Day 4

Name: *skip cubed root

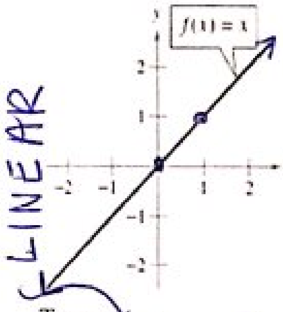
Period:

Date:

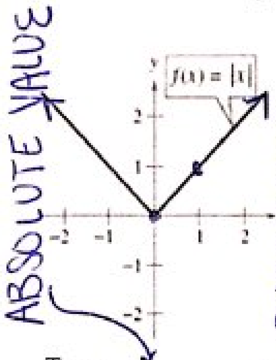
Parent Graphs

Math Lab: Investigating Radical Functions

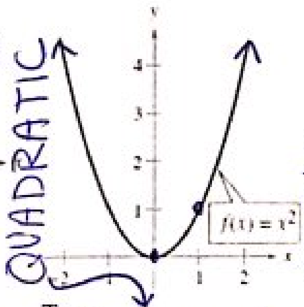
A parent graph is the most basic graph of a function. So far this year we have studied the graphs of linear, quadratic, absolute value, and cubic functions. Today we will expand the family of parent graphs to square root and cube root functions.



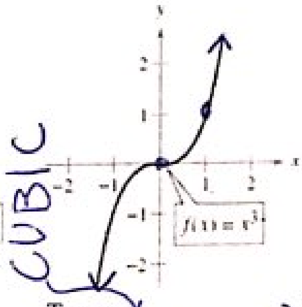
Type:
Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$



Type:
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$



Type:
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$

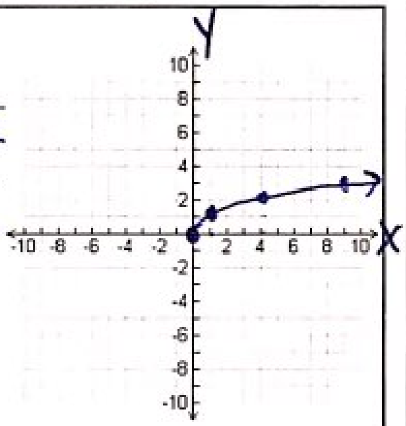


Type:
Domain: $(-\infty, \infty)$
Range: $(-\infty, \infty)$

1] Complete the table of ordered pairs and sketch the parent graphs of the square root and cube root functions. Then state their domain and range.

Square Root

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

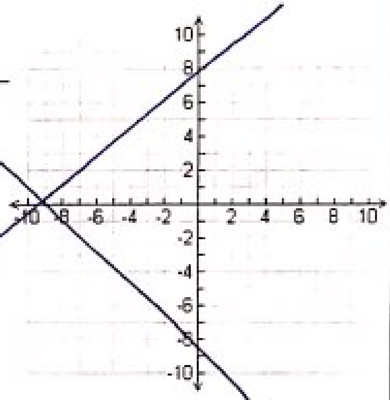


Domain: $[0, \infty)$ X

Range: $[0, \infty)$ Y

Cube Root

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



Domain:

Range:

2] What two points do all six of the parent graphs have in common?
(0,0)
(1,1)

3] All parent graphs have the same domain, except for which function?
square root

4] Which parent graphs have the same range?
quadratic, Absolute value, square root

5] Which parent graphs have symmetry about the y-axis? (If you fold the graph along the y-axis, you get a mirror image on both sides.
quadratic & absolute value

6] Which parent graphs have symmetry about the origin? (If you rotate the graph 180 degrees, you get the same graph you started with.)
linear & cubic ← odd functions

7] Which parent graph has no symmetry?
square root

Scanned by CamScanner

Graphing Using Transformations

When we studied quadratic and absolute value graphs earlier in the year, we learned that they can be graphed quickly using transformations from the equation on the parent graph. Square root and cube root graphs can be sketched the same way. Use what you learned from graphing absolute value and quadratic functions to complete the table of information and examples below.

Linear	Quadratic	Cubic
$y = a(x-h)+k$	$y = a(x-h)^2+k$	$y = a(x-h)^3+k$
Absolute Value	**Square Root**	**Cube Root**
$y = a\lvert x-h\rvert+k$	$y = a\sqrt{x-h}+k$	$y = a\sqrt[3]{x-h}+k$

The function tells you the general shape	$+k$ translates (shifts) the graph up k units
$a < 0$ reflects the graph over the x-axis (neg)	$-k$ translates (shifts) the graph down k units
$x < 0$ reflects the graph over the y-axis (neg)	$x + h$ translates (shifts) the graph left k units
a is the slope from 1 point to the next point	$x - h$ translates (shifts) the graph right k units

★ inside opposite, outside same

Find all characteristics of the graph, and then make a sketch.

8] $y = \sqrt{x+6}+2$

Transformations: left 6 units, up 2 units (k)

Two points: $(0,0) \to (-6,2)$, $(1,1) \to (-5,3)$

y-intercept: $x=0$

$y = \sqrt{0+6}+2$

$y = \sqrt{6}+2$

$y \approx 4.4$ $(0, 4.4)$

x-intercept: $y=0$

$0 = \sqrt{x+6}+2$

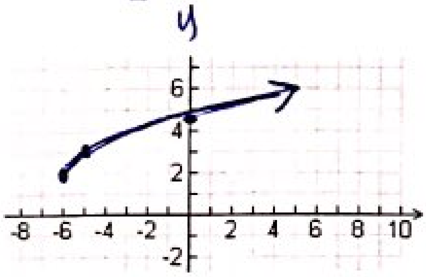
$-2 \quad\quad -2$

$\cancel{-2 = \sqrt{x+6}}$

NONE

Domain: $[-6, \infty)$

Range: $[2, \infty)$



9] $y = -\sqrt{x}+6$

Transformations: a reflects over x-axis, up 6 units

Two points: $(0,0) \to (0,6)$, $(1,1) \to (1,5)$

y-intercept: $(0, 6)$

x-intercept:

$0 = -\sqrt{x}+6$

$-6 \quad\quad -6$

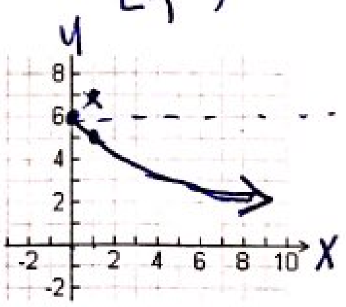
$-6 = -\sqrt{x}$

$6 = \sqrt{x}$ $x = 36$

$(36, 0)$

Domain: $[0, \infty)$

Range: $(-\infty, 6]$



Scanned by CamScanner

10] $y = 3\sqrt{x} - 6$

Transformations: k

Stretch (vertical)

down 6

Two points:

$(0,0) \to (0,-6)$

$(1,1) \to (1,-3)$

y-intercept:

$(0,-6)$

x-intercept:

$0 = 3\sqrt{x} - 6$

$+6 \quad +6$

$\frac{6}{3} = \frac{3\sqrt{x}}{3}$

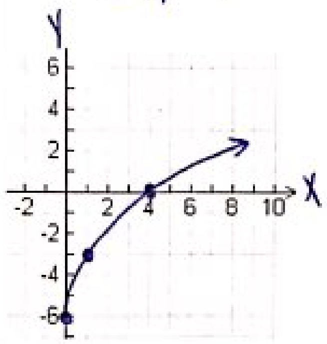
$2 = \sqrt{x}$

$x = 4$

$(4,0)$

Domain: $[0,\infty)$

Range: $[-6,\infty)$



11] $y = \sqrt{-x} - 4$

Transformations:

reflect over y-axis

down 4

Two points:

$(0,0) \to (0,-4)$

$(1,1) \to (-1,-3)$

y-intercept:

$(0,-4)$

x-intercept:

$0 = \sqrt{-x} - 4$

$+4 \quad +4$

$4 = \sqrt{-x}$

$-x = 16$

$x = -16$

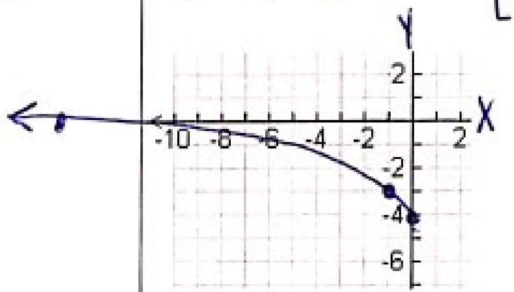
$(-16,0)$

Domain:

$(-\infty,0]$

Range:

$[-4,\infty)$



12] $y = \sqrt[3]{x-6} + 4$

Transformations:

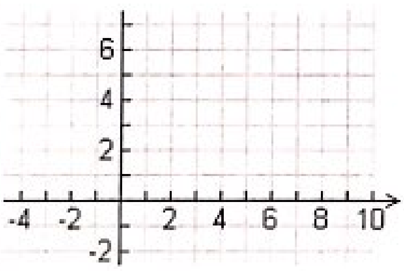
Two points:

y-intercept:

x-intercept:

Domain:

Range:



13] $y = -\sqrt[3]{x} - 6$

Transformations:

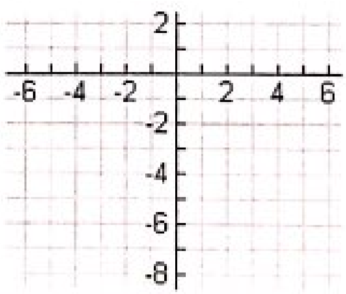
Two points:

y-intercept:

x-intercept:

Domain:

Range:



Scanned by CamScanner