Lesson 3-1

Square Root Functions and Their Graphs

+ a: NO Reflection

– a: Reflect over the x-axis

– k: Down k units

+ k: up k units

$$y = a\sqrt{x - h} + k$$

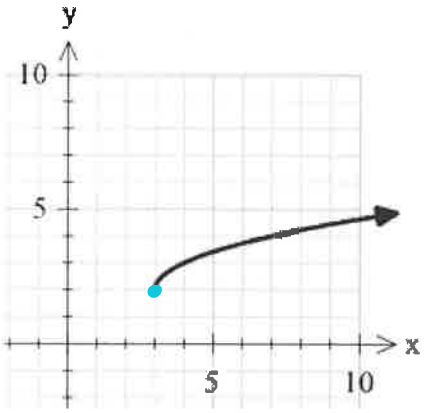
– h: Right h units

+ h: Left h units

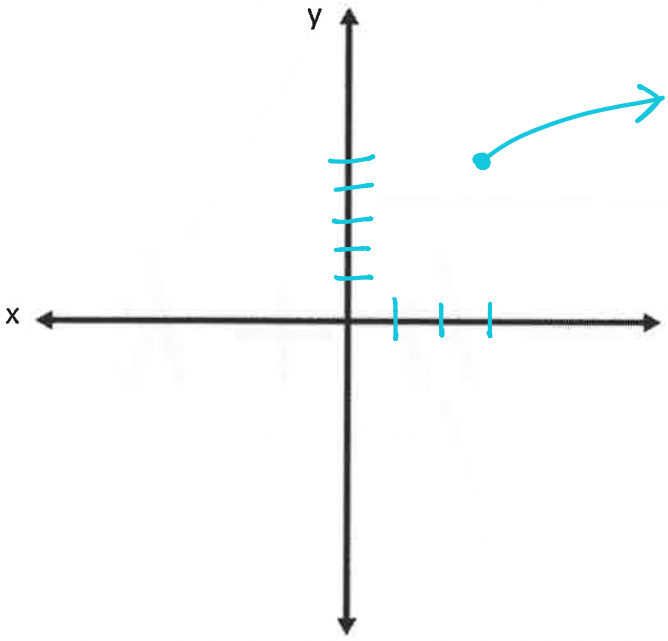
(*) opposite of what you would think

1. Write the equation for the graph shown below. Then state the domain and range.

- Equation: $y = \sqrt{x - 3} + 2$
- Domain: $x \geq 3$
- Range: $y \geq 2$



2. Find the domain and range of the function $y = \sqrt{x-3} + 5$.



Domain: $x \geq 3$

Range: $y \geq 5$

3. Algebraically determine the domain and range of the function $f(x) = \sqrt{3x-21}$.

↖ can't be negative!

$3x - 21 \geq 0$

$3x \geq 21$

$x \geq 7$

(*) plug in 7 for x to find the y-value

$3(7) - 21$

$= 0$

Range $y \geq 0$

Square Root Functions and Their Graphs Practice

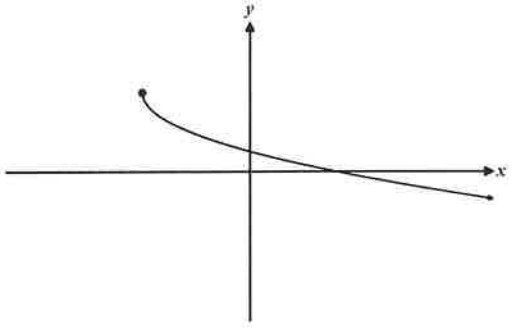
1. Given that both a and b are positive numbers, which of the following equations would describe the graph shown below given that it is a transformation of the graph of $y=\sqrt{x}$.

(1) $y=\sqrt{x+a}+b$

(2) $y=-\sqrt{x+a}+b$

(3) $y=\sqrt{x-a}-b$

(4) $y=-\sqrt{x-a}-b$



2. Which of the following represents the domain of the function $f(x)=\sqrt{3x+2}$?

(1) $x>-2$

(2) $x\leq -2$

(3) $x\geq -\frac{2}{3}$

(4) $x<-\frac{2}{3}$

$3x+2\geq 0$

$3x\geq -2$

$x\geq -2/3$

3. Which of the following functions would have no *y*-intercept?

(1) $y=\sqrt{x^2-2x+9}$

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

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

(4) $y=\sqrt{5-x}$

↳ $x=0$

$y=\sqrt{2(0)-1}$

$y=\sqrt{0-1}$

$y=\sqrt{-1}$

4. Which equation below represents the graph shown to the right?

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

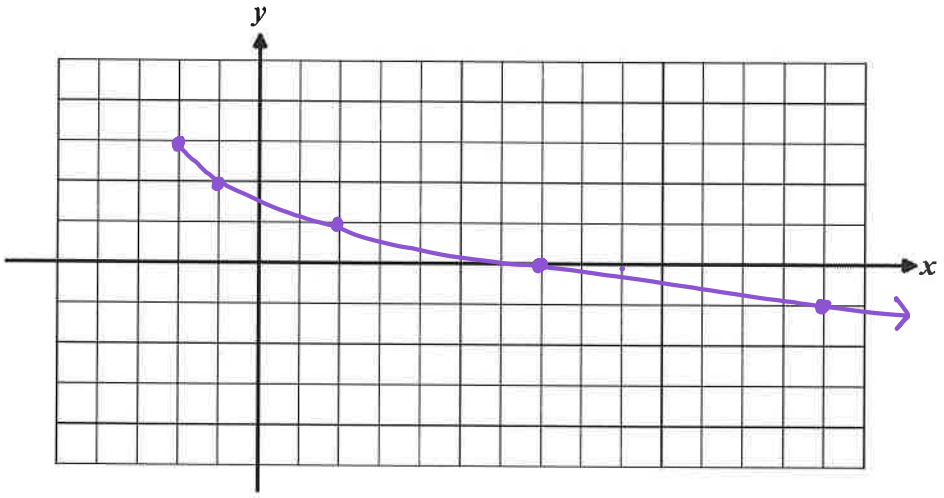
(2) $y=-\sqrt{x+2}+5$

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

(4) $y=\sqrt{x+2}+5$

5. Given the function $f(x) = -\sqrt{x+2} + 3$ answer the following:

(a) Graph the function on the grid shown.



(b) Explain how the graph of $y = \sqrt{x}$ has been transformed into the graph of $f(x)$.

- Reflection over the x-axis
- Shift left 2 units
- Shift up 3 units

(c) What are the domain and range of $f(x)$?

Domain: $x \geq -2$

Range: $y \geq 3$

6. Write the equation for the graph shown below. Then state the domain and range.

- Equation: $y = -\sqrt{x+1} + 6$
- Domain: $x \geq -1$
- Range: $y \leq 6$