H. Algebra 2 Module 10 Review

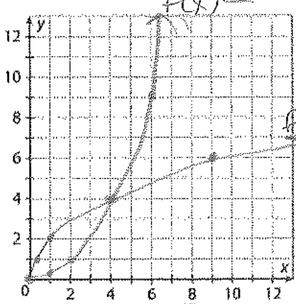
Name: Key Date: ______________ Hour: ___

10-1 Inverses of Simple Quadratic and Cubic Functions

restrict Domain composition

For 1-2, graph the function *f(x)* for the domain $\{x|x \geq 0\}$. Then write and graph its inverse function, $f^{-1}(x)$.

1. $f(x) = 0.25x^2$ $\{x|x \geq 0\}$



x	f(x)
0	0
1	1/4
2	1
4	4
6	9

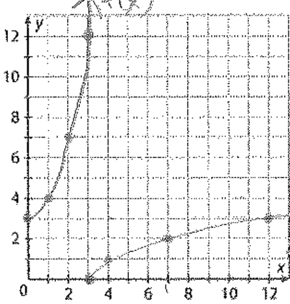
x	$f^{-1}(x)$
0	0
1/4	1
1	2
4	4
9	6

$\boxed{f^{-1}(x) = \sqrt{4x}}$

$f^{-1}(f(x)) = \sqrt{4(.25x^2)} = \sqrt{x^2} = \boxed{x}$

$f(f^{-1}(x)) = .25(\sqrt{4x})^2 = .25(4x) = \boxed{x}$

2. $f(x) = x^2 + 3$ $\{x|x \geq 0\}$



x	f(x)
0	3
1	4
2	7
3	12

x	$f^{-1}(x)$
3	0
4	1
7	2
12	3

$\boxed{f^{-1}(x) = \sqrt{x-3}}$

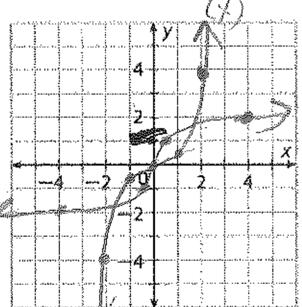
$f^{-1}(f(x)) = \sqrt{(x^2+3)-3} = \sqrt{x^2} = \boxed{x}$

$f(f^{-1}(x)) = (\sqrt{x-3})^2 + 3 = x - 3 + 3 = \boxed{x}$

For 3-4, graph the function *f(x)*. Then write and graph its inverse function, $f^{-1}(x)$. composition

No Restrictions needed

3. $f(x) = 0.5x^3$



x	f(x)
-2	-4
-1	-.5
0	0
1	.5
2	4

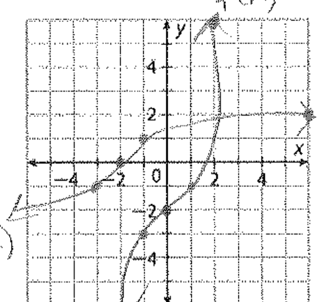
x	$f^{-1}(x)$
-4	-2
-.5	-1
0	0
.5	1
4	2

$\boxed{f^{-1}(x) = \sqrt[3]{2x}}$

$f(f^{-1}(x)) = .5(\sqrt[3]{2x})^3 = \frac{1}{2}(2x) = \boxed{x}$

$f^{-1}(f(x)) = \sqrt[3]{2(.5x^3)} = \sqrt[3]{x^3} = \boxed{x}$

4. $f(x) = x^3 - 2$



x	f(x)
-1	-3
0	-2
1	-1
2	6

x	$f^{-1}(x)$
-3	-1
-2	0
-1	1
6	2

$\boxed{f^{-1}(x) = \sqrt[3]{x+2}}$

$f(f^{-1}(x)) = (\sqrt[3]{x+2})^3 - 2 = x + 2 - 2 = \boxed{x}$

$f^{-1}(f(x)) = \sqrt[3]{(x^3-2)+2} = \sqrt[3]{x^3} = \boxed{x}$

For 5-6, use the function $d(t) = 4.9t^2$ which gives the distance, d, in meters, that an object dropped from a height will fall in t seconds.

5. Write its inverse function *t(d)* for the time, t, in seconds, it takes for an object to fall a distance of d meters.

$d = 4.9t^2$

$\boxed{t(d) = \sqrt{\frac{d}{4.9}}}$ $t(d) = \sqrt{\frac{10d}{49}}$ $\boxed{t(d) = \frac{\sqrt{10d}}{7}}$ $\{t|t \geq 0\}$

6. Find the number of seconds it takes an object to fall 150 meters. Round to the nearest 10th of a second.

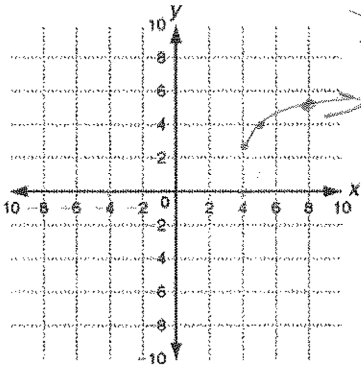
$t(150) = \sqrt{\frac{150}{4.9}} = 5.53283$ $\boxed{5.5 \text{ seconds}}$

neg → reflections

10-2 Graphing Square Root Functions

For 1-2, find the endpoint and two additional points to graph each function. Identify the domain and range.

1. $f(x) = \sqrt{x-4}+3$ endpt $(+4,3)$



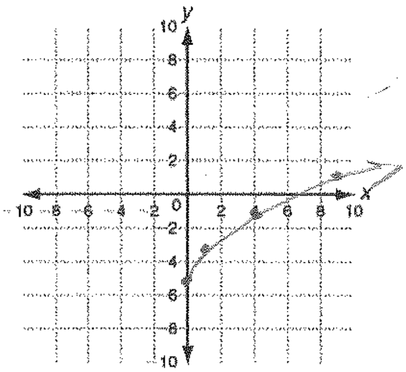
D: $\{x \mid x \geq +4\}$
R: $\{y \mid y \geq 3\}$

x	f(x)
4	3
5	4
8	5

Domain: $\{x \mid x \geq +4\}$

Range: $\{y \mid y \geq 0\}$

2. $f(x) = 2\sqrt{x}\ -5$ ep $(0,-5)$



x	f(x)
0	-5
1	-3
4	-1
9	1

Domain: $\{x \mid x \geq 0\}$

Range: $\{y \mid y \geq -5\}$

Domain: Range

For 3-4, describe the transformations applied to the graph of $f(x) = \sqrt{x}$ to produce the graph of $g(x)$.

3. $g(x) = 4\sqrt{x+8}$

horz left 8
vertical stretch 4
D: $\{x \mid x \geq -8\}$
R: $\{g(x) \mid g(x) \geq 0\}$

4. $f(x) = -\sqrt{3x}+2$

vert up 2
horz compression $\frac{1}{3}$
reflection over x-axis
D: $\{x \mid x \geq 0\}$
R: $\{g(x) \mid g(x) \leq 2\}$

For 5-6, use the transformations applied to the graph of the parent function $f(x) = \sqrt{x}$ to write a function $g(x)$.

5. Reflected across the y-axis, vertically stretched by a factor of 7, and translated down 3 units.

$\boxed{g(x) = 7\sqrt{-x}\ -3}$

6. Translated right two units, compressed horizontally by a factor of $\frac{1}{2}$, and reflected across the x-axis.

$\boxed{g(x) = -\sqrt{2(x-2)}}$

7. Write the function that matches the graph using the given transformation format.

A) $g(x) = \sqrt{\frac{1}{b}(x-h)}+k$

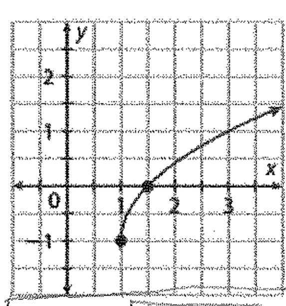
$h=1$ $k=-1$ $b=\frac{1}{2}$
pt $(3/2, 0)$

$0 = \sqrt{\frac{1}{b}(3/2-1)}\ -1$

$1 = \frac{1}{b} \cdot \frac{1}{2}$

$2b = 1$

$b = 1/2$



$\boxed{g(x) = \sqrt{2(x-1)}-1}$

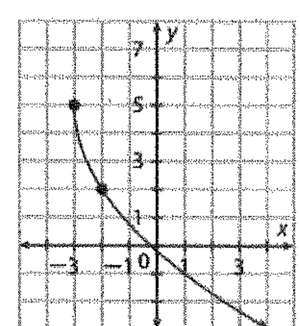
B) $g(x) = a\sqrt{x-h}+k$

$h=-3$ $k=5$ $a=-3$
pt $(-2,2)$

$2 = a\sqrt{-2+3}+5$

$2 = a \cdot 1+5$

$-3 = a$

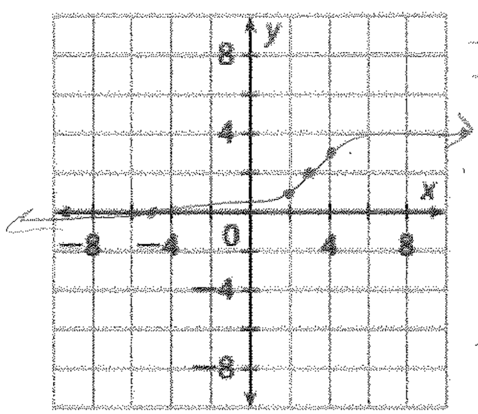


$\boxed{g(x) = -3\sqrt{x+3}+5}$

10-3 Graphing Cube Root Functions

For 1-2, tell the transformations that have been applied to the parent graph of $f(x) = \sqrt[3]{x}$ to produce the graph of $g(x)$. Then graph each cube root function by finding the point of symmetry and two points on each side.

1. $g(x) = \sqrt[3]{x-3} + 2$

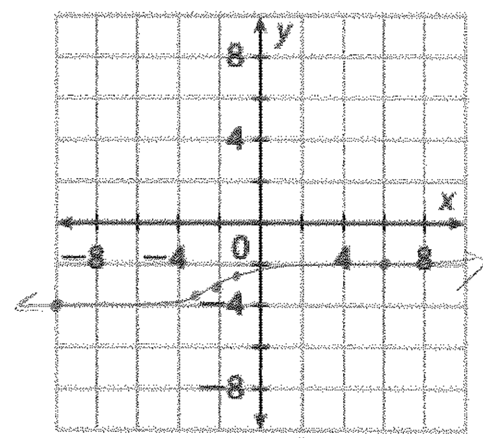


x	f(x)
-5	0
2	1
3	2
4	3
11	4

P.O.S $(3, 2)$

horz right 3
vert up 2

2. $g(x) = \frac{1}{2}\sqrt[3]{x+2} - 3$



x	f(x)
-10	-4
-3	$-3\frac{1}{2}$
-2	-3
-1	$-2\frac{1}{2}$
6	-1

P.O.S $(-2, -3)$

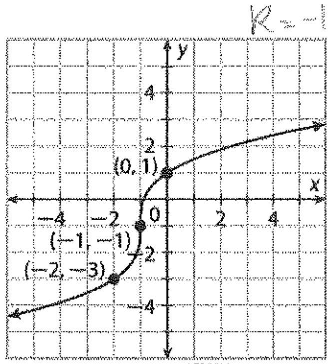
horz left 2
vert down 3
vert compression 1/2

For 3-4, write a function of the form $g(x) = a\sqrt[3]{x-h} + k$ or $g(x) = \sqrt[3]{\frac{1}{b}(x-h)} + k$ that matches each graph.

3. $g(x) = a\sqrt[3]{x-h} + k$

$h = -1$ $\quad a = 2$
$k = -1$ $\quad$ pt $(0, 1)$

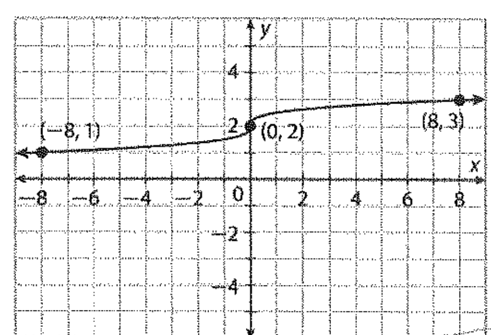
$1 = a\sqrt[3]{0+1} - 1$
$1 = a - 1$
$2 = a$



$\boxed{g(x) = 2\sqrt[3]{x+1} - 1}$

4. $g(x) = \sqrt[3]{\frac{1}{b}(x-h)} + k$

p$(8, 3)$
$h = 0$
$k = 2$
$b = 8$



$3 = \sqrt[3]{\frac{1}{b}(8-0)} + 2$
$1 = \frac{8}{b}$ $\quad b = 8$

$\boxed{g(x) = \sqrt[3]{\frac{1}{8}(x)} + 2}$

For 5-6, use the transformations applied to the graph of the parent function $f(x) = \sqrt[3]{x}$ to write a function $g(x)$.

5. Reflected across the y-axis, translated down 4 units and left 12 units.

$g(x) = \sqrt[3]{-(x+12)} - 4$

6. Stretched vertically by a factor of 8, reflected across the x-axis, translated 11 units to the right.

$g(x) = -8\sqrt[3]{x-11}$