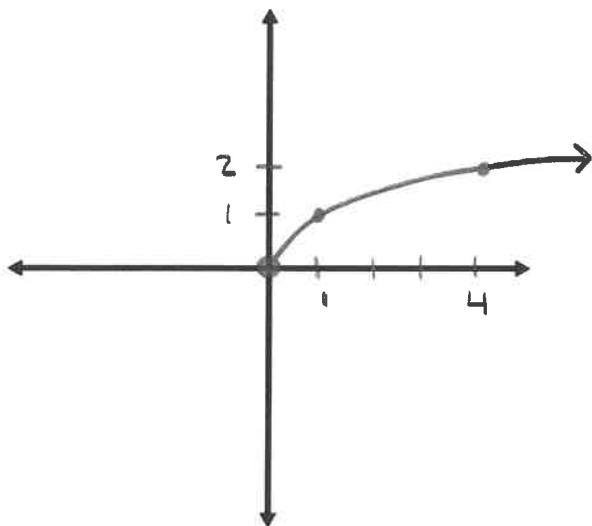


6.3 Square Root Functions and Inequalities
Honors Algebra 2

Square Root Function:

$y = \sqrt{x}$ radical function



Parent function: $y = \sqrt{x}$

Domain: $[0, \infty)$

Range: $[0, \infty)$

Intercepts: $(0, 0)$

Not defined: $x < 0$

End behavior: $x \rightarrow \infty, f(x) \rightarrow \infty$

$x \rightarrow 0, f(x) \rightarrow 0$

*notice points are the reverse of $y = x^2$ $(4, 2)$ vs $(2, 4)$

1. Identify the domain and range of the following:

a. $y = \sqrt{x+4}$

$x+4 \geq 0$

$x \geq -4$

$[-4, \infty)$

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

$x \geq 0$

$[0, \infty)$

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

$x+3 \geq 0$

$x \geq -3$

$[-3, \infty)$

OR
know shifted
left 4

KeyConcept Transformations of Square Root Functions

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

$a \rightarrow$ vertical stretch

$h \rightarrow$ horizontal shift

a neg \rightarrow reflects over
x-axis

$\sqrt{x-4}$ right 4

$\sqrt{x+4}$ left 4

$k \rightarrow$ vertical shift

$\sqrt{x} + 2$ up 2

$\sqrt{x} - 2$ down 2

* always label 2 points

* either
 ① shift parent graph points
 OR

② pick x values strategically

6.3 Square Root Functions and Inequalities

Honors Algebra 2

2. Graph each function. State the domain and range.

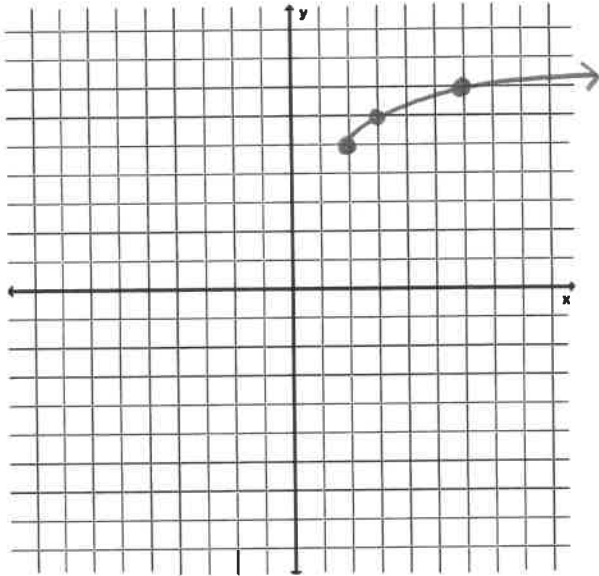
a. $y = \sqrt{x-2} + 5$

domain: $[2, \infty)$

right 2

range: $[5, \infty)$

up 5



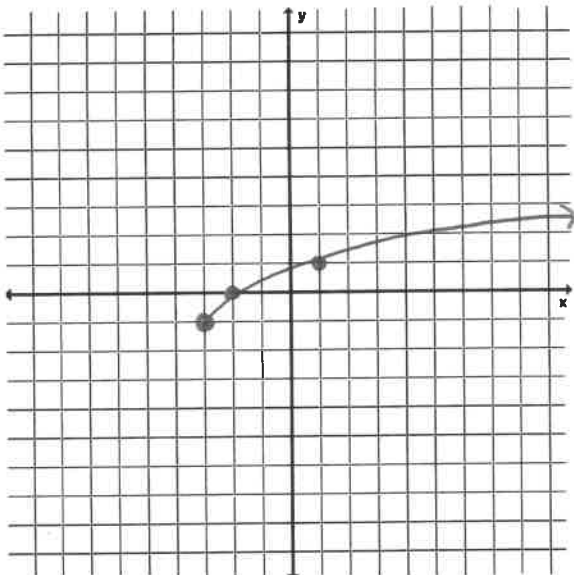
b. $y = \sqrt{x+3} - 1$

domain: $[-3, \infty)$

left 3

range: $[-1, \infty)$

down 1



do choose x=5
 choose x=3

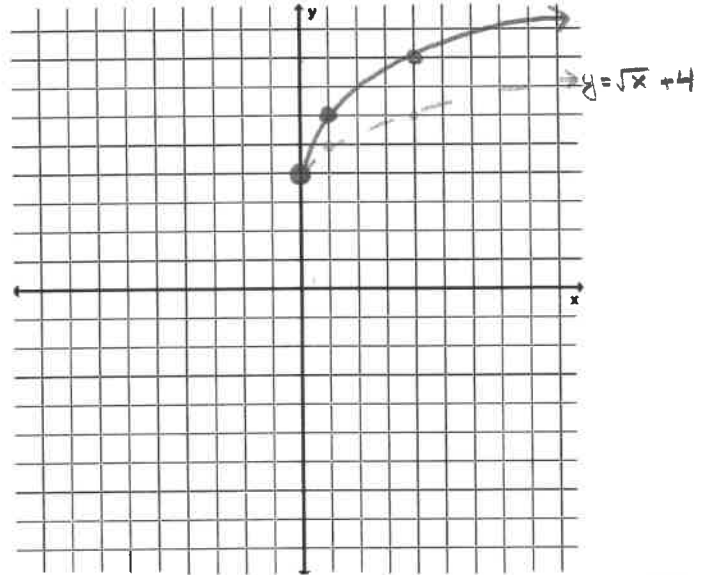
c. $y = 2\sqrt{x} + 4$

domain: $[0, \infty)$

up 4

range: $[4, \infty)$

stretched by 2



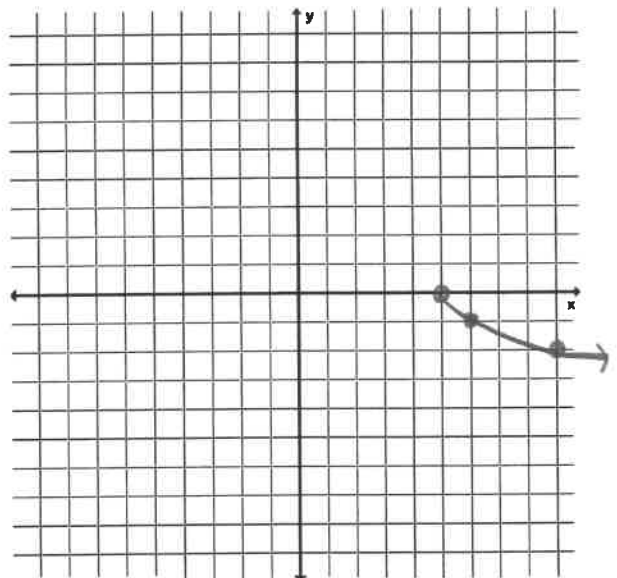
d. $y = -\sqrt{x-5}$

domain: $[5, \infty)$

right 5

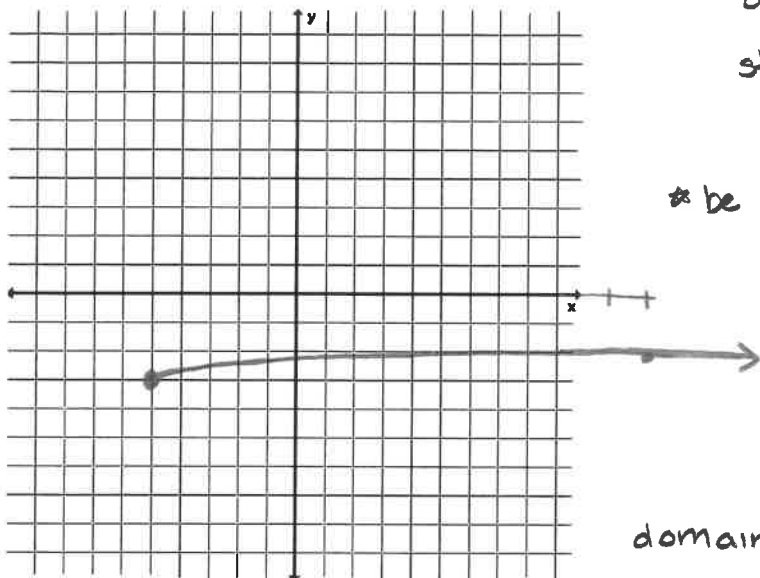
range: $(-\infty, 0]$

reflected



6.3 Square Root Functions and Inequalities
Honors Algebra 2

e. $y = \frac{1}{4}\sqrt{x+5} - 3$



left 5
down 3
stretched by $\frac{1}{4}$

* be strategic w/ x-value
need to multiply by $\frac{1}{4}$
and add -3

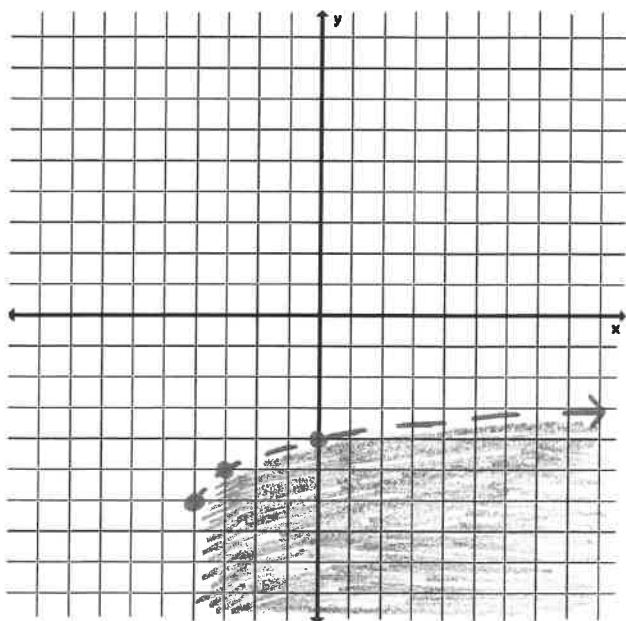
$$x = 11 \quad \frac{1}{4}\sqrt{16} - 3 = -2$$

domain: $[-5, \infty)$

range: $[-3, \infty)$

3. Graph each inequality:

a. $y < \sqrt{x+4} - 6$



left 4
down 6

dotted line
shade under

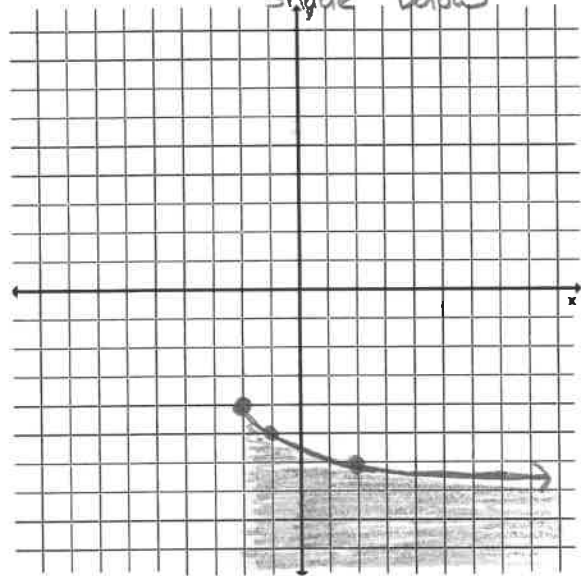
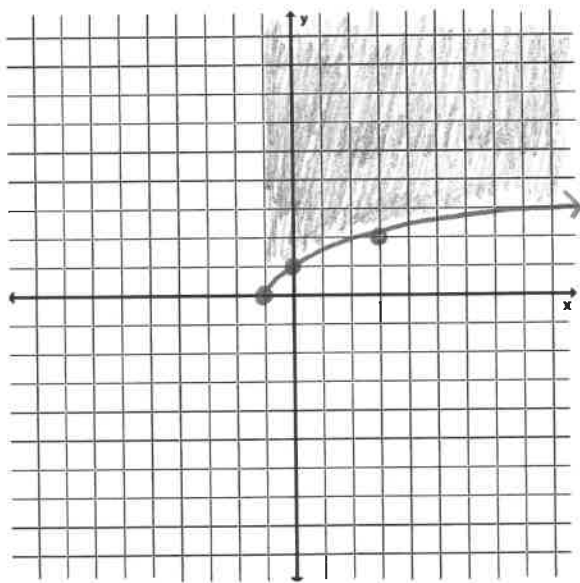
* shade w/n the domain *

6.3 Square Root Functions and Inequalities
Honors Algebra 2

- a. $f(x) \geq \sqrt{x+1}$
left 1
solid line
shade above

* always
reflect 1st

- b. $f(x) \leq -\sqrt{x+2} - 4$
left 2
down 4
reflect
solid line
shade below



* shade w/n the domain