Unit 4 Day 2

Graphing Square and Cube Roots

Warm Up

1. Write down all the transformations of the graph of $y = x^2$.

a. $y = (x + h)^2$ moves the graph of $y = x^2$ _____

b. $y = (x - h)^2$ moves the graph of $y = x^2$ _____

c. $y = (x)^2 + k$ moves the graph of $y = x^2$ _____

d. $y = (x)^2 - k$ moves the graph of $y = x^2$ _____

Graph each function then describe the transformations from the parent graph.

2) $f(x) = |3x + 9| - 2$

3) $y = -|x| + 6$

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

5) Given $f(x) = x^2$

Evaluate $f(x) + f(x+2)$

6) Given $g(x) = x^2 + 2$

Evaluate $g(x+3) - g(x)$

Done Early?
Complete Notes p. 6 ☺

Warm Up Answers

1. Write down all the transformations of the graph of $y = x^2$.

a. $y = (x + h)^2$ moves the graph of $y = x^2$ **Left h**

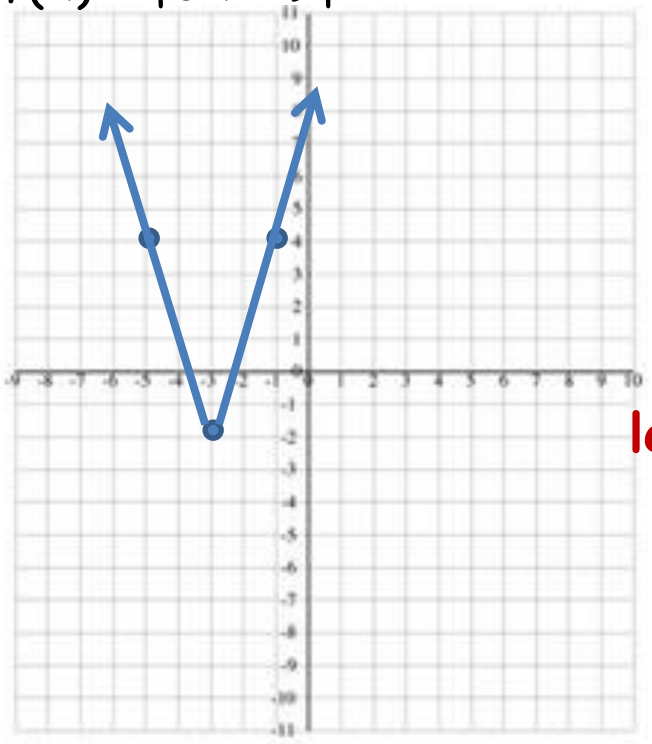
b. $y = (x - h)^2$ moves the graph of $y = x^2$ **Right h**

c. $y = (x)^2 + k$ moves the graph of $y = x^2$ **Up k**

d. $y = (x)^2 - k$ moves the graph of $y = x^2$ **Down k**

Graph each function then indicate the transformations from the parent graph.

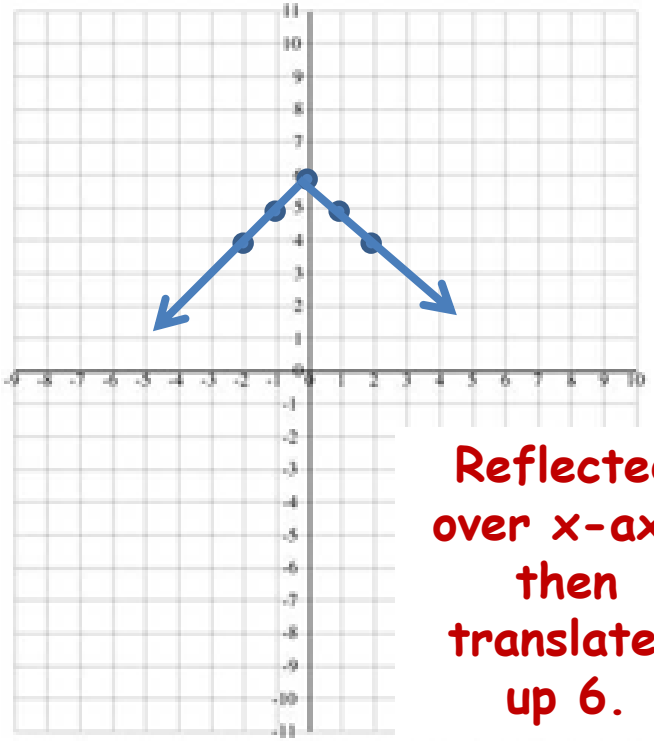
2) $f(x) = |3x + 9| - 2$



Get vertex form first
$y = 3|x+3|-2$

Translated left 3, down 2, and vertically stretched by 3.

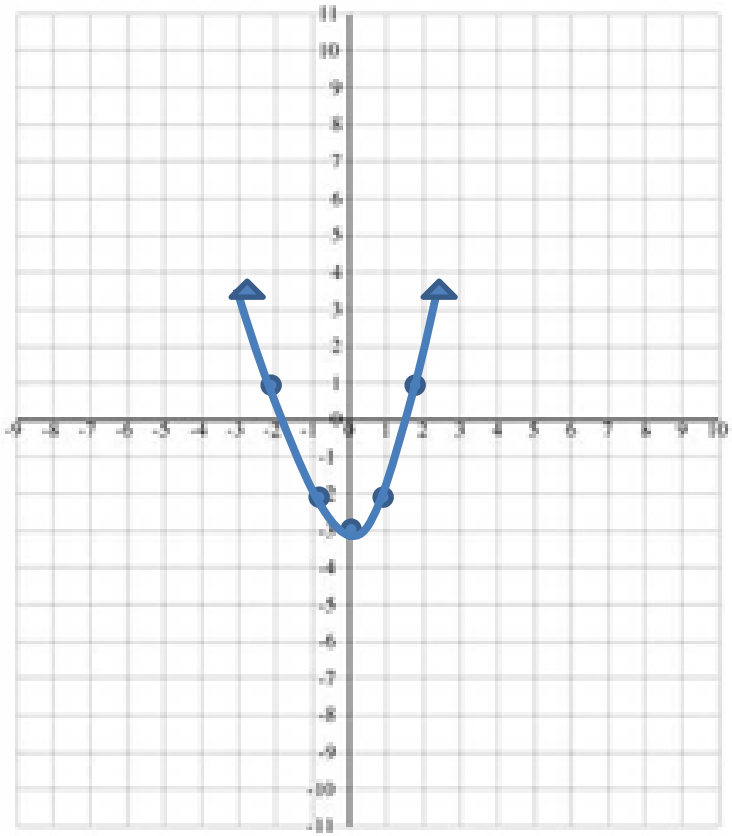
3) $y = -|x| + 6$



Reflected over x-axis then translated up 6.

Warm-up Answers Continued

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



Translated down 3 from parent $y = x^2$.

Warm-up Answers Continued

5) Given $f(x) = x^2$
Evaluate $f(x) + f(x+2)$

$x^2 + (x + 2)^2$
$x^2 + (x^2 + 4x + 4)$
$2x^2 + 4x + 4$

6) Given $g(x) = x^2 + 2$
Evaluate $g(x+3) - g(x)$

$[(x + 3)^2 + 2] - [x^2 + 2]$
$[(x^2 + 6x + 9) + 2] - [x^2 + 2]$
$(x^2 + 6x + 11) - (x^2 + 2)$
$x^2 + 6x + 11 - x^2 - 2$
$6x + 11 - 2$
$6x + 9$

Homework Answers

1. E
2. C
3. A
4. F
5. B
6. D

13. $D:(-\infty,\infty);\ R:[0,\infty)$

14. $D:(-\infty,\infty);\ R:(-\infty,0]$

15. $D:(-\infty,\infty);\ R:(-\infty,3]$

16. $D:(-\infty,\infty);\ ;\ R:(-\infty,0]$

17. $D:(-\infty,\infty);\ R:[0,\infty)$

18. $D:(-\infty,\infty);\ R:(-\infty,2]$

19. $D:(-\infty,\infty);\ R:[-4,\infty)$

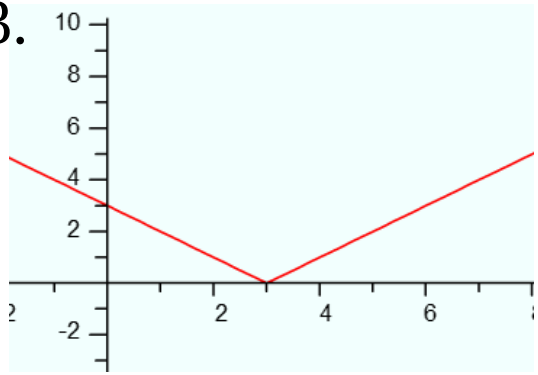
20. $D:(-\infty,\infty);\ R:[-3,\infty)$

21. $D:(-\infty,\infty) R:\ (-\infty,0]$

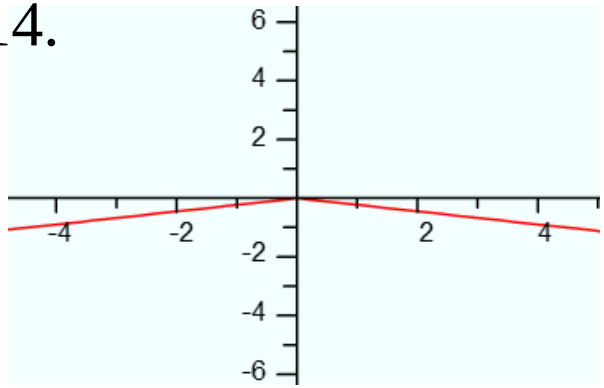
(Graphs on next slides)

Homework Answers Graphs

13.



14.



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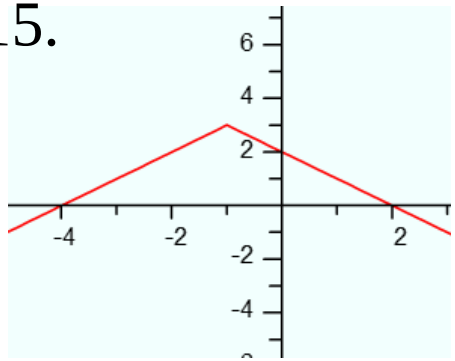

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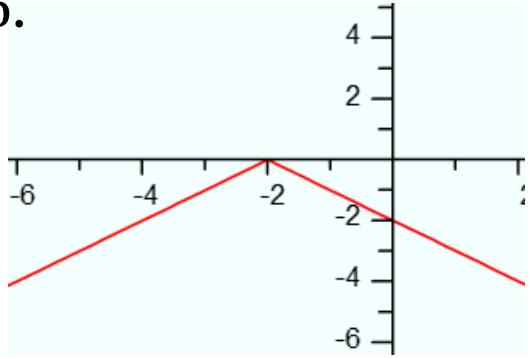

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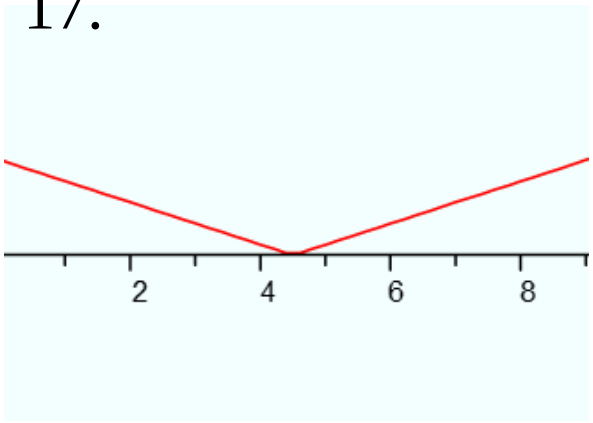
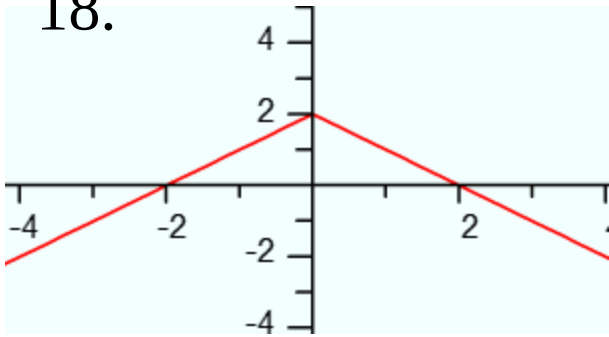
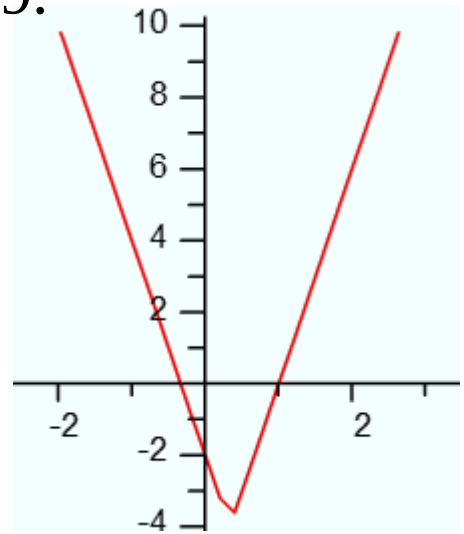


18.



Homework Answers Continued

19.



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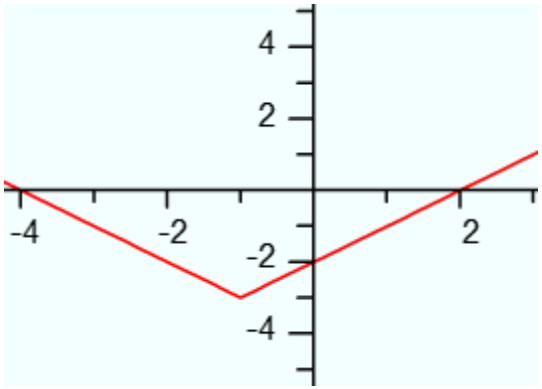

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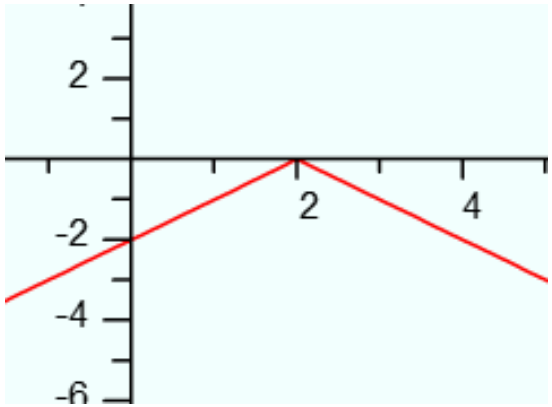


Homework Answers Bottom Pg 1

$$10.\ y = |x+2|+1; D:(-\infty,\infty); R:[1,\infty)$$

$$11.\ y = |x-4|; D:(-\infty,\infty); R:[0,\infty)$$

$$12.\ y = -|x-1|+3; D:(-\infty,\infty); R:(-\infty,3]$$

$$13.\ y = -\left|x-\frac{1}{2}\right|-\frac{3}{2}; D:(-\infty,\infty); R:(-\infty,-\frac{3}{2}]$$

$$14.\ y = |x+3|-2; D:(-\infty,\infty); R:[-2,\infty)$$

$$15.\ y = -|x|+\frac{3}{5}; D:(-\infty,\infty); R:(-\infty,\frac{3}{5}]$$

Homework Answers Pg 2

16. $y = |x + 2| + 1$

17. $y = |x| - 3$

18. $y = x + 2$

19. $y = -|x| + 2$

20. $y = -|x - 1| - 2$

21. $y = -|x + 2|$

22. a. $y = \frac{5}{4}|x - 6|$

b. Yes!! x = 10, $y = \frac{5}{4}|10 - 6|; y = 5$

23. V of image (4, 2)

move right 3 and down 4 v(7, -2)

m = 1; $y = |x - 7| - 2$

Homework Answers Bottom pg 2

24.) Given $h(t) = 10^t$

Evaluate h(t) if t = 3.5

$h(3.5) = 10^{3.5}$

$h(3.5) = 3{,}162.277$

25.) Given $f(x) = 3 + \sqrt{x}$

Evaluate f(25) =

$f(25) = 3 + \sqrt{25}$

$f(25) = 3 + 5$

$f(25) = 8$

26.) Given $f(t) = \sqrt[3]{x^t}$

Evaluate f(12)=

$f(12) = \sqrt[3]{x^{12}}$

$f(12) = x^4$

27.) Given $g(x) = 2x^2 - 5$

Evaluate g(2x - 5)=

$g(x) = 2(2x-5)^2 - 5$

$g(x) = 2(4x^2 - 20x + 25) - 5$

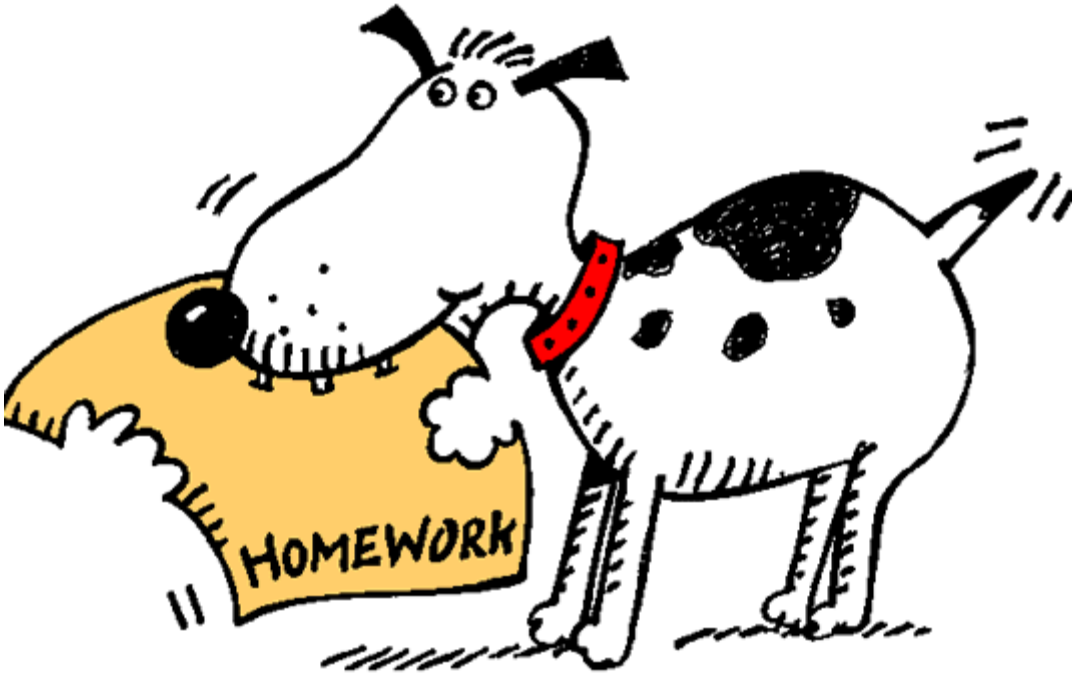
$g(x) = (8x^2 - 40x + 50) - 5$

$g(x) = 8x^2 - 40x + 45$

Homework

Packet p. 3-4

AND NOTES p. 6 (if not done yet)



Graphing Square Root Functions

Let's turn to your notes bottom of p. 7

Graphing Square Root Functions

This part not in notes…watch ☺

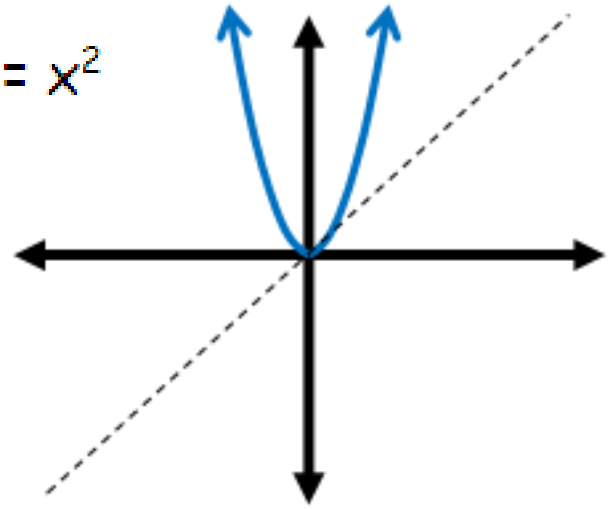
$F(x) = x^2$

x	f(x)
0	0
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81

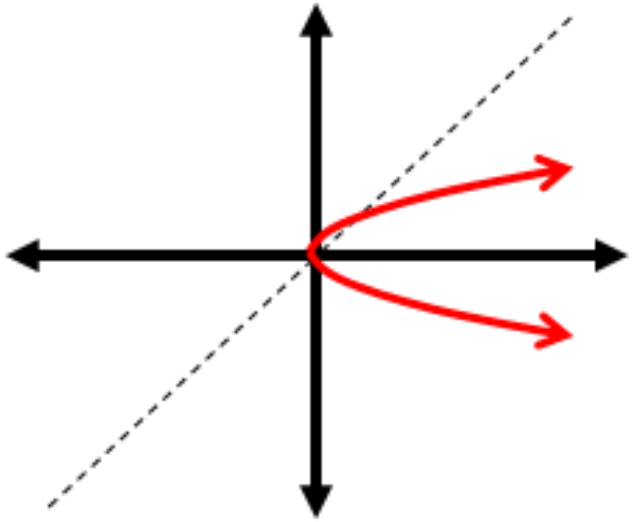
$f(x) = \sqrt{x}$

x	f(x)
0	0
1	1
2	1.41
3	1.73
4	2
5	2.24
6	2.45
7	2.65
8	2.83
9	3

$f(x) = x^2$



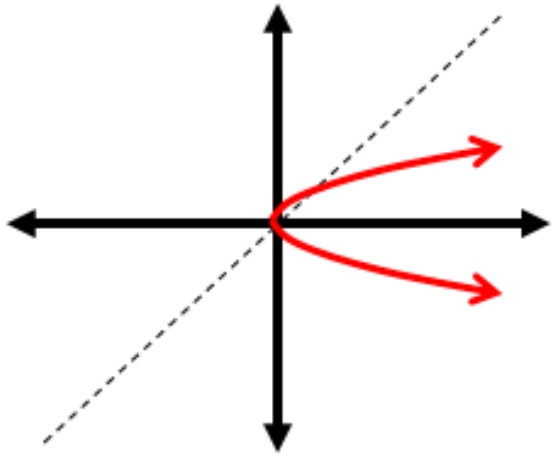
Reflect the function $f(x) = x^2$ over the line $y = x$.



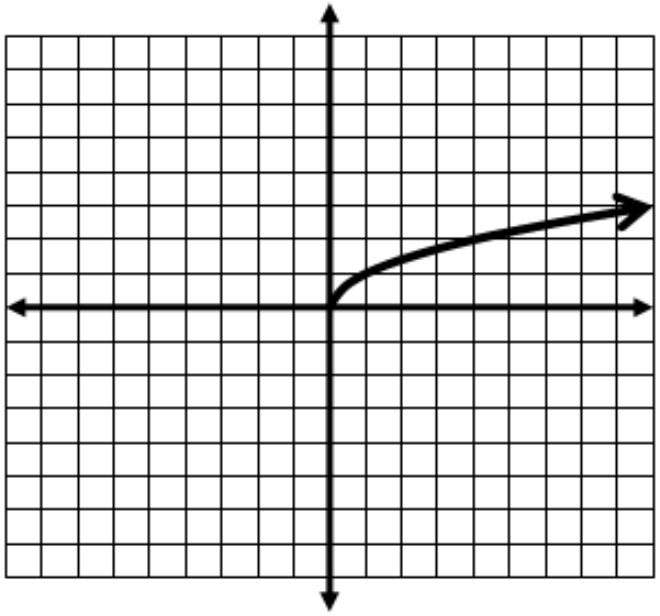
This should be the inverse of $y = x^2$, but…

Is it a function????

This means we will only use the positive top of the graph.



The result: $f(x) = \sqrt{x}$



Characteristics of the graph

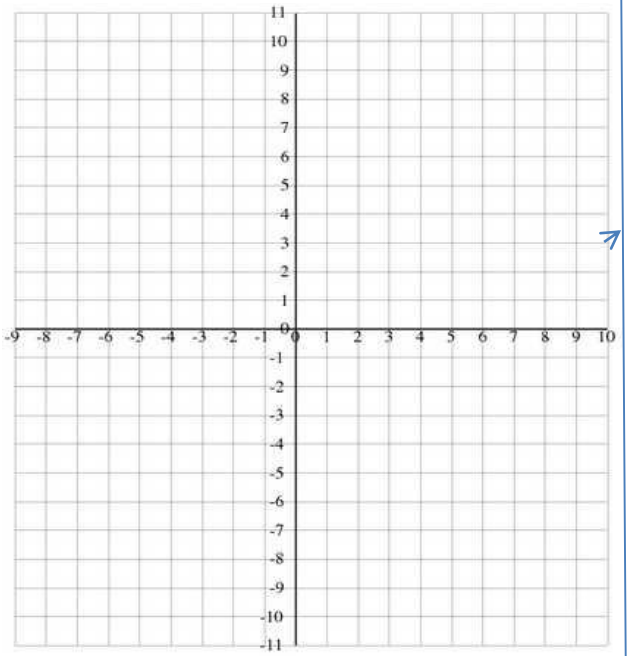
Vertex	(0,0)
End Behavior	As x goes to zero, y goes to zero. As x approaches infinity, y approaches infinity.
Domain	$[0 , \infty)$
Range	$[0 , \infty)$
Symmetry	none
Pattern	Increasing over time.

Graphing Discovery On Calc (You Try)

Notes p. 8 #1-4

Here are the problems…

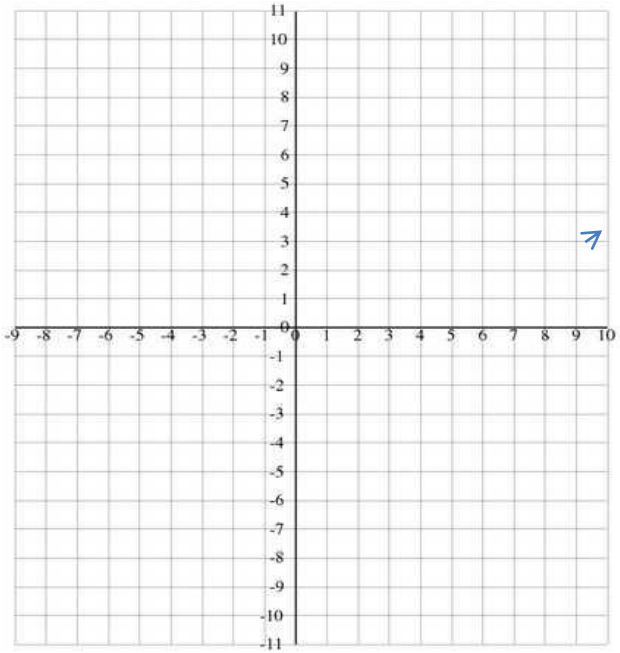
1. $y = \sqrt{x}$



Domain:_____

Range:_____

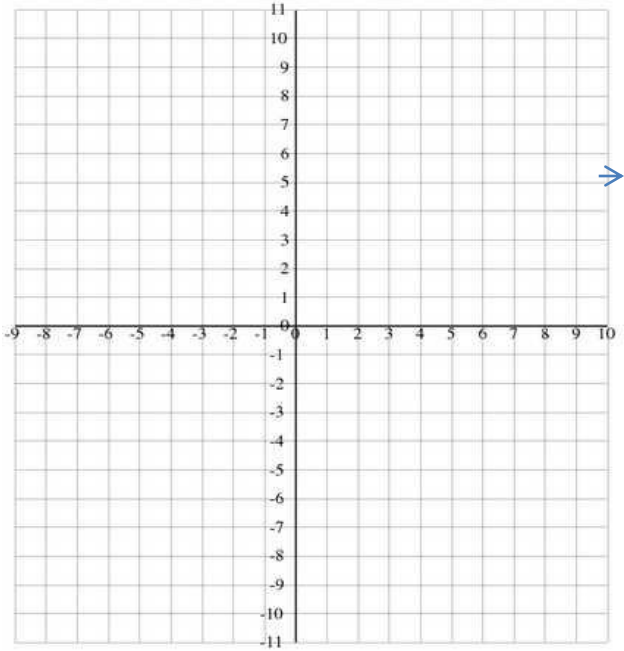
2. $y = \sqrt{x+2}$



Domain:_____

Range:_____

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



Domain:_____

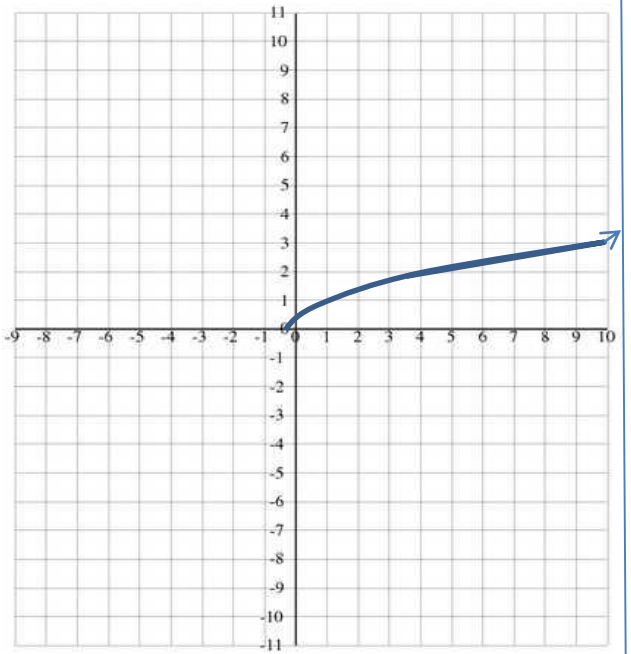
Range:_____

4. What happens when the 2 is under the radical? What happens when it is not?

When have we seen this before?

Any questions on those problems?

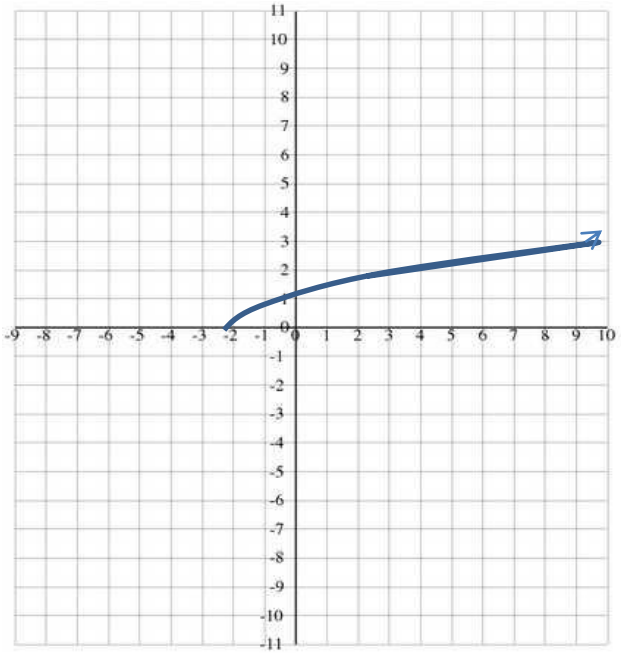
1. $y = \sqrt{x}$



Domain: $[0, \infty)$

Range: $[0, \infty)$

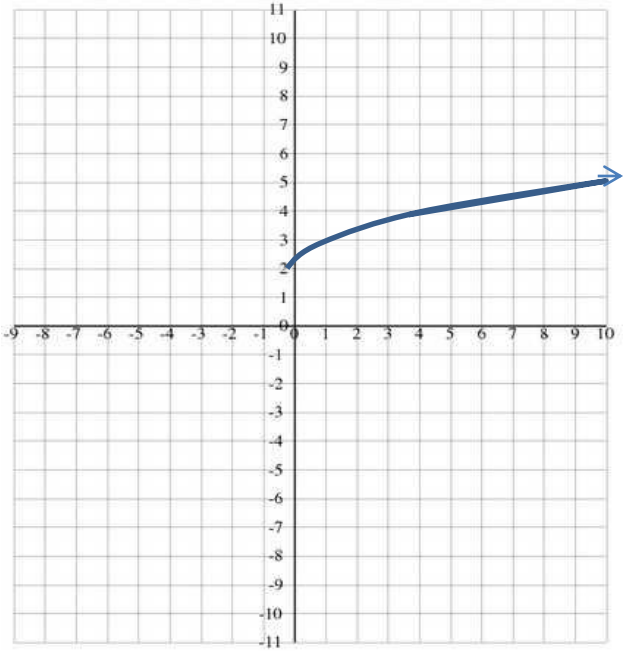
2. $y = \sqrt{x+2}$



Domain: $[-2, \infty)$

Range: $[0, \infty)$

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



Domain: $[0, \infty)$

Range: $[2, \infty)$

4. What happens when the 2 is under the radical? What happens when it is not?

- It translates left or right

- It translates up or down

When have we seen this before?

- With other functions and transformations we've studied

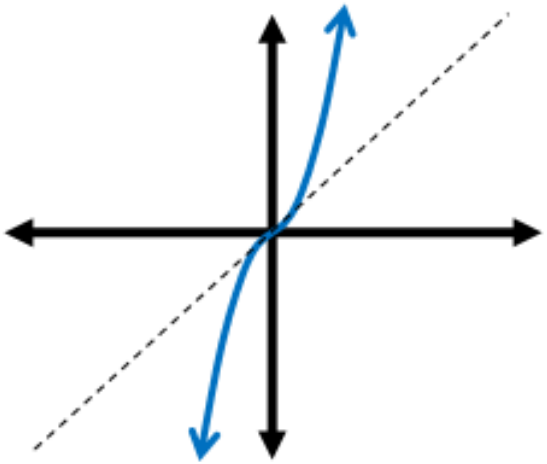
Graphing Cube Root Functions

$f(x) = x^3$

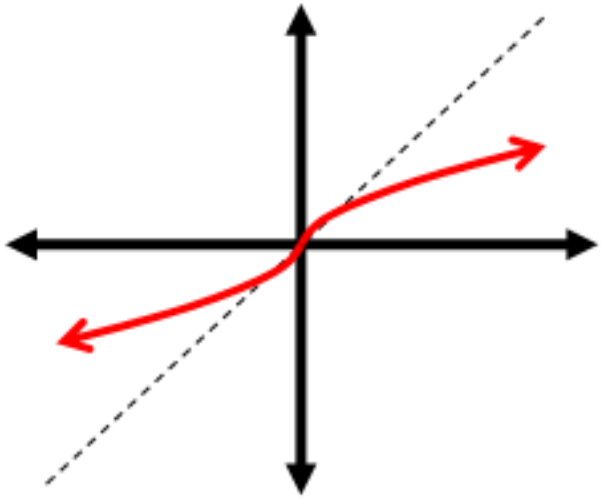
x	f(x)
-8	-512
-6	-216
-4	-64
-2	-8
-1	-1
0	0
1	1
2	8
4	64
6	216
8	512

$f(x) = \sqrt[3]{x}$

x	f(x)
-8	-2
-6	-1.82
-4	-1.59
-2	-1.26
-1	-1
0	0
1	1
2	1.26
4	1.59
6	1.82
8	2

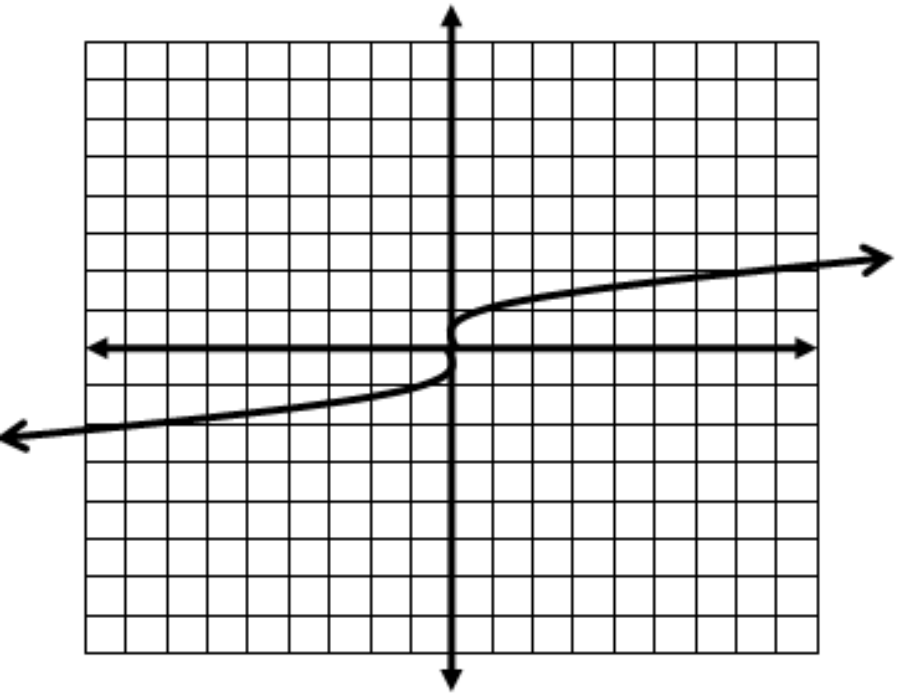


Reflect the function $f(x) = x^3$ over the line $y = x$.



Is this a function?? Yes!

The result: $f(x) = \sqrt[3]{x}$



Characteristics of the graph

Vertex (0,0)

End Behavior

As x goes to negative infinity, y goes to negative infinity. As x approaches infinity, y approaches infinity.

Domain $(-\infty , \infty)$

Range $(-\infty , \infty)$

Symmetry About the origin (rotation)

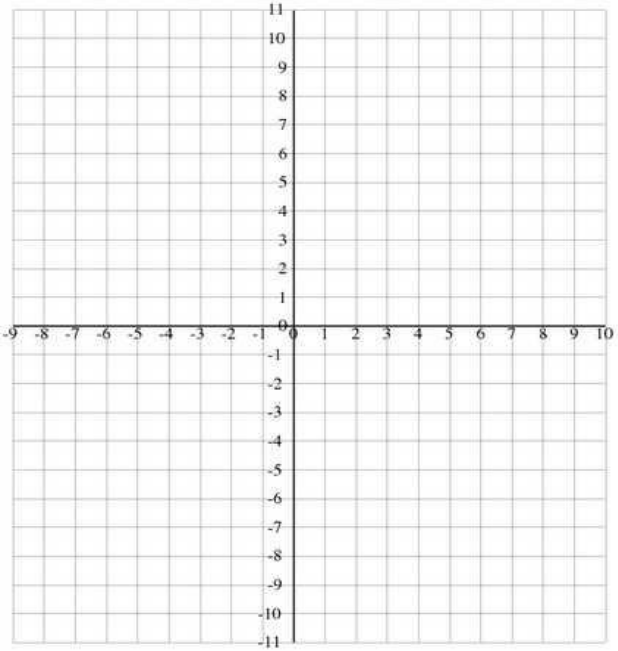
Pattern Increasing when $x > 0$
Decreasing when $x < 0$

Graphing Discovery On Calc (You Try)

Notes p. 9 #5-7

Here are the problems….

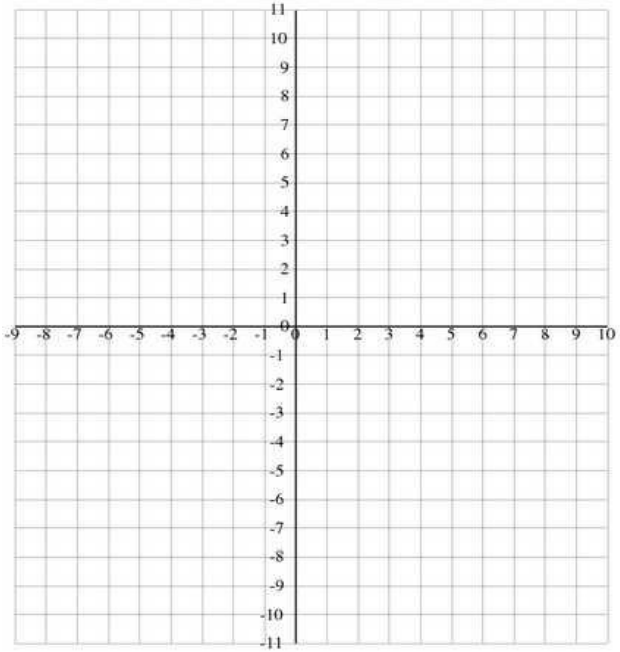
5. $y = \sqrt[3]{x}$



Domain:_____

Range:_____

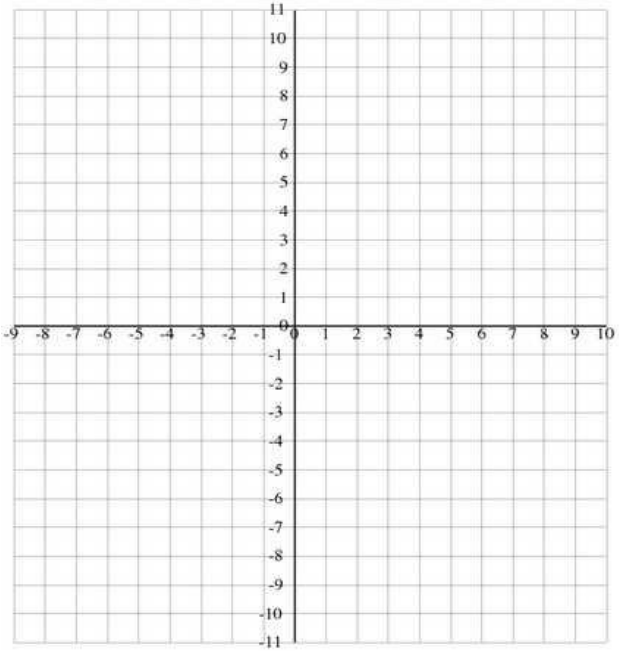
6. $y = \sqrt[3]{x+2}$



Domain:_____

Range:_____

7. $y = \sqrt[3]{x} + 2$

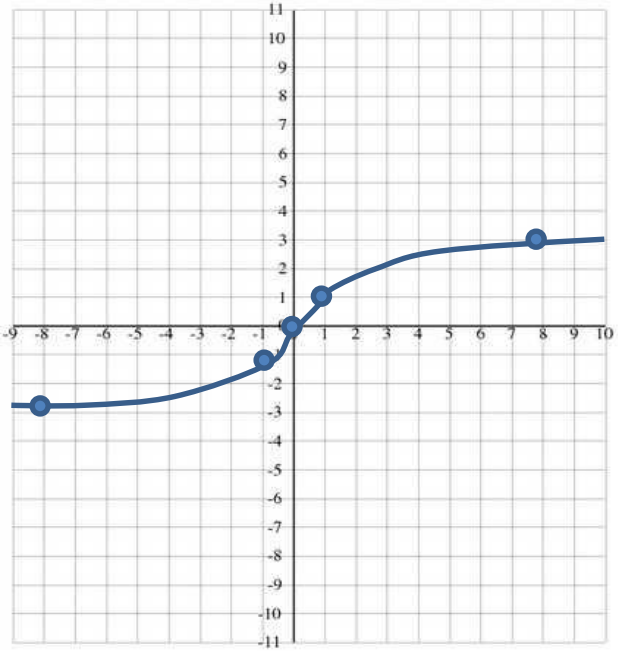


Domain:_____

Range:_____

Any questions on those problems?

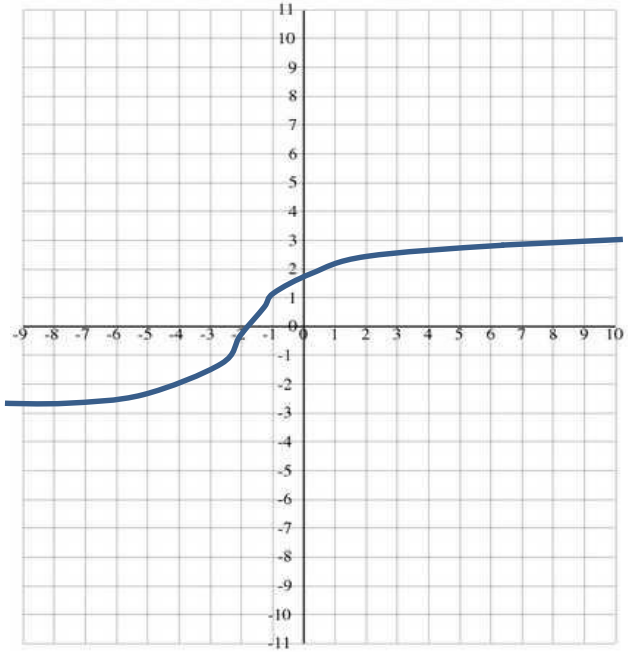
5. $y = \sqrt[3]{x}$



Domain: $(-\infty, \infty)$
(All real #s *or* $\mathbb{R}$)

Range: $(-\infty, \infty)$
(All real #s *or* $\mathbb{R}$)

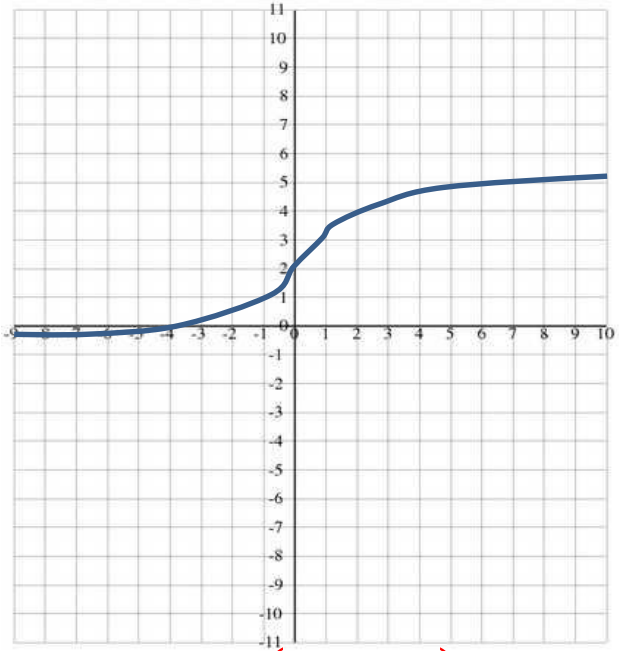
6. $y = \sqrt[3]{x+2}$



Domain: $(-\infty, \infty)$
(All real #s *or* $\mathbb{R}$)

Range: $(-\infty, \infty)$
(All real #s *or* $\mathbb{R}$)

7. $y = \sqrt[3]{x} + 2$



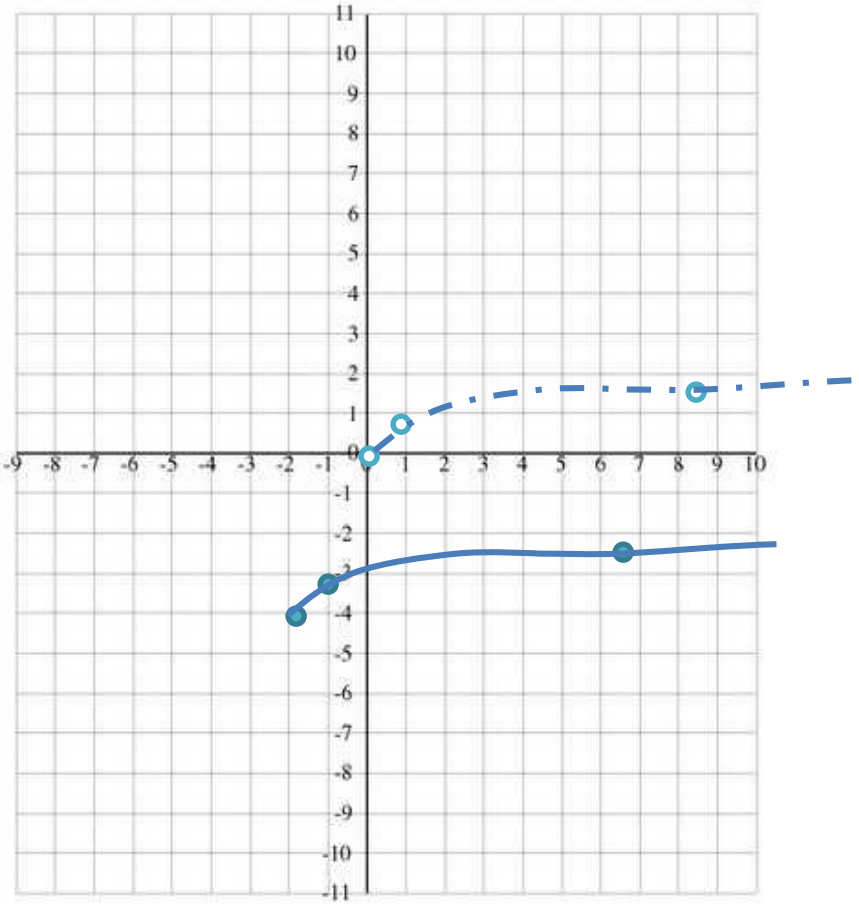
Domain: $(-\infty, \infty)$
(All real #s *or* $\mathbb{R}$)

Range: $(-\infty, \infty)$
(All real #s *or* $\mathbb{R}$)

Graph by Hand using what we know now.

We know it is the square root function translated left 2 and down 4

8. $y = \sqrt{x+2} - 4$

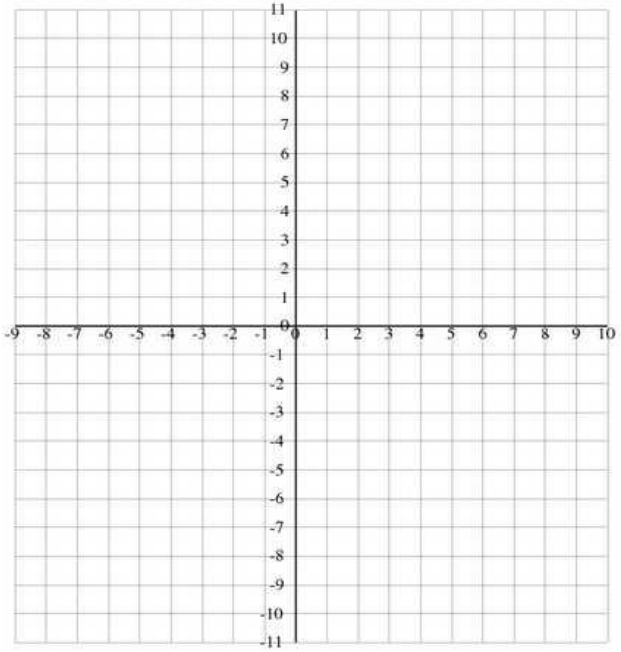


Graphing by hand
Notes p. 9 #9-10

For #10 try to make a table to help with graphing…

Here are the problems…

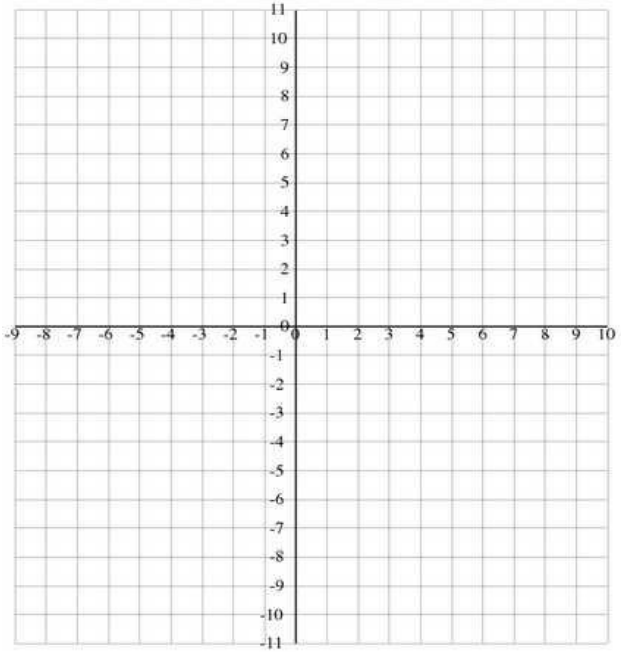
9. $y = \sqrt[3]{x-4}+6$



Domain:

Range:

10. $y = -2 \bullet \sqrt[3]{x+1}+3$

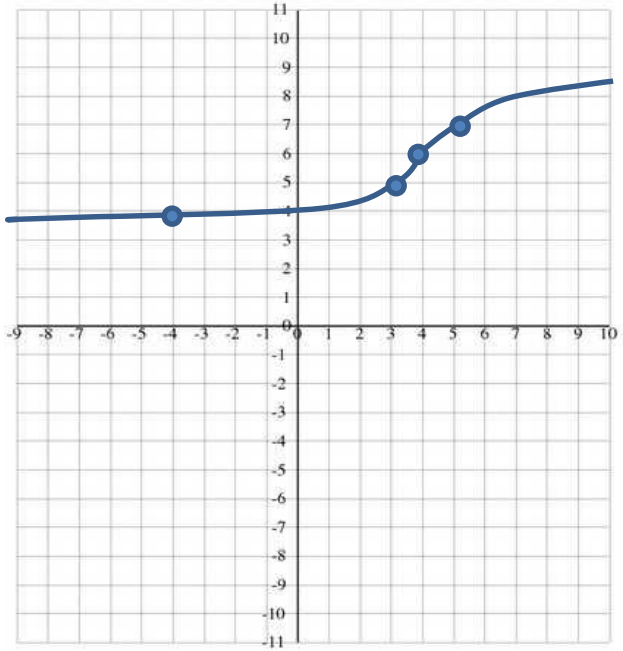


Domain:

Range:

Any questions on those problems?

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



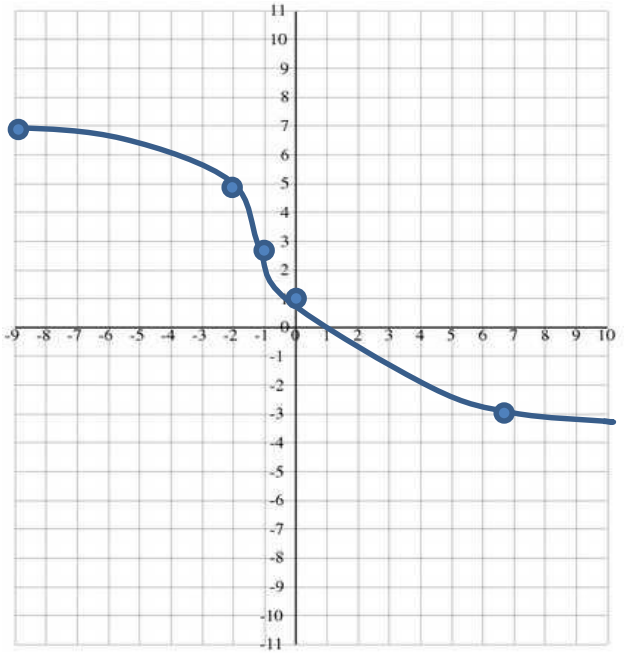
Domain: $(-\infty,\infty)$
(All real #s)

Range: $(-\infty,\infty)$
(All real #s)

Translate right 4, up 6

10. $y = -2 \cdot \sqrt[3]{x+1}+3$

x	y
-9	7
-2	5
-1	3
0	1
7	-1



Domain: $(-\infty,\infty)$
(All real #s)

Range: $(-\infty,\infty)$ (All real #s)

Reflection over x-axis, vertical stretch by 2, left 1 and up 3

Sometimes the function isn't in a nice graphing form.

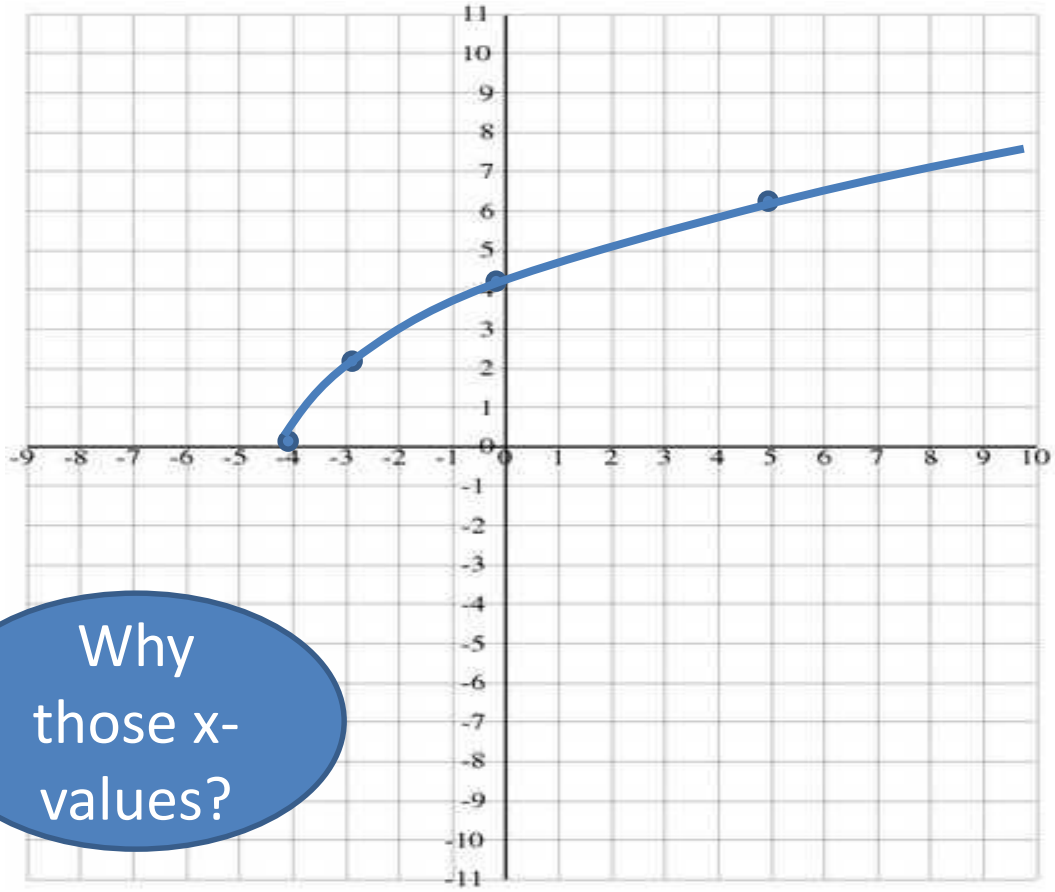
Hint: First change the following into the $y = a\sqrt{x-h}$ form.

11. $y = \sqrt{4x+16}$

$y = \sqrt{4(x+4)}$

$y = 2\sqrt{x+4}$

x	y
-4	0
-3	2
0	4
5	6



Why those x-values?

You Try: Put the following in graphing form. Then graph it.

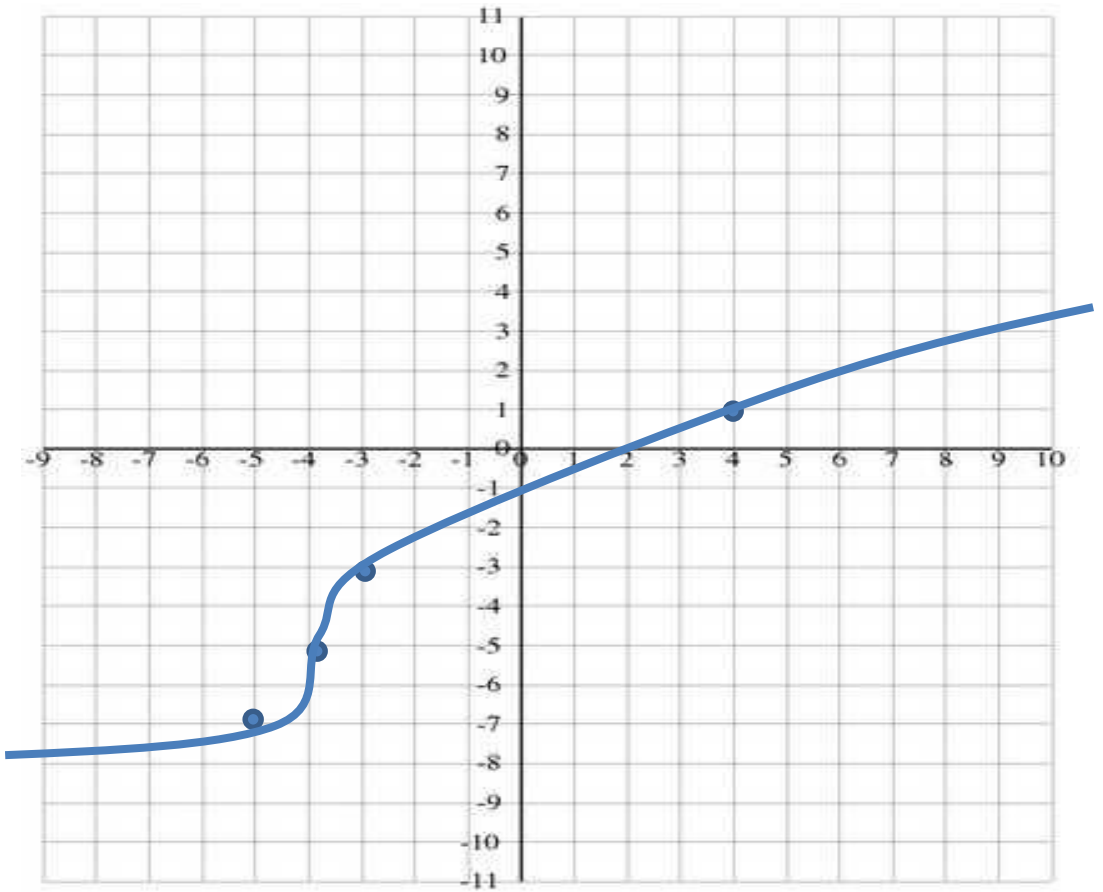
12. $f(x) = \sqrt[3]{8x+32} - 5$

(This is not graphing form)

$$y = \sqrt[3]{8(x+4)} - 5$$

$$y = 2\sqrt[3]{x+4} - 5$$

x	y
-5	-7
-4	-5
-3	-3
4	-1



Extra Practice!

1) Given $f(x) = 3x - 2x^2$
Evaluate $f(2x + 2) - f(x)$

$-6x^2 - 13x - 2$

2) Given $g(x) = 2x^2 + 4$
Evaluate $g(x - 1) + g(3)$

$2x^2 - 4x + 28$

Homework/Classwork

- Quietly work on Packet p. 3-4
- AND NOTES p. 6 (if not done yet)