

Section 4.5 Reflection & Square root family

- Square root family
- Transformation - Reflections (flip)
- Piecewise functions

Square root family ^{parent} $y = \sqrt{x}$

what is a square root?

The square root of 16 is the number, that will square to equal 16

⇒ The square roots of ^{input} 16 are ^{outputs} 4 and -4 $x = y^2$

Is the square root a function?

radical ⇒ $\sqrt{\quad}$ = primary square root (pos)

$$\sqrt{16} = 4$$

$$-\sqrt{16} = -4$$

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

Solve pos → $\sqrt{x^2} = \sqrt{16}$
 $|x| = 4$

take the square root

Square root family

$$y = \sqrt{x}$$

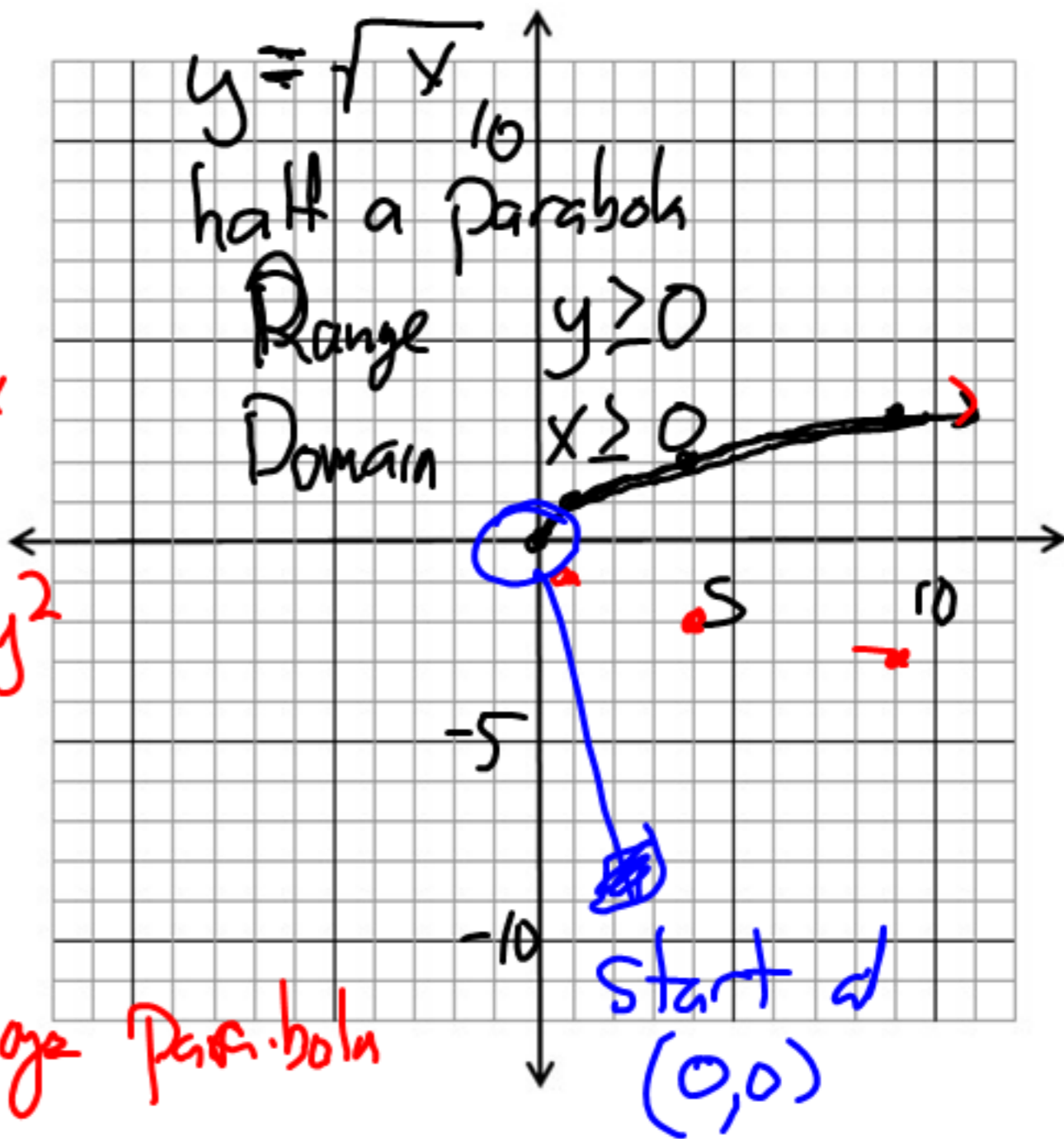
x	y
0	0
1	1
4	2
9	3
16	4

Graph
 $y = \text{square root of } x$

x	y
0	0
1	1
1	-1
4	2
4	-2
9	3
9	-3

$$x = y^2$$

Sideways Parabola



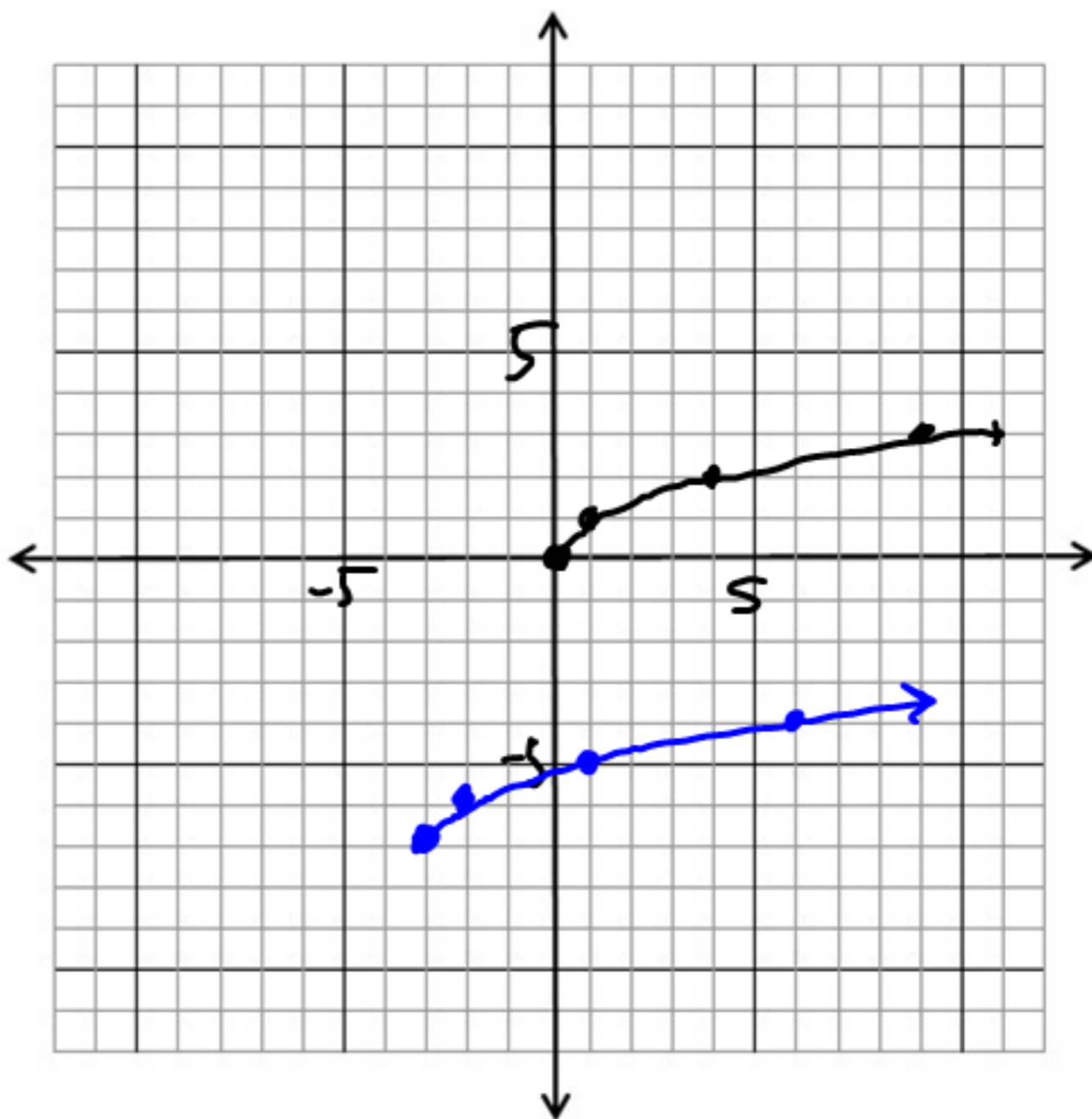
Graph

$$y = \sqrt{x+3} - 7$$

left 3

down 7

$$y = \sqrt{x}$$



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Square root family parent $y = \sqrt{x}$

What does it mean to find a square root?

A square root makes a square

$$y \text{ is the square root of } x \Rightarrow y^2 = x$$

Is the square root a function?

no

the square root of 16 ^{input} is 4 or -4 ^{outputs}

ex $\sqrt[3]{x}$

radical $\Rightarrow \sqrt{x} \Rightarrow$ primary (or pos) square root

is a function \Rightarrow

$$\sqrt{16} = 4$$
$$-\sqrt{16} = -4$$

Square root function

parent

$$y = \sqrt{x}$$

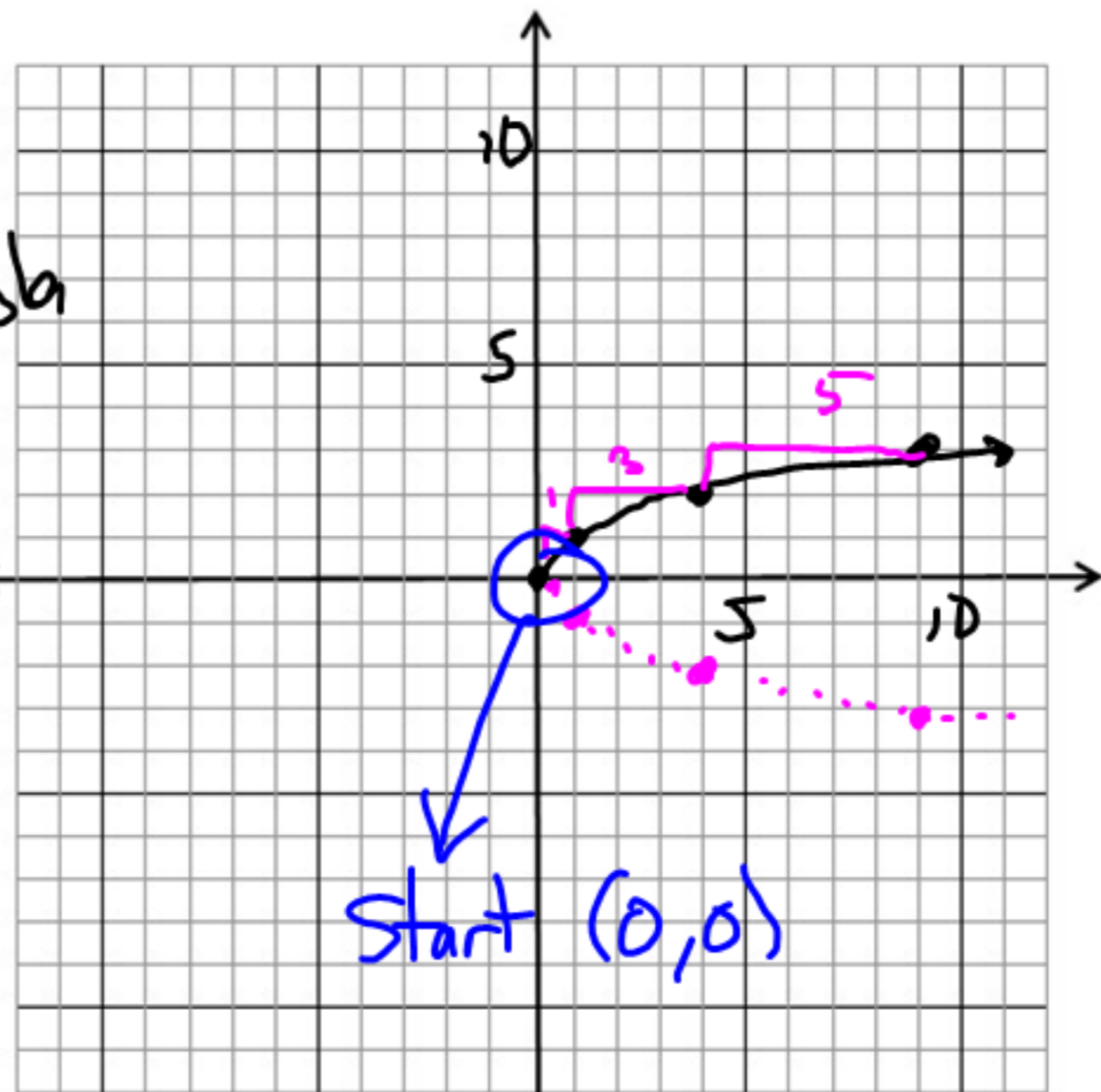
\Rightarrow half a parabola

x	y
0	0
1	1
4	2
9	3
16	4

Graph square root

x	y
0	0
1	1
1	-1
4	2
4	-2
9	3
9	-3

$$y^2 = x$$



Domain

$$x \geq 0$$

Range

$$y \geq 0$$

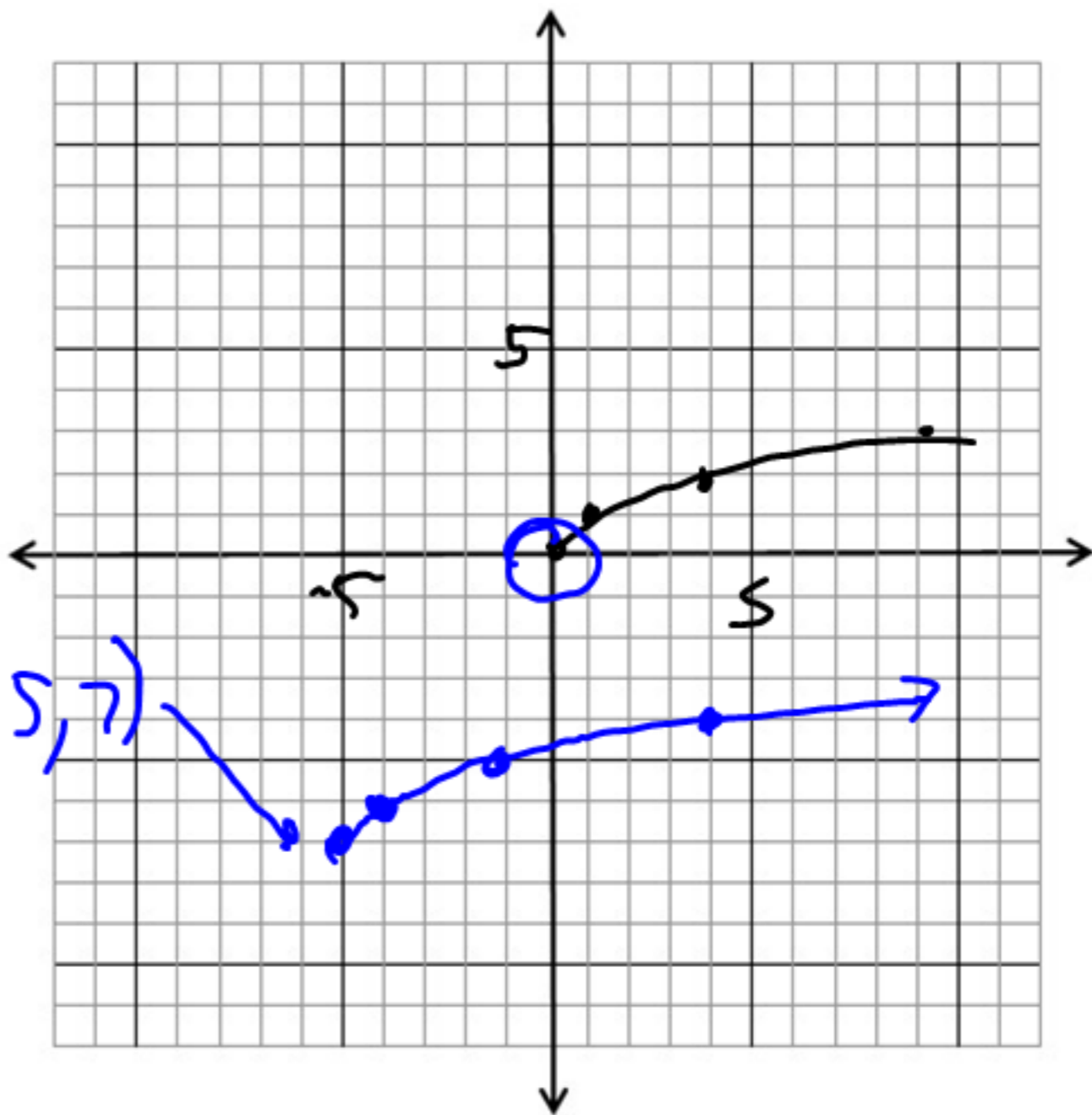
Graph

$$y = \sqrt{x+5} - 7$$

parent $y = \sqrt{x}$

left 5
down 7

Start $(-5, 7)$



$$3 + (9 - 5)^2 = 19$$

$$19 = 19 \checkmark$$

$$3 + (x - 5)^2 = 19$$

$$\begin{array}{r} -3 \\ \hline \sqrt{(x - 5)^2} = \sqrt{16} \\ |x - 5| = 4 \end{array}$$

$$3 + (1 - 5)^2 = 19$$

$$x - 5 = 4$$

$$+5 \quad -15$$

$$x = 9$$

or

$$x - 5 = -4$$

$$+5 \quad +15$$

$$x = 1$$

▶ Review



- b. Plot each point and describe the...
- c. Write an explicit function for t...
- d. Use your function to find how... are 30 teams.

10. Solve.
- a. $3 + (x - 5)^2 = 19$ @
 - c. $5 - (x - 1)^2 = -22$
11. This histogram shows the student... Ms. Noah's class. Describe what th... Ms. Noah
- a. adds five points to everyone's s...
 - b. subtracts ten points from every...

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Square root family

What is a square root?

- something times itself equals

What is the square root of 16?

4 or -4

$$4^2 = 16$$

$$(-4)^2 = 16$$

input

output

$$y^2 = x$$

or $\sqrt[3]{x}$

Is the square root a function? not a function

radical $\Rightarrow \sqrt{\quad} \Rightarrow$ primary square root (pos)

$$\sqrt{x^2} = |x|$$

$$\sqrt{16} = 4$$

$$-\sqrt{16} = -4$$

the square roots of 16

parent $y = \sqrt{x} \Rightarrow$ is a function

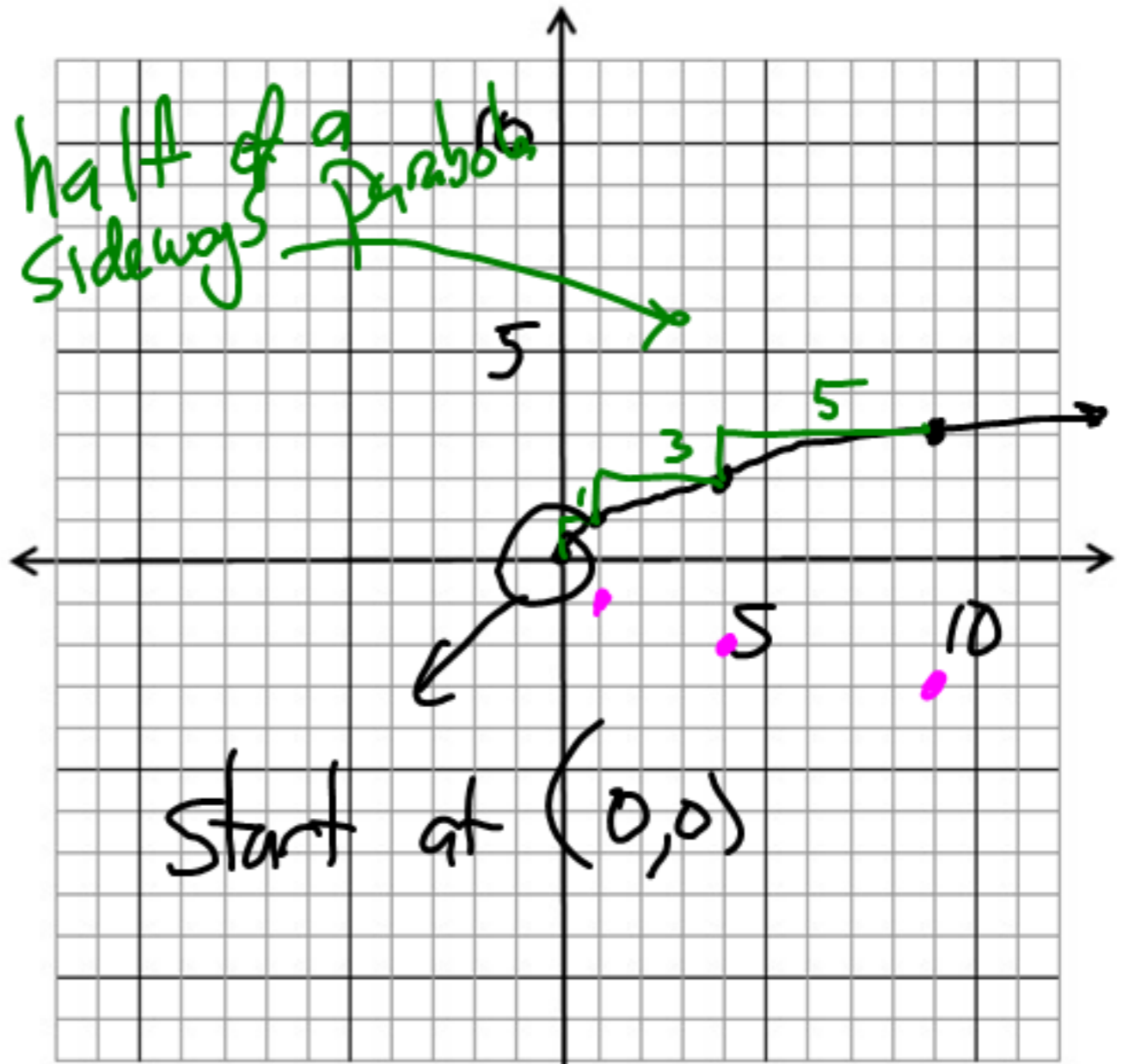
Graph

$$y = \sqrt{x}$$

X	y
0	0
1	1
4	2
9	3
16	4

Graph Square root
 $y^2 = x$

X	y
0	0
1	1
1	-1
4	2
4	-2
9	3
9	-3



Start at (0,0)

Domain: $x \geq 0$

Range: $y \geq 0$

Graph $y = \sqrt{x+3} + 2$

parent $y = \sqrt{x}$

transformation

left 3

up 2

