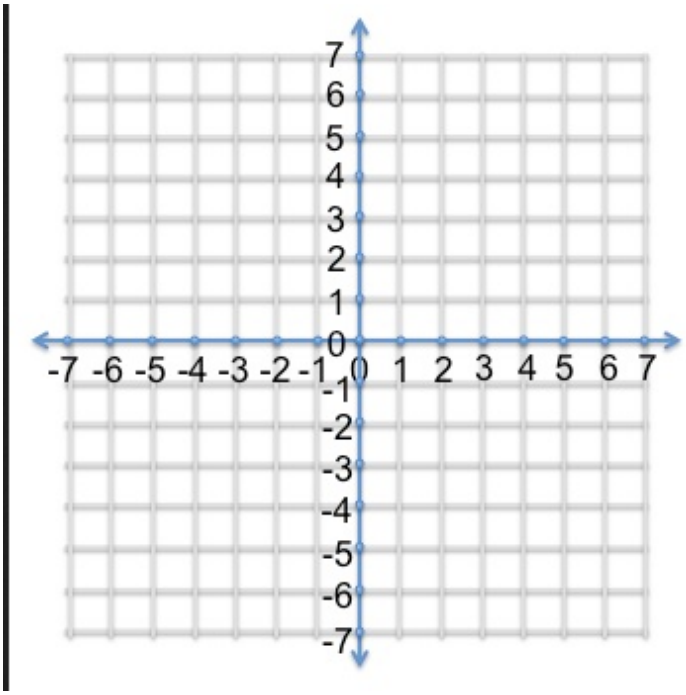
L10
Graphing Radical Functions

Warmup
Plot and graph $y = \sqrt{x}$
What is the domain and range?



X	Y
-2	
-1	
0	
1	
2	
3	
4	
5	

Radical Functions

A ***Radical Function*** is a function whose rule is a radical expression.

$y = \sqrt{x}$ is the parent function of a square root function.

#1 multiply y by vertical stretch/compression/reflection.
#2 add/subtract x by h
#3 add/subtract y by k

$$y = \sqrt{x} + k$$

What does the *k* do to the graph?

$$Compare$$
$$y = \sqrt{x}$$
$$and$$
$$y = \sqrt{x} + 2$$
$$and$$
$$y = \sqrt{x} - 1$$

What is the rule for *k?*
K determines if it goes up(+k) or down (-k).
How does it affect the domain and range?

$$y = \sqrt{x + h}$$

What does the *h* do to the graph?

$$Compare$$
$$y = \sqrt{x}$$
$$and$$
$$y = \sqrt{x+2}$$
$$and$$
$$y = \sqrt{x-1}$$

What is the rule for *h?*
h determines if it moves left (+h) or right (-h)
How does it affect the domain and range?

$$y = a\sqrt{x}$$

What does the a do to the graph?

$$Compare$$

$$y = \sqrt{x}$$
$$and$$
$$y = 2\sqrt{x}$$
$$and$$
$$y = \frac{1}{2}\sqrt{x}$$

What is the rule for *a?*
If a >1 vertical stretch
If 0<a<1 vertical compression
How does it affect the domain and range?

What does the b do to the graph?

$$Compare$$
$$y = \sqrt{bx}$$
$$and$$
$$y = \sqrt{\frac{1}{2}x}$$
$$and$$
$$y = \sqrt{2x}$$

What is the rule for *b?*

If b >1 horizontal compression
If 0<b<1 horizontal stretch

$$y = \sqrt{x}$$
$$y = -\sqrt{x}$$
$$y = \sqrt{-x}$$

What is the pattern?

What are the transformations from $y = \sqrt{x}$
How does it affect the domain and range?

Transformations of the Square-Root Parent Function $f(x) = \sqrt{x}$

Transformation	$f(x)$ Notation	Examples
Vertical translation	$f(x) + k$	$y = \sqrt{x} + 3$ 3 units up $y = \sqrt{x} - 4$ 4 units down
Horizontal translation	$f(x - h)$	$y = \sqrt{x - 2}$ 2 units right $y = \sqrt{x + 1}$ 1 unit left
Vertical stretch/compression	$af(x)$	$y = 6\sqrt{x}$ vertical stretch by 6 $y = \frac{1}{2}\sqrt{x}$ vertical compression by $\frac{1}{2}$
Horizontal stretch/ compression	$f\left(\frac{1}{b}x\right)$	$y = \sqrt{\frac{1}{5}x}$ horizontal stretch by 5 $y = \sqrt{3x}$ horizontal compression by $\frac{1}{3}$
Reflection	$-f(x)$ $f(-x)$	$y = -\sqrt{x}$ across x-axis $y = \sqrt{-x}$ across y-axis

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Compare

You try:

1) $y = 2\sqrt{x-5}+3$

Even Talk, Odd listen

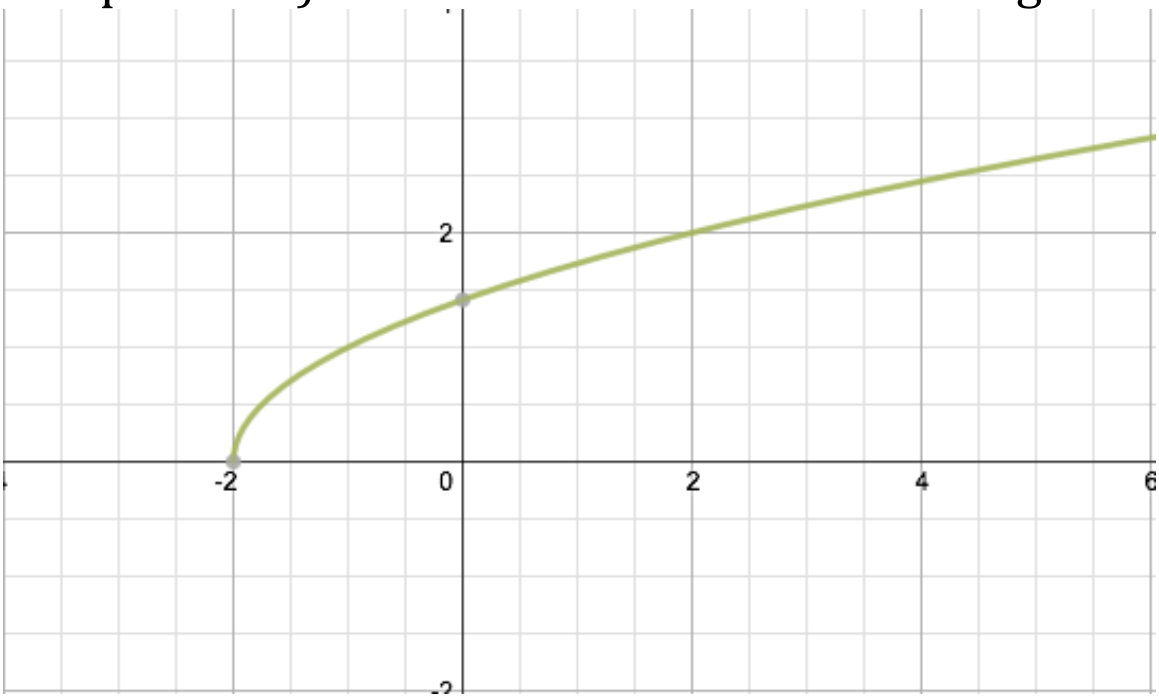
2) $y = -\sqrt{x+2}-1$

3) $y = \frac{1}{2}\sqrt{x-1}-5$

What is the function (Assume no stretch or compression)? What are the domain and range?

$y = \sqrt{x}$-2

What is the function (Assume no stretch or compression)? What are the domain and range?



$y = \sqrt{x+2}$

Domain: $x \geq -2$

Range: $y \geq 0$

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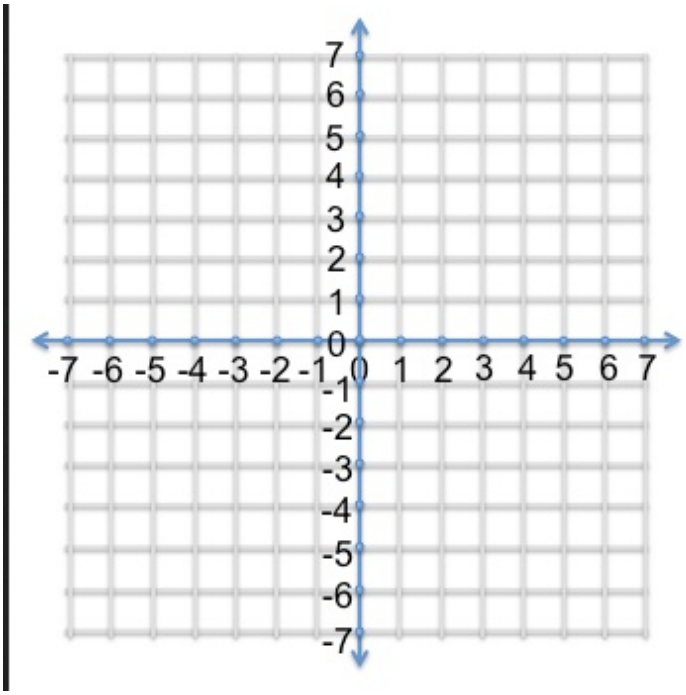
What are the transformations? Sketch the graph.
What are the domain and range? $y = 3\sqrt{x+1}$-2


7
6
5
4
3
2
1
0
-7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7
-1
-2
-3
-4
-5
-6
-7