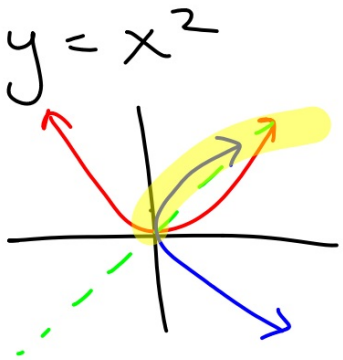
Algebra 2 6.3

Graph and analyze square root functions

Graph square root inequalities

$y = \sqrt{x}$

Quiz 6.1-6.2 Tues.



quadratic

inverse function

parent graph $y = x^2$

square root function $y = \sqrt{x}$

$\sqrt{25} = 5$

radical function $\sqrt[3]{\ }$ $y = \sqrt[3]{x}$

x domain $y = x$

y range

equation =

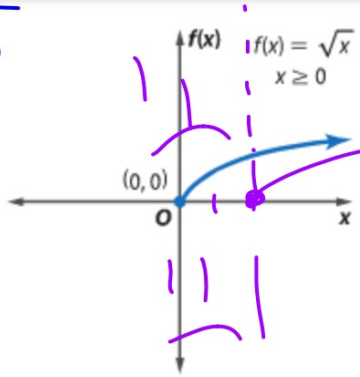
inequality < >

$y = \sqrt{x}$ $y = \sqrt{-4}$

KeyConcept Parent Function of Square Root Functions

Parent function:	$f(x) = \sqrt{x}$
Domain:	$\{x \mid x \geq 0\}$
Range:	$\{f(x) \mid f(x) \geq 0\}$
Intercepts:	$x = 0, f(x) = 0$
Not defined:	$x < 0$
End behavior:	$x \to 0, f(x) \to 0$
	$x \to +\infty, f(x) \to +\infty$

x	$\sqrt{x}$
0	0
1	
4	



$y \sqrt{x-2}$

The domain of a square root function is limited to values for which the function is defined.

(So it will be REAL... What does that imply?)

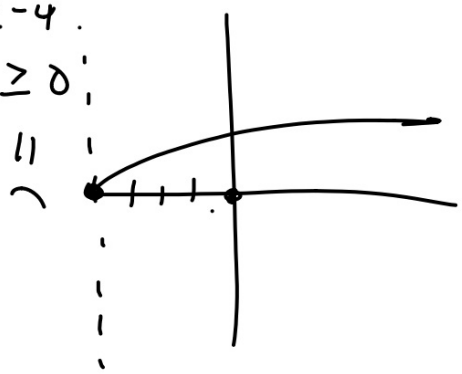
Must be real...
(Where is the first place that √( ) can be real?)

Example 1 Identify Domain and Range

Identify the domain and range of $f(x) = \sqrt{x+4}$.

D $x \geq -4$.

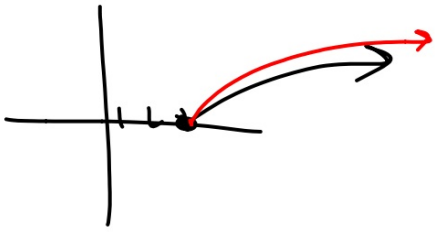
R $y \geq 0$;



GuidedPractice

Identify the domain and range of each function.

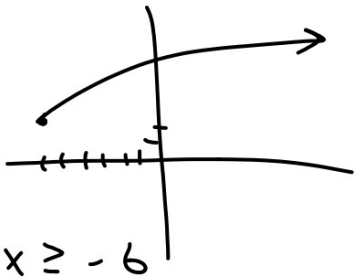
1A. $f(x) = \sqrt{x - 3}$



D: $x \geq 3$

R: $y \geq 0$

1B. $f(x) = \sqrt{x + 6} + 2$



D $x \geq -6$

R $y \geq 2$

$y = x^2 + 2$

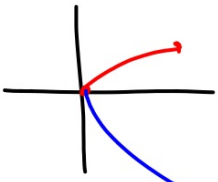
Same as transformations of other parent graphs, quadratic, etc.

KeyConcept Transformations of ~~Square Root~~ Functions

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

***h*—Horizontal Translation**

***k*—Vertical Translation**



***a*—Orientation and Shape**

- If $a < 0$, the graph is reflected across the x-axis.
- If $|a| > 1$, the graph is stretched vertically.
- If $0 < |a| < 1$, the graph is compressed vertically.

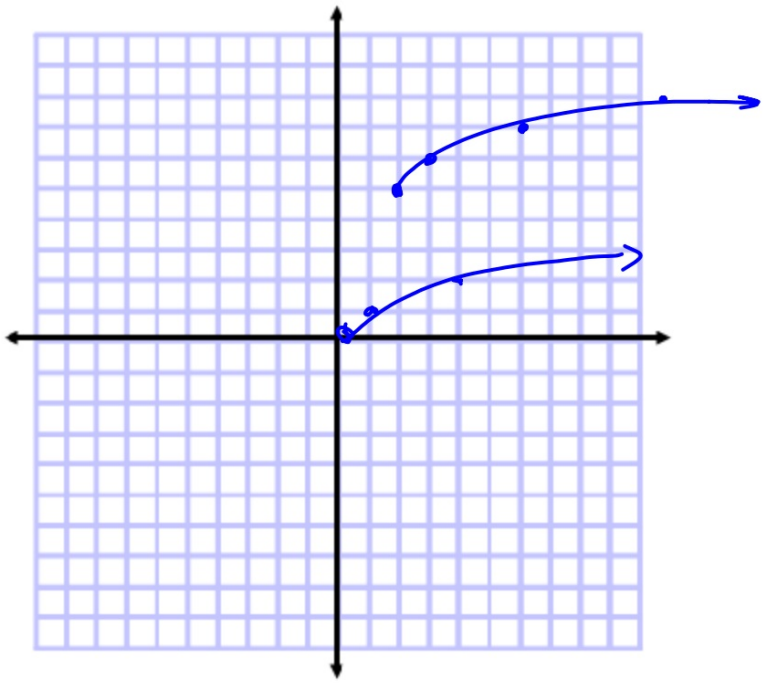
Example 2 Graph Square Root Functions

Graph each function. State the domain and range.

a. $y = \sqrt{x-2} + 5$

D $x \geq 2$

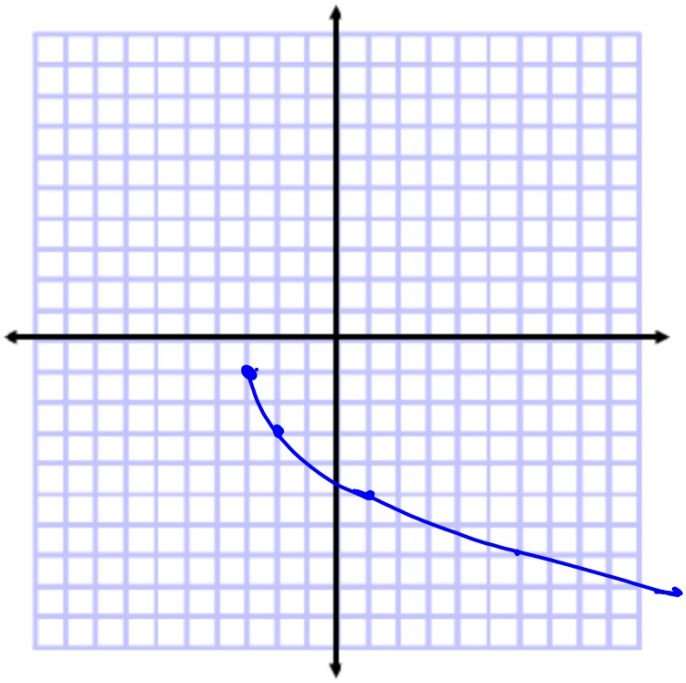
R $y \geq 5$



Think about the parent graph.
Where is it real? (locate the vertex)
What y-coordinates will be included?
You can use a couple of ordered pairs, if necessary.

b. $y = -2\sqrt{x+3} - 1$

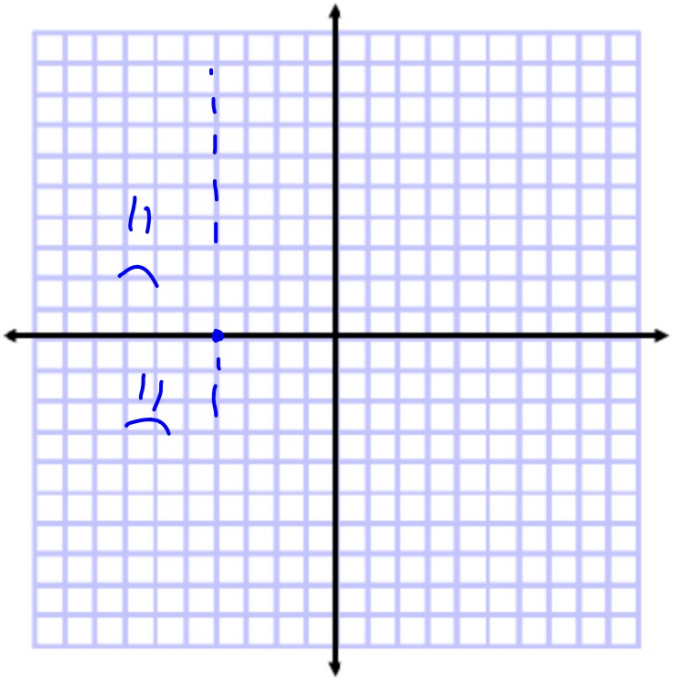
Where is it real?
What y-coordinates will be included?



D: $x \geq -3$

R: $y \leq -1$

Where is it real?
What y-coordinates will be included?



GuidedPractice

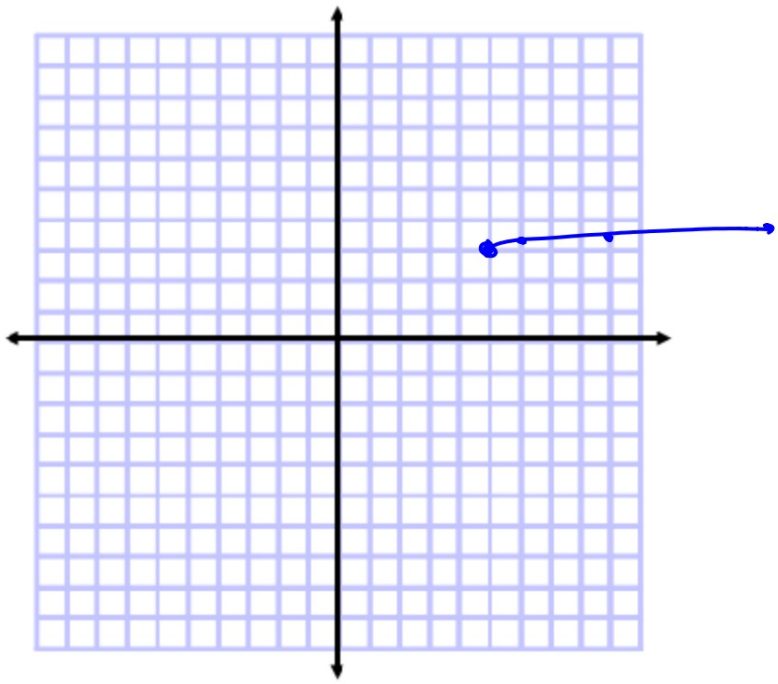
2A. $f(x) = 2\sqrt{x+4}$

$x + 4 \geq 0$
$-4 \quad -4$
$x \geq -4$

2B. $f(x) = \frac{1}{4}\sqrt{x-5}+3$

D $x \geq 5$

R $y \geq 3$



Graph each function. State the domain and range.

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

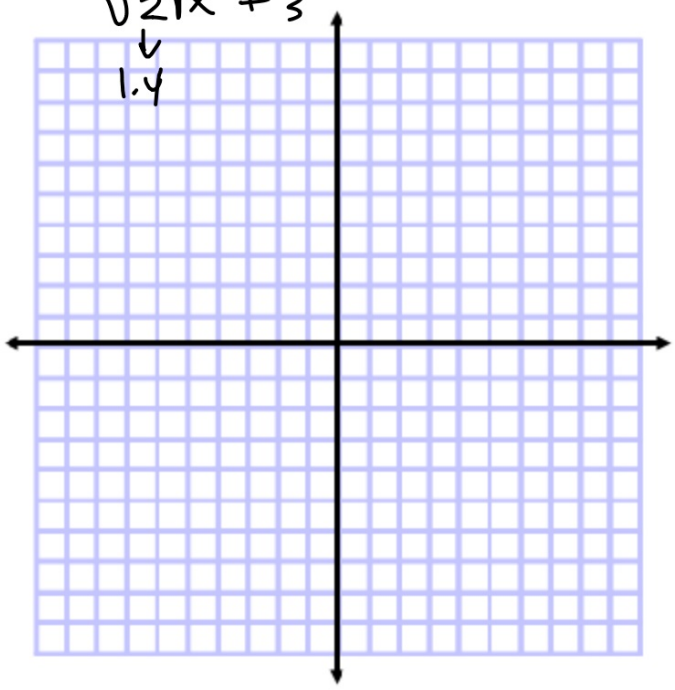
5. $f(x) = 3\sqrt{x-1}$

$\sqrt{2x} + 3$

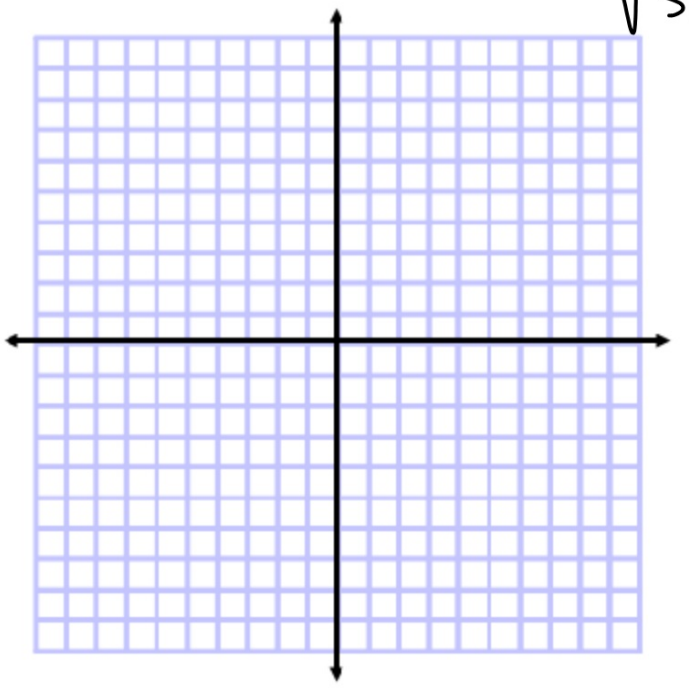
$\sqrt{2}\sqrt{x} + 3$

$\downarrow$

1.4



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



7. $f(x) = -\sqrt{3x-6} + 5$

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

h k

* Always use factored form for h (left/right)

6.3 p. 403

13-29 odd