

# INTERMEDIATE ALGEBRA

GPS #34

7.4 RADICAL FUNCTIONS

NAME:

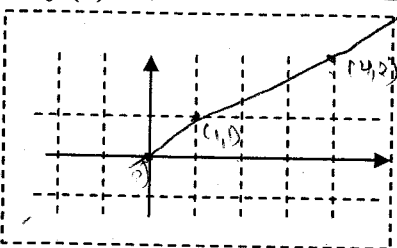
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## Useful Guidelines:

- \* Square Root and Cube Root: The cube root function is defined for all inputs, whereas the square root function is defined only for nonnegative inputs.
- \* Square Root Property: If  $k$  is a nonnegative number and  $x^2 = k$ , then  $x = \pm\sqrt{k}$ .
- \* Solve Equations with Cube Roots: The solution to the equation  $x^3 = k$  is  $x = \sqrt[3]{k}$ .
- \* Power function:  $f(x) = x^p$ , where  $p$  is a rational number.
- \* Root function:  $f(x) = \sqrt[n]{x}$ , where  $n \geq 2$ .

1. Graph each function. Give the domain and the range.

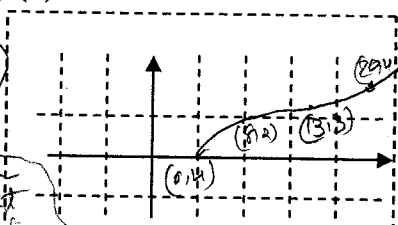
a.  $f(x) = \sqrt{x}$  D:  $[0, \infty)$  R:  $[0, \infty)$



x	y	$\sqrt{x}$
0	0	0
1	1	1
4	2	2
9	3	3

moves side ways when constant in side of roots

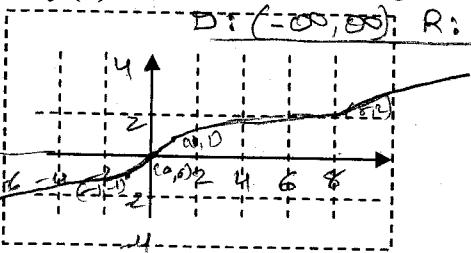
b.  $f(x) = \sqrt{x-4}$  D:  $[4, \infty)$  R:  $[0, \infty)$



x	y	$\sqrt{x-4}$
4	0	0
5	1	1
9	2	2

moves 2 UP down when constant outside of roots

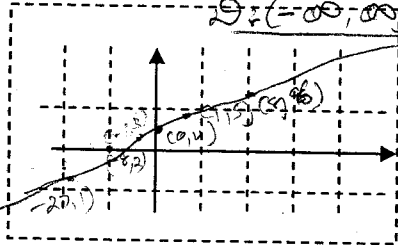
c.  $f(x) = \sqrt[3]{x}$  include negative part. D:  $(-\infty, \infty)$  R:  $(-\infty, \infty)$



x	y	$\sqrt[3]{x}$
0	0	0
1	1	1
8	2	2
27	3	3
-1	-1	-1
-8	-2	-2
-27	-3	-3

x	y	$\sqrt[3]{x+4}$
0	0	0
1	1	1
8	2	2
27	3	3
-1	-1	-1
-8	-2	-2
-27	-3	-3

d.  $f(x) = \sqrt[3]{x+4}$  D:  $(-\infty, \infty)$  R:  $(-\infty, \infty)$



goes up 4 points on y-axis

2. Use the square root property to solve each equation and give the solution set.

a)  $x^2 = 49$

$x = \pm\sqrt{49}$   
 $x = \pm 7$

Sol. set  $\{x | x = \pm 7\}$

c)  $(x-4)^2 = 25$

$x-4 = \pm\sqrt{25}$   
 $x-4 = \pm 5$

$x-4 = 5$  |  $x-4 = -5$

$x = 9$  |  $x = -1$

Sol. set  $\{x | x = 9 \text{ or } x = -1\}$

b)  $x^2 - 8 = 0$

$x^2 = 8$

$x = \pm\sqrt{8}$  (simpl)

$x = \pm 2\sqrt{2}$

Sol. set =  $\{x | x = \pm 2\sqrt{2}\}$

d)  $(2x-5)^2 = 12$

$2x-5 = \pm\sqrt{12}$

$2x-5 = \pm 2\sqrt{3}$

$2x-5 = 2\sqrt{3}$

$2x = 5 + 2\sqrt{3}$

$x = \frac{5 + 2\sqrt{3}}{2}$

$2x-5 = -2\sqrt{3}$

$2x = 5 - 2\sqrt{3}$

$x = \frac{5 - 2\sqrt{3}}{2}$

Sol. set  $\{x | x = \frac{5 \pm 2\sqrt{3}}{2}\}$

3. Use the cube roots to solve each equation and give the solution set.

a)  $x^3 = 125$

$x = \sqrt[3]{125}$

$x = \{x | x = 5\}$

b)  $\frac{3(y-1)^3}{3} = \frac{81}{3}$

$y-1 = \sqrt[3]{27}$

$y-1 = 3$

$y = 4$

Sol. set  $\{x | x = 4\}$