Inverse of a Square Root Function

Act #7
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Graph: $f(x) = 2\sqrt{x+3} - 1$ using

x	-3	1	6
y	-1	3	5

① $V(-3,-1)$

② $x = 1$

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

$= 2(2) - 1$

$= 3$

$P(1,3)$

③ $x = 6$

$y = 2\sqrt{6+3} - 1$

$= 2\sqrt{9} - 1$

$= 5$

$P(6,5)$

How do you graph $f^{-1}(x)$?

Interchange x and y.

x	-1	3	5
y	-3	1	6

The inverse of a square root function is a function whose graph is a semi-parabola.

* $\boxed{\text{dom } f^{-1} = \text{ran } f \qquad \text{ran } f^{-1} = \text{dom } f}$

f and f^{-1} are symmetrical about the bisector of the 1st quadrant.

Finding the rule of the Inverse

Given: $f(x)= 2\sqrt{x+3} -1$ find $f^{-1}(x)$.

Solution:

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

Interchange x and y,

now solve for y again.

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

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

$\frac{1}{4}(x+1) = y+3$ (square both sides)

$\frac{1}{4}(x+1) - 3 = y$

$\therefore f^{-1}(x) = \frac{1}{4}(x+1) - 3$

What restriction must be set on x?

$x \geq -1$

Since: dom f^{-1} = ran f = $[-1,+\infty[$

The graphic representation of the inverse corresponds to a semi-parabola.