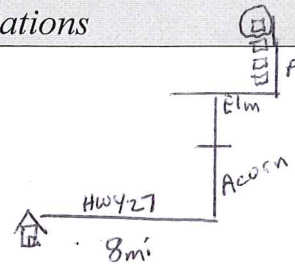
Name ____________________ Period __________

7.1A *Introduction to Root Functions and Radical Equations*



1. You are given the following directions to a new camping store:

- From your house, go East on Hwy 27 for 8 miles
- Turn Left onto Acorn Street
- Go to the 2nd stop sign and turn Right onto Elm Street.
- Turn Left onto Aspen Drive
- The camping store is on the 4th building on the left

a) Write the directions to *get home from the store*:

- Turn right out of the parking lot onto Aspen Drive
- Turn right onto Elm Street
- Turn left onto Acorn Street
- Turn right (or West) on Hwy 27
- Go 8 miles to arrive at your house.

b) How did you come up with the directions to get home?
I drew a map and reversed my path.

c) Finding your way back home is an ***inverse*** process. What do you think the word ***inverse*** mean in this situation? go the opposite direction to undo my original path.

2. Consider the following number trick:

- Start with a number and subtract 3 from it
- Double the answer
- Add 1 to your answer
- Divide your total by 5

$5-3=2$
$2\times 2=4$
$4+1=5$
$5\div 5=1$

a) What is the final result when you use the trick with the number 5? 1

b) If you know the final result is 5, what is the original number?
$5\times 5=25-1=24\div 2=12+3=15$

c) Write a function $f(x)$, which when given a number, x (the original number), will model the number trick given above. $f(x)=\frac{2((x)-3)+1}{5}=\frac{2x-6+1}{5}$

$f(x)=\frac{2x-5}{5}$

d) Write a function $g(x)$, which when given a number, x (the original number), will model the backward procedure for the number trick given above. $g(x)=\frac{5(x)-1}{2}+3=\frac{5}{2}x-\frac{1}{2}+\frac{6}{2}=\frac{5x+5}{2}$

$g(x)=\frac{5x+5}{2}$

e) $f(x)$ and $g(x)$ are ***inverse*** functions. In your own words, describe the effect of an inverse function.
An inverse function will undo what the original function did.

Name ______________________ Period __________

7.1A *Introduction to Root Functions and Radical Equations*

3. Suppose Felix works at the ice arena. In addition to his regular duties, he receives $5 per pair of ice skates that he sharpens.

a) Complete the following chart displaying the amount Felix makes on sharpening skates.

Pairs of Skates Sharpened	Additional Pay
4	$ 20
20	$100
8	$ 40
13	$65
x	$ 5x
$\frac{x}{5}$	x

b) $P(x) = 5x$ Explain what this means in the context of the problem. If x is the pairs of skates sharpened, then 5x is the additional payment.

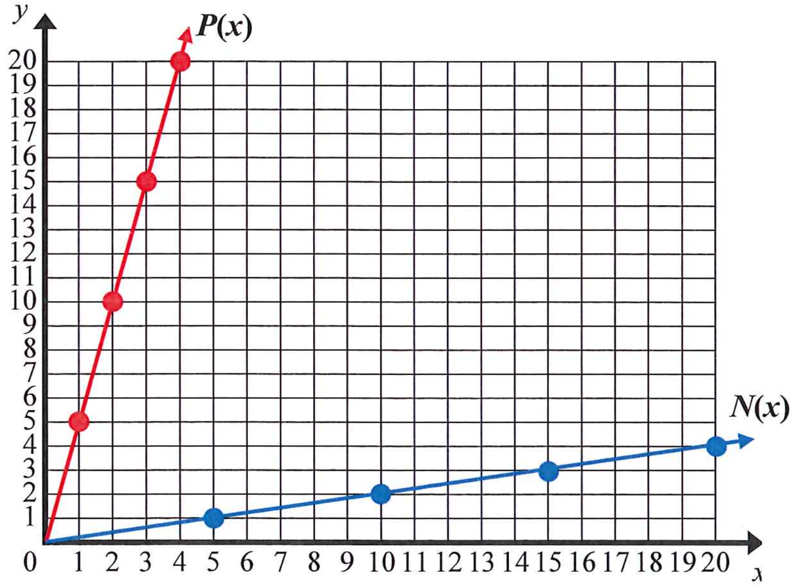
c) $N(x) = \frac{x}{5}$ Explain what this means in the context of the problem. If x is the additional payment dividing x by 5 gives the number of pairs of skates sharpened.

d) Find $P(3)$ and explain what this means in the context of the problem.
P(3) = 5(3) = $15 ; 3 pairs of skates sharpened gives Felix $15 additional pay.

e) Find $N(15)$ and explain what this means in the context of the problem.
N(15) = 15/5 = 3 ; $15 additional payment divided by 5 gives 3 pairs of skates sharpened.

f) What do you notice about $P(3)$ and $N(15)$? (15,3) (3,15)
The coordinates are reversed.

g) The graphs of $P(x)$ and $N(x)$ are shown to the right.



i) For each function, complete the table with the points highlighted in the graph.

x	$P(x)$
1	5
2	10
3	15
4	20

x	$N(x)$
5	1
10	2
15	3
20	4

ii) What do you notice about the values in the two tables?
The (x, y) coordinates in P(x) are in reverse order for N(x).

Name ____________ Period ________

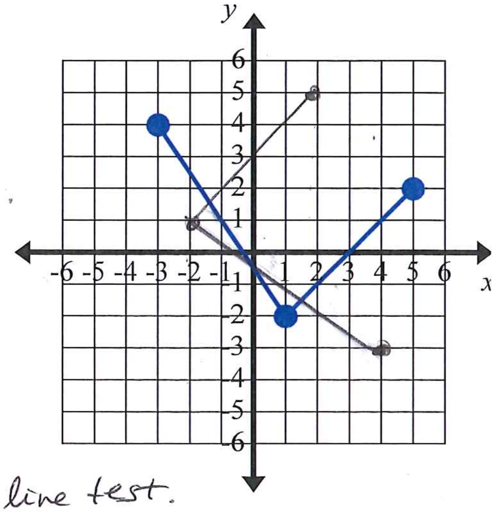
7.1A Introduction to Root Functions and Radical Equations

4. The function $f(x)$ is shown on the graph.

a) Complete the table for $f(x)$ with the points highlighted in the graph.

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

x	$f^{-1}(x)$
4	-3
-2	1
2	5



b) If $f^{-1}(x)$ is the inverse of $f(x)$, complete the table above for $f^{-1}(x)$.

c) Graph $f^{-1}(x)$ on the same graph.

d) Is $f^{-1}(x)$ a function? Justify your answer.

No; It does not pass the vertical line test.

5. Given $f(x)=\{(-13,5),(-9,-9),(0,-4),(4,6),(9,10)\}$

a) Find $f^{-1}(x)$. $f^{-1}(x)=\{(5,-13),(-9,-9),(-4,0),(6,4),(10,9)\}$

b) Is $f^{-1}(x)$ a function? Justify your answer.

Yes; each x-value is paired with exactly one y-value.

6. Given $g(x)=\{(-2,4),(4,7),(0,11),(-3,7)\}$:

a) Find $g^{-1}(x)$.

$g^{-1}(x)=\{(4,-2),(7,4),(11,0),(7,-3)\}$

b) Is $g^{-1}(x)$ a function? Justify your answer.

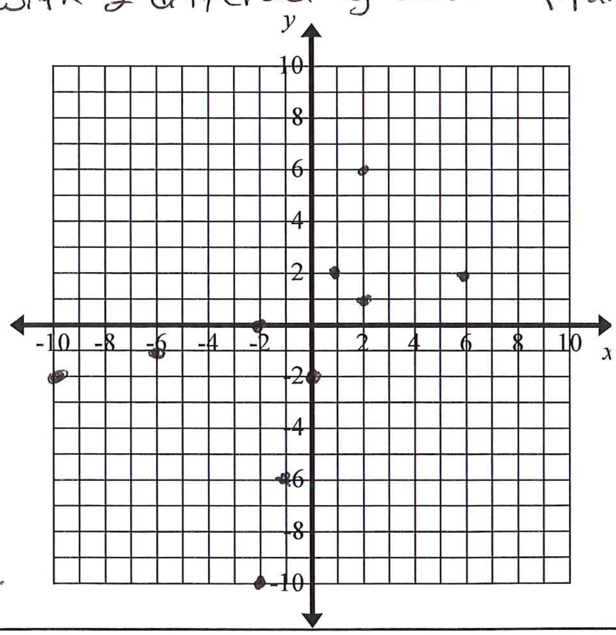
No; the x-value of 7 is paired with 2 different y-values (4 and -3).

7. A table of values for the function $g(x)$ is given below.

x	−10	−6	−2	2	6
$g(x)$	−2	−1	0	1	2

a) Complete the table below for $g^{-1}(x)$.

x	-2	-1	0	1	2
$g^{-1}(x)$	-10	-6	-2	2	6



b) Graph $g(x)$ and $g^{-1}(x)$ on the same coordinate plane.

c) Is $g^{-1}(x)$ a function? Justify your answer.

Yes; each x-value is paired with exactly one y-value.

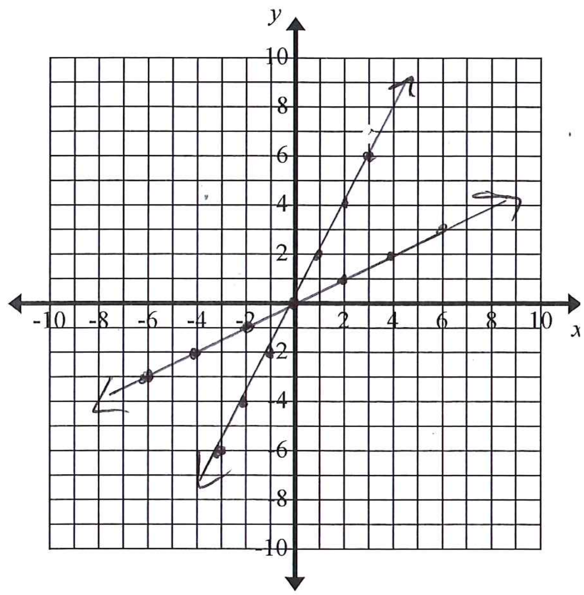
Name ______________________ Period __________

7.1A *Introduction to Root Functions and Radical Equations*

8. Complete the table of values for the functions $y = 2x$ and $y = \frac{1}{2}x$. Graph the lines.

x	$y = 2x$
–3	–6
–2	–4
–1	–2
0	0
1	2
2	4
3	6

x	$y = \frac{1}{2}x$
–6	–3
–4	–2
–2	–1
0	0
2	1
4	2
6	3



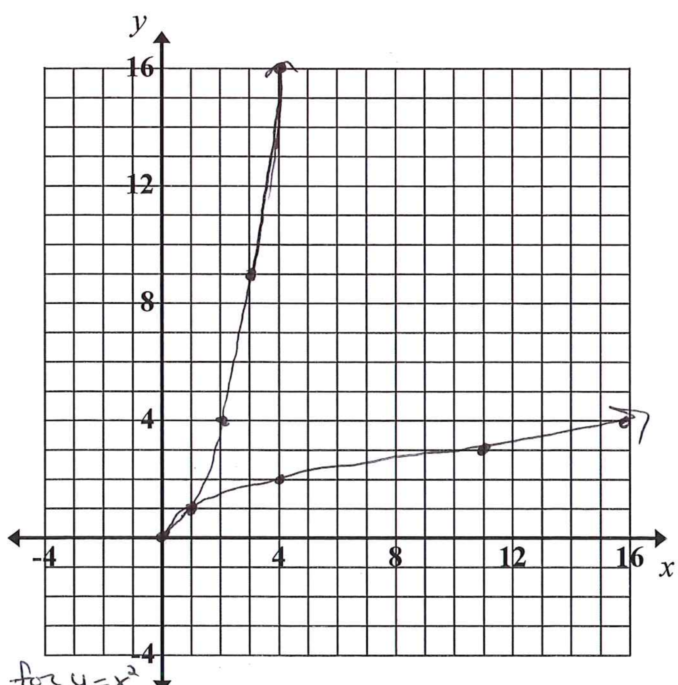
Do you think these functions are inverse functions? Justify your answer.

Yes; the (x, y) coordinates are reversed for every point. Also these functions reflect over the line y = x onto each other

9. Complete the tables for the functions $y = x^2$ and $y = \sqrt{x}$. Graph the first **four** points from each table and draw a smooth curve through them.

x	$y = x^2$
0	0
1	1
2	4
3	9
4	16
5	25
6	36
7	49

x	$y = \sqrt{x}$
0	0
1	1
4	2
9	3
16	4
25	5
36	6
49	7



Do you think these functions are inverse functions? Justify your answer.

Yes; the coordinates for $y = \sqrt{x}$ are the reverse order coordinates for $y = x^2$. Also, the 2 graphs reflect onto each other over the line y = x.

Name ______________________ Period ________

7.1A *Introduction to Root Functions and Radical Equations*

10. Suppose you attended the London Olympics in 2012. If the exchange rate for 1 British pound is the same as 1.54 US dollars. The function model to translate from US dollars to British pounds is modeled by $p = 1.54d$ where p represents the amount of British pounds and d represents the amount of US dollars.

a) How many British pounds would you receive for the $500 of spending money you brought on your trip?

$p = 1.54(\$500)$
$p = 770$ pounds

b) Explain what the inverse function of the model above would represent.

It would represent the # of dollars given the # of pounds.

c) Write an equation for the inverse function.

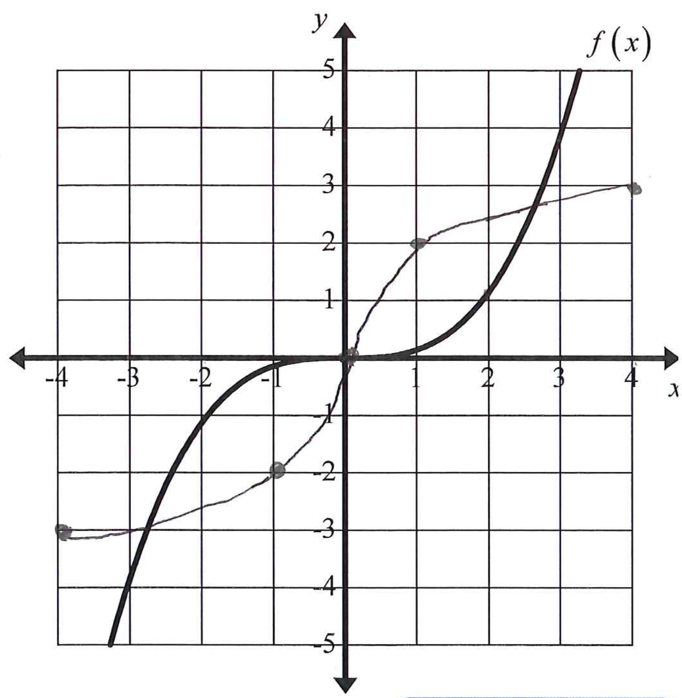
$d = \frac{p}{1.54}$

d) The cost of a ticket to attend the Olympic Team Finals in Gymnastics was 295 British pounds. Find the cost of an Olympic ticket in US dollars.

$d = \frac{295}{1.54}$, $\boxed{d = \$191.56}$

11. Describe how you can graph the inverse of a function without determining the inverse function itself. Demonstrate by graphing the inverse of the function shown.

Reverse the order of the coordinates for each point of f(x).



Section 7.1A

Name ______________________________ Period __________

7.1A *Introduction to Root Functions and Radical Equations*

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Name ______________________ Period __________

7.1B *Graphing Square Root Functions*

1. Look at the following function in its different forms.

Equation: $y = \sqrt{x-3} + 5$

Graph:

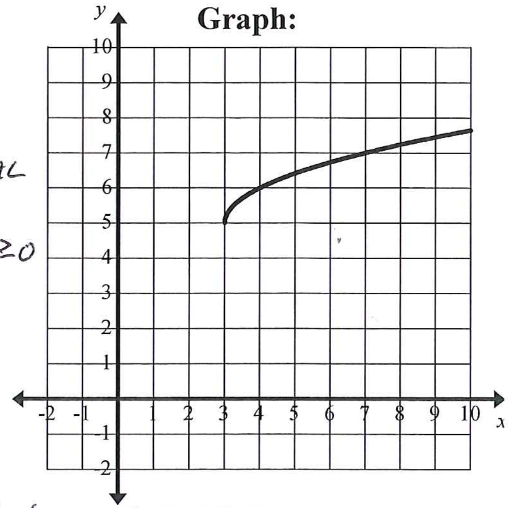


Table of Values:

x	y
0	error
1	error
2	error
3	5
4	6
5	6.4142
6	6.7321
7	7
8	7.2361
9	7.4495

a) What values can't x be? Why?

X cannot be less than 3; The square root of a negative is NOT REAL

b) What values can't y be? Why?

y can't be less than 5; $\sqrt{x-3}$ must be ≥ 0 then add 5, so $y \geq 5$.

c) How can we tell what the domain and range are by looking at the equation?

For the domain, the radicand must be ≥ 0, then solve for x; $x-3 \geq 0$, $x \geq 3$

For the range, $y \geq$ the number added after the radical; so $\boxed{y \geq 5}$

d) How can we tell what the domain and range are by looking at the graph?

Look at the (x, y) coordinates of the starting point of the sq. root curve (x, y)

e) How can we tell what the domain and range are by looking at the table of values?

Look at the first point (x, y) in the table after the last error value for y.

2. Use the given information for each of the functions to explain the domain and range of each function. Explain your reasoning.

a) Equation

$f(x) = -\sqrt{x-7} - 4$

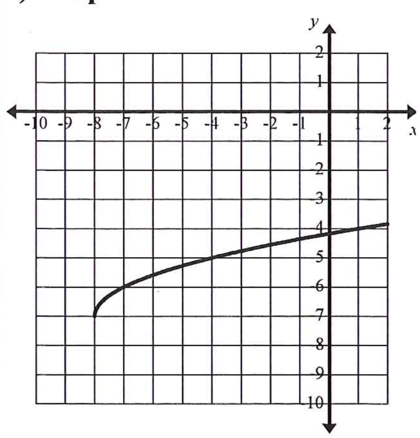
Domain $x \geq 7$

Range $y \leq -4$

Explanation For the domain $(x-7) \geq 0$, so $x \geq 7$.

For the range, use the number added after the radical; $y = -4$, But $\boxed{y \leq -4}$ this time because the -1 coefficient of the sq. root reflects the function down over the ~~line $y=-4$~~ making the range $y \leq -4$.

b) Graph



Domain $x \geq -8$

Range $y \geq -7$

Explanation $(-8, -7)$ is the starting point for the sq. root curve.

c) Table of values

x	y
0	error
1	error
2	error
3	5
4	6
5	6.4142
6	6.7321
7	7
8	7.2361
9	7.4495

Domain $x \geq 3$

Range $y \geq 5$

Explanation (3, 5) is the first point in the table after the last error value for y.

Name ______________________ Period ________

7.1B *Graphing Square Root Functions*

3. When given the function $f(x) = \sqrt{x+7} + 8$, Milo says that the domain is $x \geq -7$ and Basra says the domain is $x \geq 8$. Who is correct? What could you say to help the other person understand their mistake?

Milo is correct. Tell Basra that the domain is the set of all possible x-values of the function, which are restricted since the radicand containing x must be ≥ 0.

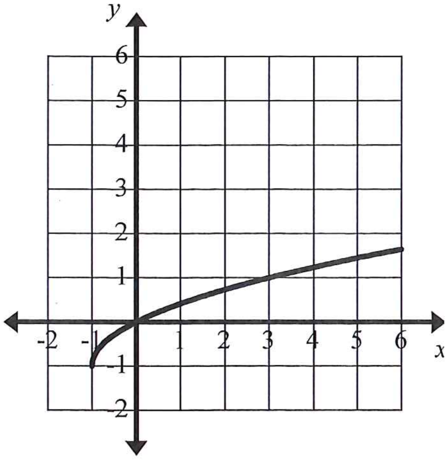
#4 – 6: Match the function with its graph.

4. $y = \sqrt{x} - 1$ graph B

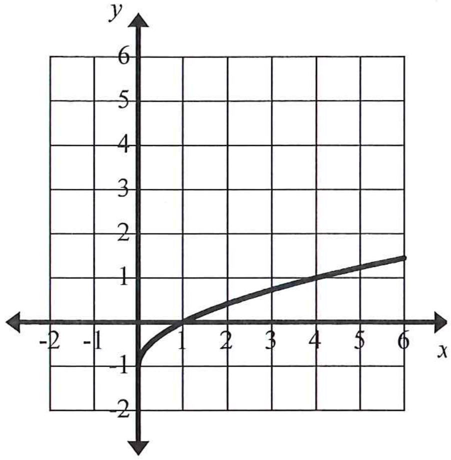
5. $y = \sqrt{x+1}$ graph C

6. $y = \sqrt{x+1} - 1$ graph A

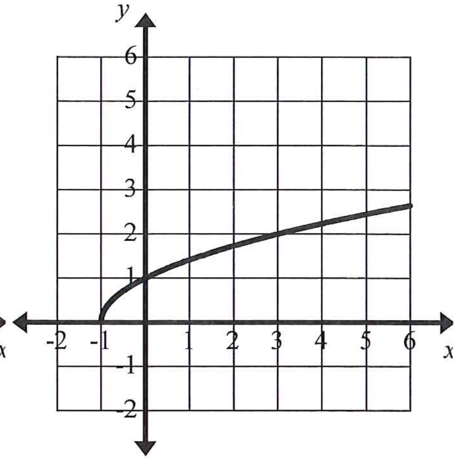
[Graph A]



[Graph B]

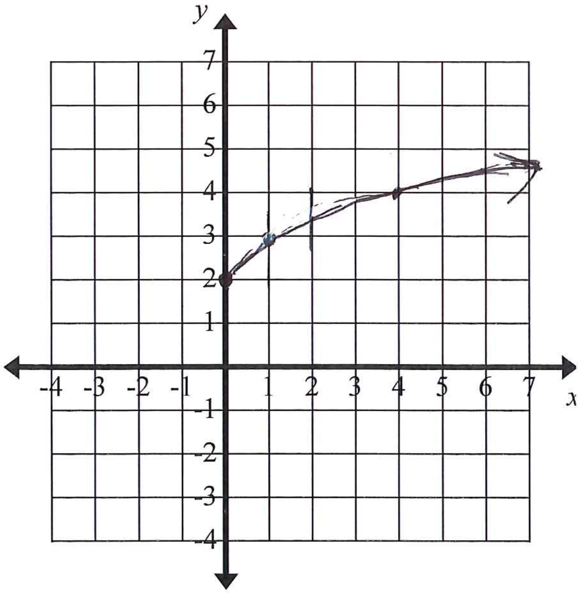


[Graph C]



#7 – 12: Graph each of the following.

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

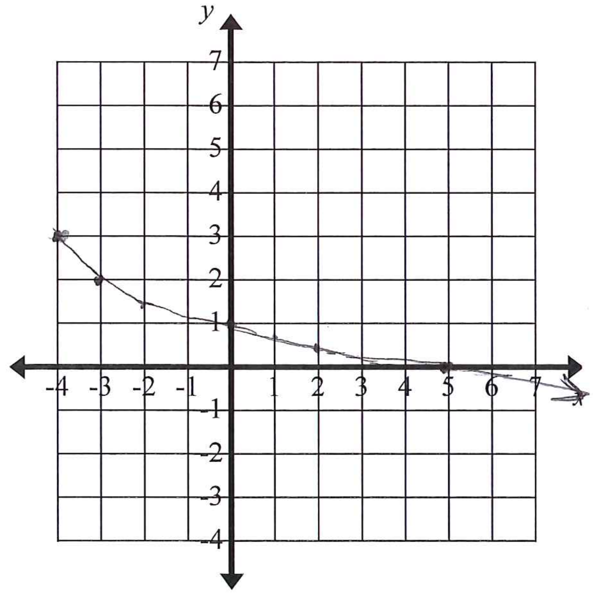


Increasing or decreasing ? (Circle one)

Domain $x \geq 0$ Range $y \geq 2$

x-intercept none *y*-intercept (0, 2)

8. $y = -\sqrt{x+4} + 3$



Increasing or decreasing ? (Circle one)

Domain $x \geq -4$ Range $y \leq 3$

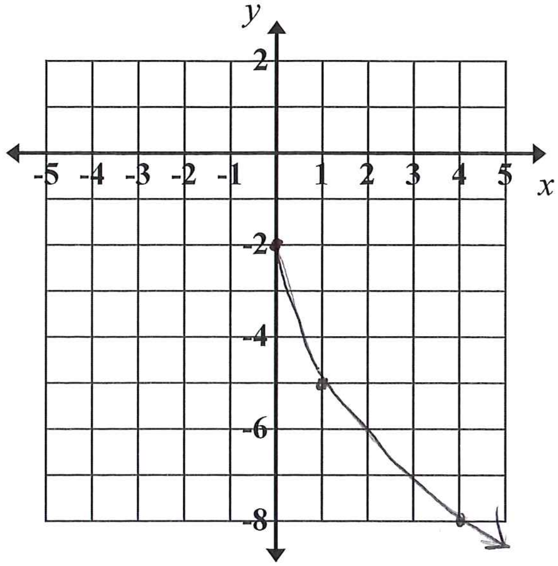
x-intercept (5, 0) *y*-intercept (0, 1)

Name ______________________ Period ________

7.1B *Graphing Square Root Functions*

#7 – 12 (continued): Graph each of the following.

9. $y = -3\sqrt{x} - 2$

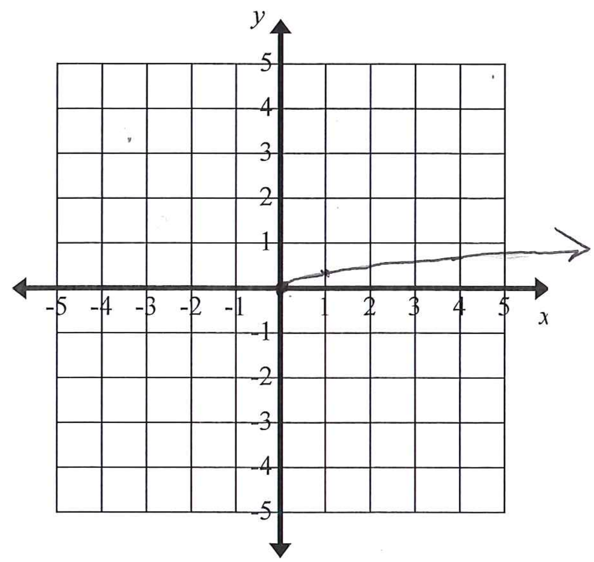


Increasing or decreasing ? (Circle one)

Domain $x \geq 0$ Range $y \leq -2$

x-intercept none *y*-intercept $(0, -2)$

10. $y = \frac{1}{3}\sqrt{x}$

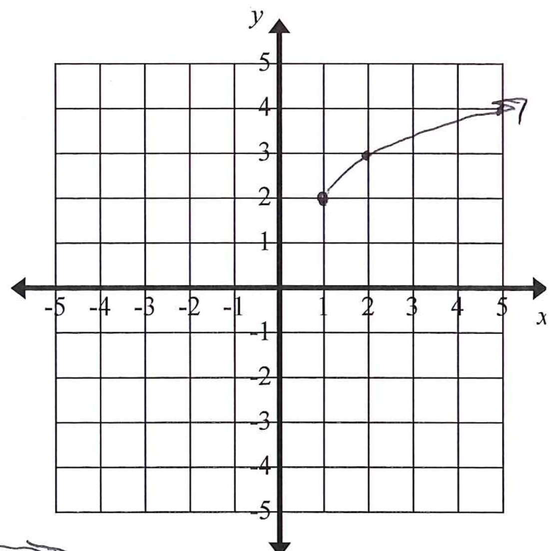


Increasing or decreasing ? (Circle one)

Domain $x \geq 0$ Range $y \geq 0$

x-intercept $(0, 0)$ *y*-intercept $(0, 0)$

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

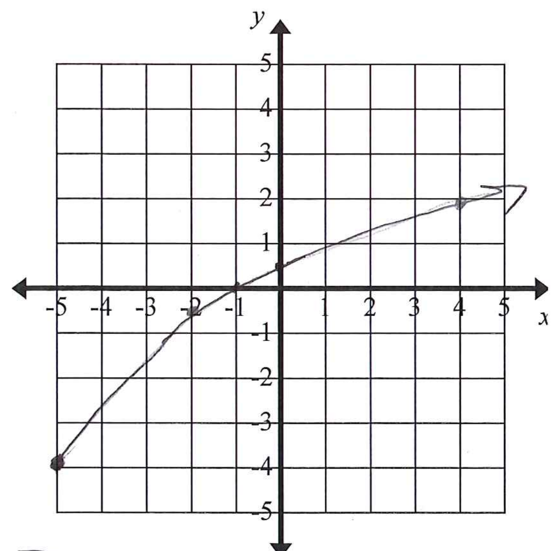


Increasing or decreasing ? (Circle one)

Domain $x \geq 1$ Range $y \geq 2$

x-intercept none *y*-intercept none

12. $y = 2\sqrt{x + 5} - 4$



Increasing or decreasing ? (Circle one)

Domain $x \geq -5$ Range $y \geq -4$

x-intercept $(-1, 0)$ *y*-intercept $(0, 0.47)$

Name ______________________ Period __________

7.1B Graphing Square Root Functions

#13 – 14: Compare and contrast:

13. How does the graph of $y = \sqrt{x+3} - 4$ differ from the graph of $y = \sqrt{x}$?

Explain: Different starting pt. (-3, -4) vs. the origin on parent function. same rate of change
shifted left 3 units and down 4 units

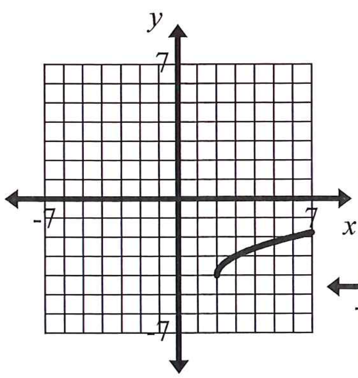
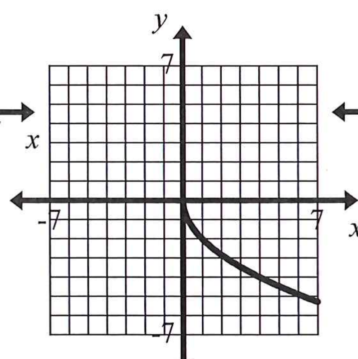
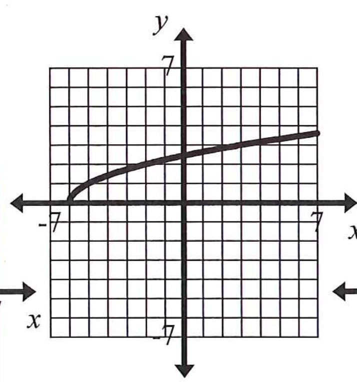
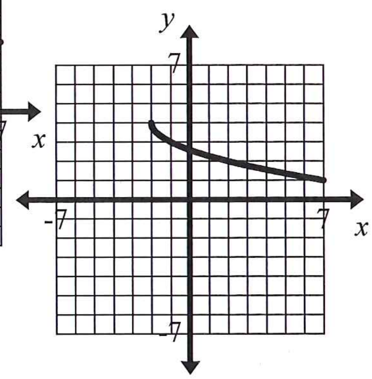
14. How does the graph of $y = -\sqrt{x-2} + 5$ differ from the graph of $y = \sqrt{x}$?

Explain: 1st graph is decreasing from (2,5)
2nd graph is increasing from (0,0)
reflected over x-axis, shifted right 2 units and up 5 units

15. Determine which graph below has the identified value as a significant feature. Then use the graph to complete the table.

Graph Number:	2	3	1	4
Beginning point	(0,0)	(-6,0)	(2,-4)	(–2, 4)
***x*-intercept**	(0,0)	(-6,0)		
***y*-intercept**	0,0	(0, 2.5)	none	(0, 2.5)
Increasing or Decreasing	decreasing	Increasing	Increasing	Decreasing
Domain	$x \geq 0$	$x \geq -6$	$x \geq 2$	$x \geq -2$
Range	$y \leq 0$	$y \geq 0$	$y \geq -4$	$y \leq 4$

[Graph 1] **[Graph 2]** **[Graph 3]** **[Graph 4]**

#16 – 17: State the domain and range without graphing:

16. $y = \sqrt{x+3} - 4$

Domain $x \geq -3$ Range $y \geq -4$

17. $y = -2\sqrt{x-4} + 1$

Domain $x \geq 4$ Range $y \leq 1$

18. Write a square root function that has the following domain and range.

a) Domain: $x \geq 5$ Range: $y \geq 2$

$y = \sqrt{x-5} + 2$

b) Domain: $x \geq -7$ Range: $y \leq 10$

$y = -\sqrt{x+7} + 10$

c) Domain: $x \geq 0$ Range: $y \geq 9$

$y = \sqrt{x} + 9$

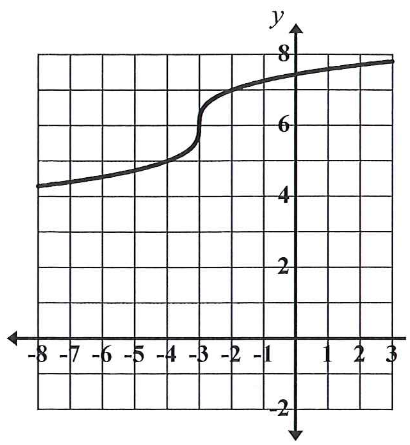
Section 7.1B

Name ______________________ Period __________

7.1C *Graphing Cube Root Functions*

1. Look at the following function in its different forms.

[A] Graph



[B] Table of values

x	y
–30	3
–11	4
–4	5
–3	6
–2	7
5	8
24	9

[C] Equation

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

a) Are there any Domain restrictions? NO

How do you know? A cubic root can be negative as well as positive or 0.

b) Are there any Range restrictions? NO

How do you know? Since X can be any real number, the cubic root can be negative, positive, or 0.

c) What is the point of inflection? (−3, 6)

d) How can we tell what the point of inflection is by looking at the equation?
For the x-coordinate, set the radicand equal to 0 and solve for x. The y-coordinate is the number added to the radical.

e) Is the graph increasing or decreasing? How can you tell from the equation?
The coefficient of the radical (1 in this case) is positive.

2. Use the given information to explain what the domain and range of the function are. Explain your reasoning.

a) Equation

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

The coefficient of the radical is positive.

Increasing or Decreasing?
(Circle one)

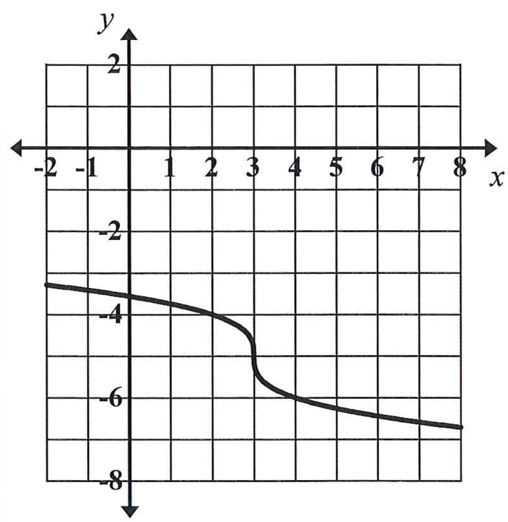
Domain all real numbers

Range all real numbers

Point of inflection (2, −4)

See #1d above

b) Graph



As $x \to \infty$, $y \to -\infty$

Increasing or Decreasing?
(Circle one)

Domain all real numbers

Range all real numbers

Point of inflection (3, −5)

where the shape of the curve changes from a hill to a bowl

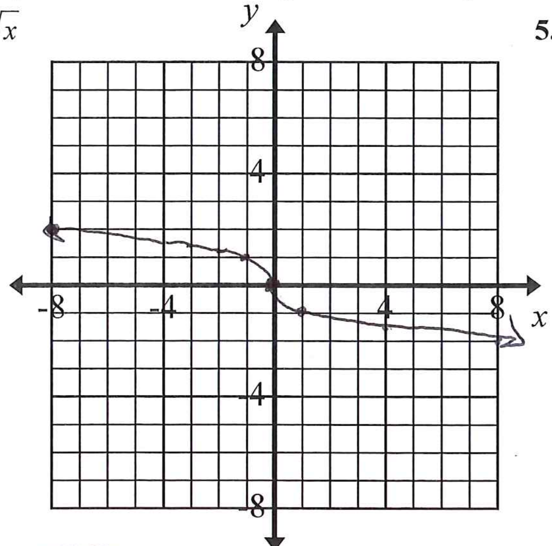
Name ______________________ Period __________

7.1C *Graphing Cube Root Functions*

3. When given the function $f(x) = \sqrt[3]{x-12} + 10$, Arturo says that the point of inflection is $(-12, 10)$ and Kira says the point of inflection is $(10, 12)$. Who, if anyone, is correct? What could you say to help them understand their mistake(s)? Neither is correct. To get the x-coordinate, set the radicand equal to 0 and solve for x, ie $x-12=0$, so $x=12$. To get the y-coordinate, use the number added to the radical, so $y=10$. Correct Pt. of Inflection is $(12,10)$

#4 – 9: Graph each function and provide the requested information.

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

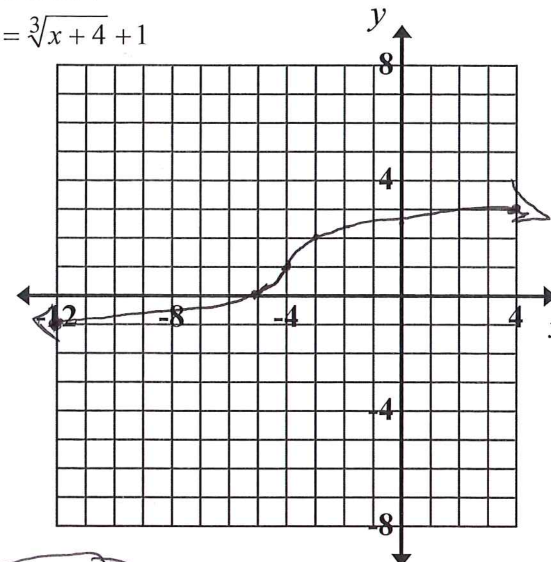


Increasing or Decreasing? (Circle one)

Domain $\mathbb{R}$ Range $\mathbb{R}$

Point of inflection $(0,0)$

5. $y = \sqrt[3]{x+4} + 1$

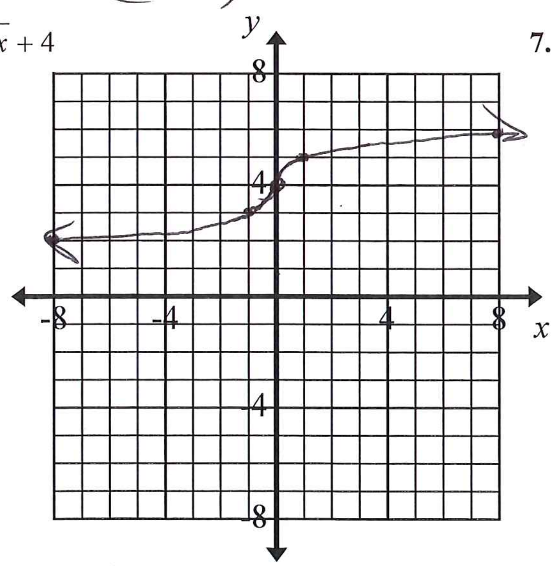


Increasing or Decreasing? (Circle one)

Domain $\mathbb{R}$ Range $\mathbb{R}$

Point of inflection $(-4,1)$

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

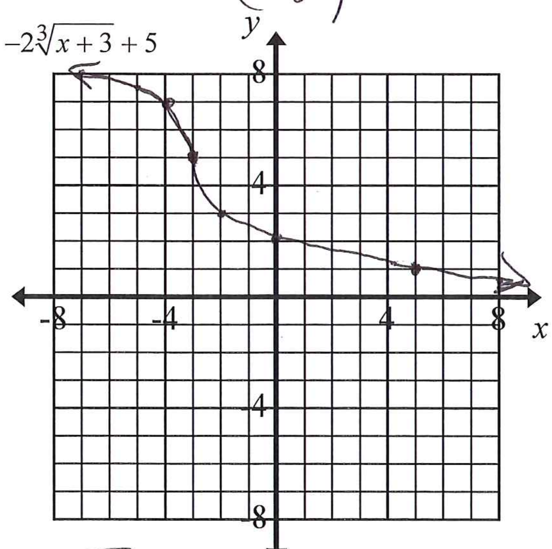


Increasing or Decreasing? (Circle one)

Domain $\mathbb{R}$ Range $\mathbb{R}$

Point of inflection $(0,4)$

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



Increasing or Decreasing? (Circle one)

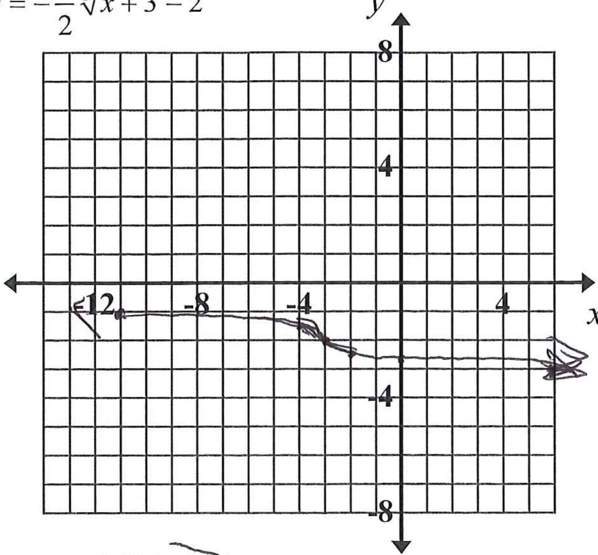
Domain $\mathbb{R}$ Range $\mathbb{R}$

Point of inflection $(-3,5)$

Name ______________________ Period __________

7.1C *Graphing Cube Root Functions*

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

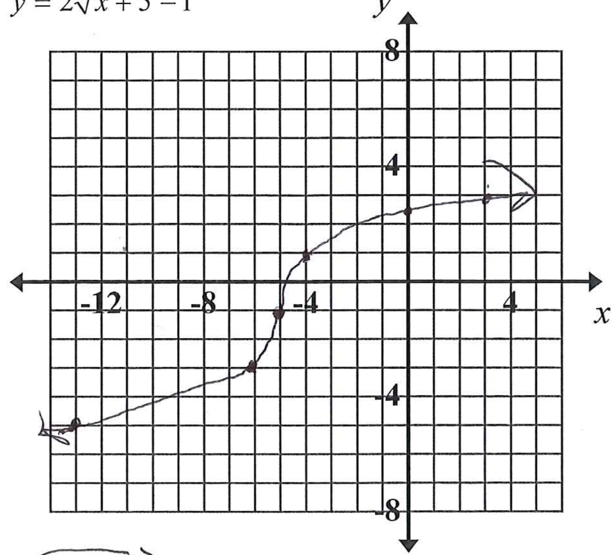


Increasing or Decreasing (Circle one)

Domain $\mathbb{R}$ Range $\mathbb{R}$

Point of inflection $(-3, -2)$

9. $y = 2\sqrt[3]{x+5} - 1$



Increasing or Decreasing (Circle one)

Domain $\mathbb{R}$ Range $\mathbb{R}$

Point of inflection $(-5, -1)$

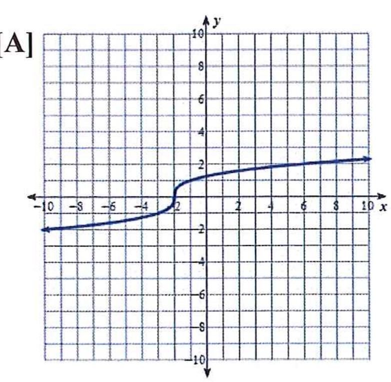
#10 – 12: Match the function with its graph:

10. $y = \sqrt[3]{x}$ → Graph: C

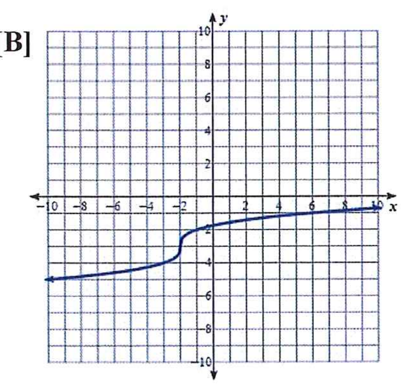
11. $y = \sqrt[3]{x} + 2$ → Graph: A

12. $y = \sqrt[3]{x+2} - 3$ → Graph: B

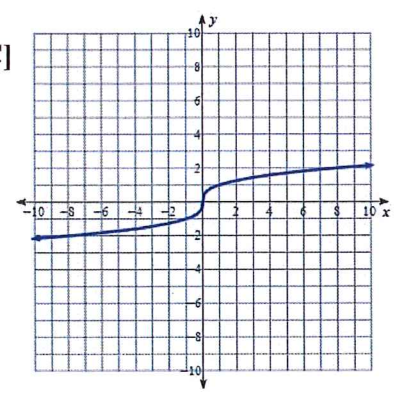
[A]



[B]



[C]



13. Tell how you would determine each of the following from a graph, table and equation.

a) Explain how to determine where the point of inflection will be from:

- a graph where the curve changes from hill to bowl
- a table look for 3 consecutive integral x-values where the y-values are the same distance apart; the point in the middle of these 3 is the pt. of inflection.
- an equation To get the x-coordinate, set radicand = 0; the y-coordinate is the number added to the radical.

b) Explain how to determine if the graph is increasing or decreasing from:

- a graph if the y-values are always increasing, (decreasing), the function is inc. (dec.)
- a table look at the y-values and see if they are increasing or decreasing.
- an equation Check the coefficient of the radical; if positive => increasing; if negative => decreasing

Name ______________________ Period __________

7.1C *Graphing Cube Root Functions*

#14 – 15: Determine the following without graphing:

a) $y = \sqrt[3]{x-7} - 4$

Increasing or decreasing (Circle one)

Point of inflection $(7,-4)$

15. $y = -2\sqrt[3]{x+9}$

Increasing or decreasing (Circle one)

Point of inflection $(-9,0)$

#16 – 17: Compare and contrast:

16. How does the graph of $y = \sqrt[3]{x+2} - 4$ differ from the graph of $y = \sqrt[3]{x}$?

Explain: Different pt of inflection $(-2,-4)$ vs $(0,0)$
shifted left 2 units and down 4 units.

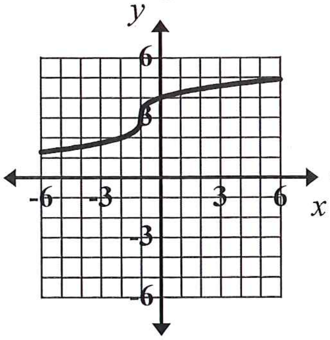
17. How does the graph of $y = -\sqrt[3]{x-3} + 4$ differ from the graph of $y = \sqrt[3]{x}$?

Explain: Different pt. of inflection $(3,4)$ $(0,0)$
Also, 1st function is decreasing and 2nd function is increasing
reflect over x-axis, shift right 3, up 4 units.

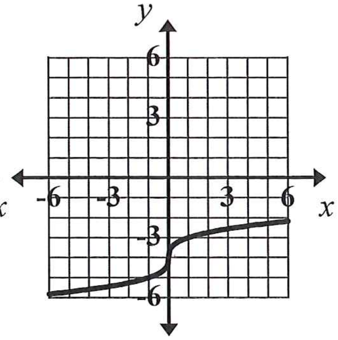
18. Determine which graph below has the identified value as a significant feature. Then use the graph to complete the table.

Graph Number:	4	1	3	2
Point of Inflection	$(-2,6)$	$(-1,3)$	$(5,0)$	$(0,-4)$
***y*-intercept**	$(0,4.74)$	$(0,4)$	$(0,1.71)$	$(0,-4)$
Increasing or Decreasing	decreasing	increasing	decreasing	increasing

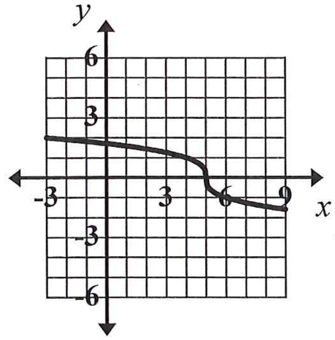
[Graph 1]



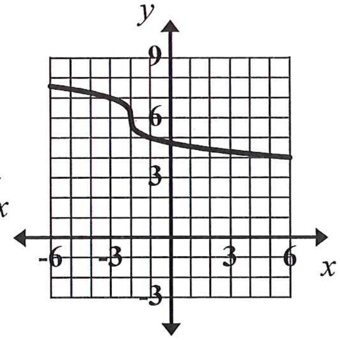
[Graph 2]



[Graph 3]



[Graph 4]



19. Write a cube root function that has the following qualities.

a) Point of inflection $(-3,5)$
Increasing
$y = \sqrt[3]{x+3} + 5$

b) Point of inflection $(4,-6)$
Decreasing
$y = -\sqrt[3]{x-4} - 6$

c) Point of inflection $(2,9)$
Increasing
$y = 2\sqrt[3]{x-2} + 9$

Section 7.1C

Name ______________________________ Period __________

7.2A Power Properties: The Sequel

#1 – 6: Multiple choice: Circle the correct answer

1. Which one of the expressions is NOT the same as 6^{-2}?

[A] $\frac{1}{6^{-2}}$

[B] $\left(\frac{1}{6}\right)^2$

[C] $\frac{1}{6^2}$

2. Which of the following has the greatest value?

[A] 5^{-2}

[B] $(-2)^0$

[C] 2^1

3. Evaluate $\left(3^{-2}\right)^{-1}$

[A] 9

[B] $\frac{1}{9}$

[C] $\frac{1}{27}$

4. Simplify 4^{-2}

[A] –8

[B] $\frac{1}{16}$

[C] $\frac{1}{8}$

5. Simplify $3^2 + 3^4$

[A] 90

[B] 729

[C] 6561

6. Which power has the value 16?

[A] 8^2

[B] 4^{-2}

[C] $\left(\frac{1}{4}\right)^{-2}$

7. True or False? If the equation is false, then correct it to make it true.

F **a)** $2^3 = 2 \cdot 3$

$\boxed{2^3 = 2 \cdot 2 \cdot 2 = 8}$

b) $\frac{6x^7y^5}{3x^{-1}} = 2x^8y^5$

TRUE

F **c)** $xy^2z^{-3} \cdot x^6yz^4 = \cancel{x^6y^2z}$

$\boxed{= x^7y^3z}$

d) $2x^2 \cdot (2x)^4 = 32x^6$

TRUE

F **e)** $6x^2 + (3x)^2 = 9x^4$

$6x^2 + 9x^2 = \boxed{15x^2}$

F **f)** $\left(2x^{-5}z^4\right)^3 = \frac{2z^{12}}{x^{15}}$

$= \boxed{\frac{8z^{12}}{x^{15}}}$

8. Mr. Nguyen gave his class a problem and asked them to find a number that could replace the question mark.

The problem was $\left(x^3\right)^0 = x^? \cdot x^5$.

Jobi says that the question mark should be replaced by 0.
Tiana says that the question mark should be 1.
Katiana says that the question mark should be –5.
Toby says that the question is impossible to answer.

Who is correct? Explain why.

Katiana $(x^3)^0 = x^0 = 1$

$x^{-5} \cdot x^5 = x^0 = 1$

Name ______________________ Period __________

7.2A Power Properties: The Sequel

9. Determine the number value that could appropriately replace the question mark to make the equation true.

a) $d^{?} \cdot d^{4} = d^{8}$

4

b) $\left(x^{2}\right)^{?} = x^{-6}$

-3

c) $\dfrac{w^{?}}{w^{3}} = w^{-3}$

0

Change r to a "?" **d)** $\left(?^{4}\right)^{0} = 4^{0}$

"?" can be any real number except 0.

#10 – 1: For the following problems, state what each student did incorrectly and fix their mistake.

10. **Sarah's work**

Line 1 $\dfrac{\left(p^{4}d^{-3}q^{5}\right)^{2}}{q^{-1}\left(p^{-2}d^{3}\right)^{-2}}$

Line 2 $\dfrac{p^{8}d^{-6}q^{10}}{q^{2}p^{4}d^{-3}}$

Line 3 $\dfrac{p^{4}q^{8}}{d^{3}}$

q^{-1} is not included in the parenthesis for power of a product. d^{3} is included in the parens for power of a product.

$\dfrac{p^{8}d^{-6}q^{10}}{q^{-1}p^{4}d^{-6}}$

$\boxed{p^{4}q^{11}}$

11. **Tyrell's work**

Line 1 $\left(2n^{-3}\right)^{-4} \cdot 2n^{-3}$

Line 2 $-8n^{12} \cdot 2n^{-3}$

Line 3 $-16n^{9}$

$2^{-4} \cdot 2 = 2^{-3} = \dfrac{1}{2^{3}} = \dfrac{1}{8}$

$\boxed{\dfrac{n^{9}}{8}}$

12. A friend of yours is having a difficult time understanding why the answer to the following problem is true.

Explain how to simplify the expression to your friend. $\dfrac{3x^{5}\left(xy^{3}\right)^{-2}}{18x^{-4}y^{5}} = \dfrac{x^{7}}{6y^{11}}$

1) Do Power of a Product first $\rightarrow \dfrac{3x^{5}x^{-2}y^{-6}}{18x^{-4}y^{5}}$

2) Apply Product of Powers law on numerator $\rightarrow \dfrac{3x^{3}y^{-6}}{18x^{-4}y^{5}}$

3) Reduce the fraction $\frac{3}{18} = \frac{1}{6}$ $\rightarrow \dfrac{x^{3}y^{-6}}{6x^{-4}y^{5}}$

4) Apply quotient of Powers law on like bases $\rightarrow \dfrac{x^{7}y^{-11}}{6} = \boxed{\dfrac{x^{7}}{6y^{11}}}$

5) Apply negative exponent law) to write y^{-11} as $\frac{1}{y^{11}}$.

Name ______________________________ Period __________

7.2A *Power Properties: The Sequel*

13. Can you add the following expressions? Explain why or why not and state the answer.

$-2x^3y^4 + 7x^3y^4 = 5x^3y^4$ Yes because they are like terms so you just add the coefficients.

#14 – 22: Simplify. Your answer should contain only positive exponents.

14. $b^{-2} \cdot (2b)^2$

$b^{-2} 4b^2$

$4b^0$

$4(1)$

4

15. $\dfrac{\left(k^2\right)^{-2}}{2k^0k}$

$\dfrac{k^{-4}}{2(1)k}$

$\dfrac{1}{2k^5}$

16. $\dfrac{2p^{-3} \cdot p^2}{2p^0(2p)^4}$

$\dfrac{2p^{-1}}{2 \cdot 1 \cdot 16p^4}$

$\dfrac{2}{32p^5}$

$\dfrac{1}{16p^5}$

17. $\left(\dfrac{c^3r^{-2}p^4}{r^2p^3}\right)^3$

$\dfrac{c^9r^{-6}p^{12}}{r^6p^9}$

$c^9r^{-12}p^3$

$\dfrac{c^9p^3}{r^{12}}$

18. $\left(3\left(z^2b\right)^3\right)^2$

$(3z^6b^3)^2$

$9z^{12}b^6$

19. $2\left(\dfrac{3x^2}{2}\right)^2$

$2\left(\dfrac{9x^4}{4}\right)$

$\dfrac{9x^4}{2}$

Section 7.2A

Name ______________________________ Period __________

7.2A *Power Properties: The Sequel*

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Name ______________________ Period __________

7.2B *Definition of Rational Exponents*

#1 – 8: Match each expression with its simplified form.

1. $25^{1/2}$ H **2.** $81^{1/2}$ B **3.** $8^{1/3}$ D **4.** $4^{3/2}$ E

5. $27^{-2/3}$ G **6.** $\left(\frac{1}{9}\right)^{1/2}$ A **7.** $\left(\frac{1}{9}\right)^{-1/2}$ F **8.** $\left(25a^8\right)^{1/4}$ C

[A] $\frac{1}{3}$ [B] 9 [C] $a^2\sqrt{5}$ [D] 2 [E] 8 [F] 3 [G] $\frac{1}{9}$ [H] 5

9. Which expression is equal to $9^{1/3}$?

[A] 3 [B] $\sqrt{9^3}$ [C] $\sqrt[3]{9}$ [D] $\frac{1}{9^3}$

10. Which expression is equal to $\left(a^2-9\right)^{-2/3}$?

[A] $\sqrt[3]{\left(a^2-9\right)^2}$ [B] $\boxed{\frac{1}{\sqrt[3]{\left(a^2-9\right)^2}}}$ [C] $\frac{1}{\sqrt{\left(a^2-9\right)^3}}$ [D] $\sqrt{\left(a^2-9\right)^3}$

#11 – 17: A student rewrote each expression in radical notation. Are her answers correct? If no, explain what she did wrong and how to do the problem correctly.

11. $17^{1/2}=\frac{1}{\sqrt{17}}$

She did $17^{-1/2}$; A positive fraction exponent $\sqrt{17}$ is just a radical.

12. $11^{1/4}=\sqrt[4]{11}$

CORRECT

13. $7^{3/4}=\left(\sqrt[4]{7}\right)^3$

Correct

14. $(5b)^{1/5}=\sqrt[5]{b}$

She missed $5^{1/5}$ should be a radical on the 5, similar to b's which she did correctly. Using power on a product yields $\sqrt[5]{5b}$

15. $(3bc)^{2/5}=\sqrt[5]{(3bc)^2}$

Correct

16. $\left(3fg^3\right)^{1/2}=\sqrt{3fg^3}$

1st step is correct BUT the radical can be simplified.

$\sqrt{g^3}=\sqrt{g^2 g}=g\sqrt{g}$, so $\sqrt{3fg^3}=\boxed{g\sqrt{3fg}}$

17. ~~$7^{3/4}=\left(\sqrt[4]{7}\right)^3$~~ $4^{\frac{4}{5}}=\left(\sqrt[4]{4}\right)^5$

The index of the radical is the denominator of the fractional exponent. So $4^{\frac{4}{5}}=\left(\sqrt[5]{4}\right)^4$

18. Which expression is equal to $\sqrt[7]{\frac{3}{4}r^8 s}$?

[A] $\left(\frac{3}{4}r^8 s\right)^{1/2}$ [B] $\left(\frac{3}{4}r^8 s\right)^7$ [C] $\frac{3}{4}r^8 s^{1/7}$ [D] $\boxed{\left(\frac{3}{4}r^8 s\right)^{1/7}}$

19. Which expression is equal to $\sqrt{13^5}$?

[A] $13^{1/5}$ [B] $13^{2/5}$ [C] $\boxed{13^{5/2}}$ [D] $13^{5/1}$

Name ______________________ Period __________

7.2B *Definition of Rational Exponents*

#20 – 25: Erich turned in this assignment. Correct his work. If his answer is correct, place a smiley face next to the problem. If his answer is incorrect, cross out his answer, write the correct answer and explain why his answer is incorrect.

20. $\sqrt[3]{16} = 16^{1/3}$

21. $\sqrt[4]{5d} = \cancel{5d^{1/4}}$ $(5d)^{1/4}$

The radicand is 5d, not d.

22. $\sqrt[6]{36fg} = \cancel{6}f^{1/6}g^{1/6}$ $= 36^{1/6}f^{1/6}g^{1/6}$

$36^{1/6} \neq 6$, and cannot be simplified.

23. $3\sqrt[5]{q} = 3q^{1/5}$

24. $\sqrt[5]{b^2+c^2} = \cancel{b^{2/5}+c^{2/5}}$ $(b^2+c^2)^{1/5}$

There is NO Power on a Sum exponent property.

25. $\sqrt[3]{\dfrac{(2a)^2}{4a^2}} = 1$

#26 – 33: Simplify each expression if possible. There should not be any negative exponents in your final answer. Show your process for doing this (i.e. Do <u>NOT</u> simply enter this into a calculator.)

26. $9^{-1/2} = \dfrac{1}{9^{1/2}} = \dfrac{1}{\sqrt{9}} = \dfrac{1}{3}$

27. $125^{1/3}$ $\sqrt[3]{125} = 5$

28. $16^{-5/2}$ $\dfrac{1}{16^{5/2}} = \dfrac{1}{(\sqrt{16})^5} = \dfrac{1}{4^5} = \dfrac{1}{1024}$

29. $\left(\dfrac{16}{49}\right)^{1/2} = \sqrt{\dfrac{16}{49}} = \dfrac{\sqrt{16}}{\sqrt{49}} = \dfrac{4}{7}$

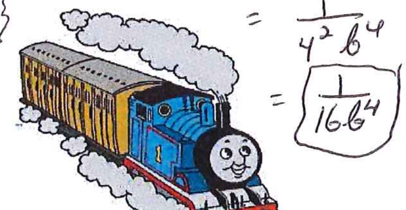
30. $\left(\dfrac{25}{49}\right)^{-3/2}$ $\dfrac{1}{\left(\frac{25}{49}\right)^{3/2}} = \dfrac{1}{\left(\sqrt{\frac{25}{49}}\right)^3} = \dfrac{1}{\left(\frac{5}{7}\right)^3} = \dfrac{1}{\frac{125}{343}} = \boxed{\dfrac{343}{125}}$

31. $\left(343d^3\right)^{1/3} = \sqrt[3]{343d^3} = 7d$

32. $\left(\dfrac{16}{81g^4}\right)^{3/4} = \dfrac{16^{3/4}}{(81g^4)^{3/4}}$ $\dfrac{(\sqrt[4]{16})^3}{81^{3/4}g^3} = \dfrac{2^3}{(\sqrt[4]{81})^3 \cdot g^3} = \dfrac{8}{27g^3}$

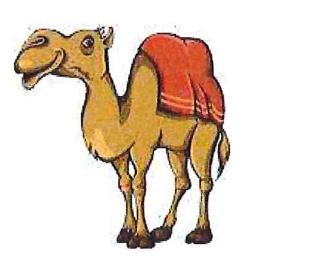
33. $\left(64b^6\right)^{-2/3} = \dfrac{1}{(64b^6)^{2/3}} = \dfrac{1}{64^{2/3}b^4} = \dfrac{1}{(\sqrt[3]{64})^2 b^4} = \dfrac{1}{4^2b^4} = \boxed{\dfrac{1}{16b^4}}$

34. The population of the Island of Sodor can be modeled by the equation $P(t) = 3.32t^{5/3}$. Where P represents the population in millions and t represents the time in years. How many people will be on the island after 27 years?



$P(27) = 3.32(\sqrt[3]{27})^5$
$= 3.32(3)^5$
$= 806.76 \approx \boxed{807 \text{ people}}$

35. For mammals, the lung volume V (in millimeters) can be modeled by $V = 170m^{4/5}$ where m is the body mass (in kilograms). Find the lung volume of a camel whose body mass is 243kg. $V = 170(\sqrt[5]{243})^4$
$= 170(3)^4$
$= 170(81)$
$\boxed{V = 13{,}770 \text{ mm}}$



#36 – 37: TRUE or FALSE? Explain your answer.

36. $-36^{1/2} = -6$ TRUE

By order of operations, powers are done before multiplying by −1. So $-\sqrt{36} = \boxed{-6}$

35. $(-16)^{1/4} = 2$ FALSE

$\sqrt[4]{(-16)}$ is NOT REAL

$2^4 \neq -16$ or $2^4 = 16$

$(-2)^4 \neq -16$ or $(-2)^4 = 16$

Section 7.2B

Name ______________________________ Period __________

7.2C *Simplifying Radical Expressions and Expressions with Rational Exponents*

#1 – 8: Are the following statements always true, sometimes true, or never true? Explain your reasoning.

1. $(-256)^{1/4} = -4$

NEVER TRUE

$\sqrt[4]{\text{negative}}$ is NOT REAL, since any $(\text{real})^4$ is positive. $(-4)^4 = 256$

2. $\sqrt[5]{-32} = -2$

ALWAYS TRUE

$(-2)^5 = -32$ ✓

3. $\sqrt[3]{64b^3} = 4b$

ALWAYS TRUE

A cubic root can be pos or neg.

4. $\sqrt[3]{343d^6f^9} = 49d^2f^3$

NEVER TRUE

$\sqrt[3]{343} = 7$; the variables are OK; a cubic root can be pos or neg.

5. $(625d^4)^{1/4} = 5d$

SOMETIMES TRUE only when $d \geq 0$.

If $d < 0$, the 2 sides of the equation would not be equal. $\sqrt[4]{625d^4} = 5d$

pos ≠ Neg

6. $(81a^8b^{12})^{3/4} = 27a^6b^9$

SOMETIMES TRUE when $b \geq 0$.

The 4th Root must be ≥ 0. To guarantee that $27a^6b^9$ is ≥ 0, b must be ≥ 0.

7. $\sqrt{\dfrac{81c^6}{36c^4}} = \dfrac{3c}{2}$

SOMETIMES TRUE only when $c > 0$

The sq. root will always be > 0 (not 0 this time since c is in denominator). To guarantee that $\frac{3c}{2}$ is > 0, c must be > 0.

8. $\sqrt[5]{243q^{10}} = 3q^2$

ALWAYS TRUE

Both sides of the equation will always be positive or 0 because of the even powers on base q.

#9-22: Simplify the following expression. Use absolute value symbols where required.

9. $81^{1/4}$

3

10. $\sqrt[3]{(64)^2}$

$4^2 = 16$

11. $27^{2/3}$

$(\sqrt[3]{27})^2 = 3^2 = 9$

12. $\sqrt[4]{16^3}$

$2^3 = 8$

13. $125^{2/3}$

$5^2 = 25$

14. $0.00243^{1/5}$

0.3

15. $\sqrt{0.36x^8}$

$0.6x^4$

16. $\left(\dfrac{10000}{81}\right)^{1/4}$

$\dfrac{10}{3}$

17. $\sqrt[3]{216c^3d^5}$

$6cd\sqrt[3]{d^2}$

18. $(512g^6h^3)^{2/3}$

$(\sqrt[3]{512g^6h^3})^2 = (8g^2h)^2 = \boxed{64g^4h^2}$

19. $(2401d^4)^{3/4}$

$(\sqrt[4]{2401d^4})^3$

$(7|d|)^3$

$\boxed{343|d|^3}$

20. $\sqrt[3]{\left(\dfrac{125}{8}\right)^2}$

$\left(\dfrac{5}{2}\right)^2$

$\boxed{\dfrac{25}{4}}$

21. $\left(\dfrac{4096}{16d^8}\right)^{3/4}$

$\dfrac{(\sqrt[4]{4096})^3}{(\sqrt[4]{16})^3 \cdot d^6} = \dfrac{8^3}{2^3d^6} = \dfrac{512}{8d^6} = \boxed{\dfrac{64}{d^6}}$

22. Circle the expression if absolute value symbols are required when simplifying.

[A] $\sqrt{a^4b^6}$ [B] $\sqrt[3]{-k^6m^9}$ [C] $\sqrt[4]{g^{12}h^8}$ [D] $\sqrt{f^6r^8}$

Name ______________________________ Period __________

7.2C *Simplifying Radical Expressions and Expressions with Rational Exponents*

#23 – 25: The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Find the radius to the nearest hundredth for spheres with the following volumes.

23. $V = 10 \text{ in}^3$

$\left(\frac{3}{4}\right)10 = \frac{4}{3}\pi r^3\left(\frac{3}{4}\right)$

$\frac{7.5}{\pi} = \frac{\pi r^3}{\pi}$

$\sqrt[3]{2.3873} = \sqrt[3]{r^3}$

$\boxed{r \approx 1.34 \text{ in}}$

24. $V = 20 \text{ ft}^3$

$\left(\frac{3}{4}\right)\frac{4}{3}\pi r^3 = 20\left(\frac{3}{4}\right)$

$\frac{\pi r^3}{\pi} = \frac{15}{\pi}$

$\sqrt[3]{r^3} = \sqrt[3]{4.7746}$

$\boxed{r \approx 1.68 \text{ ft}}$

25. $V = 0.45 \text{ cm}^3$

$\left(\frac{3}{4}\right)\frac{4}{3}\pi r^3 = 0.45\left(\frac{3}{4}\right)$

$\frac{\pi r^3}{\pi} = \frac{0.3375}{\pi}$

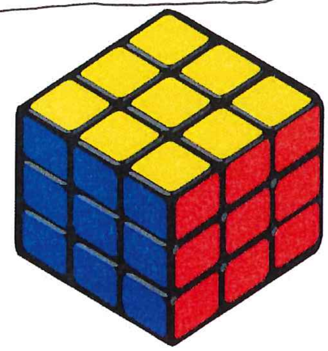
$\sqrt[3]{r^3} = \sqrt[3]{0.1074}$

$\boxed{r \approx 0.48 \text{ cm}}$

26. A cube has a volume of $12167d^6$ cm^3. What is the length of one side of the cube?

$\sqrt[3]{s^3} = \sqrt[3]{12167d^6}$

$\boxed{\text{Side} = 23d^2 \text{ cm}}$



$V = s^3$
$SA = 6s^2$

27. A cube has a volume of 1728 cm^3, what is the surface area of the cube?

(Hint: What do you need to know to be able to calculate the surface area?)

$V = 1728$

$\sqrt[3]{s^3} = \sqrt[3]{1728}$

$s = 12$

$SA = 6s^2$
$= 6(12)^2$
$= 6(144)$

$\boxed{SA = 864 \text{ cm}^2}$

28. Suppose P dollars in principal is invested in an account that earns interest annually. If after t years the investment grows to A dollars, then the annual rate of return on the investment is represented by

$$r = \left(\frac{A}{P}\right)^{1/t} - 1$$

Find the annual rate of return on a \$5,000 investment that grows to \$12,500 after 6 years.

$r = \left(\frac{12{,}500}{5{,}000}\right)^{\frac{1}{6}} - 1$

$r = (2.5)^{\frac{1}{6}} - 1$

$r = .165$

$\boxed{r = 16.5\%}$

Section 7.2C

Name ______________________________ Period __________

7.2D Power Properties and Rational Exponents

#1 – 10: Izza took a quiz on simplifying expressions. Below, make an answer key for the quiz with your answers and any work. Use your key to correct her quiz. Deduct 1 point for each incorrect answer and place her grade in the box.

Name **Izza**

Quiz grade:

Answers rounded to 3 decimal places where needed.

~~1.~~ $16^{1/4}$	4	2. $(-2)^{4/3}$	2.520
~~3.~~ $81^{-1/2}$	–9	~~4.~~ 49^{-2}	$\frac{1}{7}$
5. $64^{2/3}$	16	~~6.~~ $81^{1/4} \cdot 2^{-1}$	2
~~7.~~ $3^{1/2} \cdot 2^{1/2}$	$\frac{3}{2}$	~~8.~~ $100^{1/2} \cdot 25^{-2}$	$\frac{1}{25}$
~~9.~~ $(100^{1/2})^2$	10	~~10.~~ $3b^{1/3} \cdot 2b^{2/3}$	$6b^{2/9}$

ANSWER KEY	
1. $\sqrt[4]{16} = 2$	2. $\sqrt[3]{(-2)^4}$ $\sqrt[3]{16} = 2.520$
3. $\frac{1}{81^{1/2}} = \frac{1}{\sqrt{81}} = \frac{1}{9}$	4. $\frac{1}{49^2} = \boxed{\frac{1}{2401}}$
5. $(\sqrt[3]{64})^2$ $4^2 = 16$	6. $\sqrt[4]{81} \cdot \frac{1}{2^1}$ $3 \cdot \frac{1}{2} = \frac{3}{2}$
7. $\sqrt{3} \cdot \sqrt{2} = \sqrt{6}$	8. $\sqrt{100} \cdot \frac{1}{25^2}$ $\frac{10}{1} \cdot \frac{1}{625} = \frac{2}{125}$
9. $100^1 = 100$ or $(\sqrt{100})^2 = 100$ 10^2	10. $3 \cdot 2 \cdot b^{1/3} \cdot b^{2/3}$ $6 \cdot b^{3/3} = 6b$

11. Jerome and Cambria were working on this problem:

Replace the question mark with the exponent that will make the equation true. $(-64)^? = \frac{1}{2}$

Jerome thought the answer was $-\frac{1}{6}$ and Cambria thought the answer was 6. Are they correct? Explain your reasoning. Neither is correct. With Jerome's answer, $(-64)^{-1/6} = \frac{1}{(-64)^{1/6}}$. But $\sqrt[6]{-64}$, an even root of a negative, is not real. With Cambria's answer, $(-64)^6$ = a positive huge number!

#12 – 17: What value will make the equation true? Explain why your answer is correct.

12. $36^? = 6$ $\frac{1}{2}$

A fraction exponent is a radical $\sqrt{36} = 6$

13. $7^{1/3} \cdot 7^{1/3} \cdot 7^? = 7$ $\frac{1}{3}$

Using Product of Powers law, add the exponents $7^{\frac{1}{3}+\frac{1}{3}+\frac{1}{3}} = 7^{\frac{3}{3}} = 7^1 = 7$

14. $(6^{1/4})^? = -\frac{1}{36}$

There is no exponent that will turn a positive base 6 into a negative number.

Name ______________________ Period ________

7.2D Power Properties and Rational Exponents

#12 –17 (continued): What value will make the equation true? Explain why your answer is correct.

15. $\frac{x^{2/3}}{x^?} = x^{1/3}$ $? = \frac{1}{3}$

Quotient of Powers ~~Rule~~: Keep the base and subtract the exponents.

16. $\frac{4^{1/2}}{4^?} = 16$ $? = -\frac{3}{2}$

Quotient of Powers Rule

$\frac{1}{2} - -\frac{3}{2} = \frac{4}{2} = 2$

Keep the base + SUBT The exponents. $4^2 = 16$

17. $7p^? \cdot 3p^{3/2} = 21p$ $? = -\frac{1}{2}$

Product of Powers Rule

Keep the base and add the exps.

$p^{-\frac{1}{2}} \cdot p^{\frac{3}{2}} = p^{\frac{2}{2}} = p^1 = p$

#18 – 29: Simplify each expression.

18. $\left(216^2\right)^{1/3}$

$\sqrt[3]{216^2}$

$6^2 = 36$

19. $2^{1/2} \cdot 8^{1/2}$

$\sqrt{2} \cdot \sqrt{8} =$

$\sqrt{16} = 4$

20. $3a^{3/2} \cdot 2a^{5/4} \cdot 2a^{5/3}$

$12a^{\frac{18}{12} + \frac{15}{12} + \frac{20}{12}}$

$\boxed{12a^{53/12}}$

21. $\left(p^{-2}\right)^{1/2} \cdot \left(p^{1/4}\right)^{-5/4}$

$p^{-1} \cdot p^{-5/16}$

$p^{-16/16} \cdot p^{-5/16}$

$p^{-21/16} = \boxed{\frac{1}{p^{21/16}}}$

22. $\left(k^{3/2}\right)^{5/3} \cdot k^{2/3}$

$K^{5/2} \cdot K^{2/3}$

$K^{\frac{15}{6} + \frac{4}{6}}$

$\boxed{K^{19/6}}$

23. $\left(z^{2/3} z^{2/3}\right)^{3/4}$

$\left(z^{4/3}\right)^{3/4} = z^1 =$

$\boxed{z}$

24. $b^{2/3}\left(b^{4/3}\right)^{1/4}$

$b^{\frac{4}{3} \cdot \frac{1}{4}}$

$b^{2/3} \cdot b^{1/3} = b^{3/3} = \boxed{b}$

25. $2\left(d^{5/3}\right)^{3/5} \cdot d^{-1}$

$2d^1 \cdot d^{-1}$

$2d^0$

$2(1) = 2$

26. $\frac{\left(x^{1/4}\right)^2 \cancel{x^{5/3}}}{\cancel{x^{5/3}} x^{-1}} = \frac{x^{\frac{1}{4} \cdot 2} \cdot x^1}{1} =$

$x^{\frac{1}{2} + \frac{2}{2}} = \boxed{x^{3/2}}$

27. $\left(216^{1/4}\right)^{2/3} \cdot 36^{1/4}$

$\left(\left(6^3\right)^{1/4}\right)^{2/3} \cdot \left(6^2\right)^{1/4}$

$\left(6^{3/4}\right)^{2/3}$

$6^{1/2} \cdot 6^{1/2} = 6$

28. $\left(81^{1/3}\right)^{1/2}\left(27^{2/3}\right)^{1/4}\left(9^{1/3}\right)^{5/4}$

$\left(\left(3^4\right)^{1/3}\right)^{1/2} \cdot \left(\left(3^3\right)^{2/3}\right)^{1/4} \cdot \left(\left(3^2\right)^{1/3}\right)^{5/4}$

$\left(3^{4/3}\right)^{1/2} \cdot \left(3^2\right)^{1/4} \cdot \left(3^{2/3}\right)^{5/4}$

$3^{2/3} \cdot 3^{1/2} \cdot 3^{5/6}$

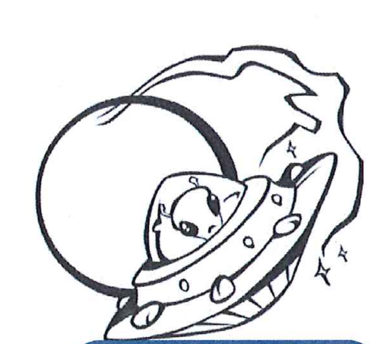
$3^{\frac{4}{6} + \frac{3}{6} + \frac{5}{6}} = 3^{12/6} = 3^2 = \boxed{9}$

29. $\frac{\left(125^{2/3}\right)^{1/2}}{\left(25^{3/4}\right)^{2/3}} = \frac{\left(\left(5^3\right)^{2/3}\right)^{1/2}}{\left(\left(5^2\right)^{3/4}\right)^{2/3}} = \frac{5^{2 \cdot \frac{1}{2}}}{5^{\frac{3}{2} \cdot \frac{2}{3}}} = \frac{5^1}{5^1} = \boxed{1}$

30. A little green man in his spaceship has discovered another planet. He names the planet Ork and he determines that Ork's distance from the sun is 32 Astronomical units.

(One Astronomical unit (AU) = 93,000,000 miles.)

The time (T measured in years) for Ork to orbit the sun can be determined using the formula $T = (32AU)^{3/2}$.



How long does it take Ork to orbit the sun?

$T = (32 \cdot 93{,}000{,}000)^{3/2}$

$(2{,}976{,}000{,}000)^{3/2} = 1.623489149\text{E}14 =$

162348914900000 years

Section 7.2D

That's over 162 Trillion years!

Name ______________________________ Period __________

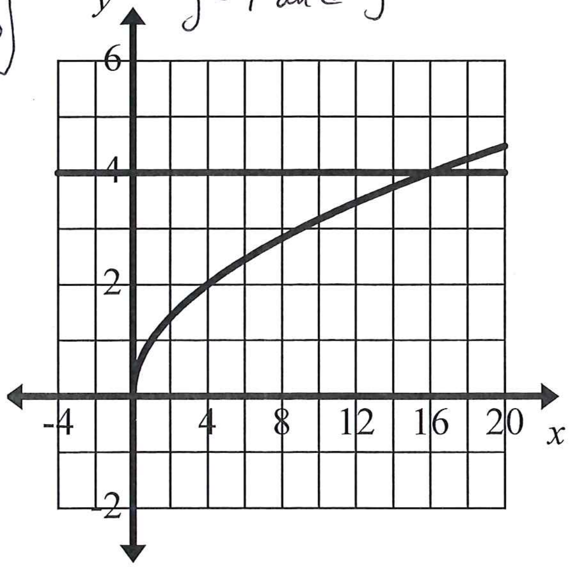
7.3A *Solving Radical Equations and Equations with Rational Exponents*

1. For each equation, explain how to use the graph to solve the equation. Then identify the solution to the equation.

a) $4=\sqrt{x}$

The solution is the x-coordinate of the pt. of intersection of $y=4$ and $y=\sqrt{x}$.

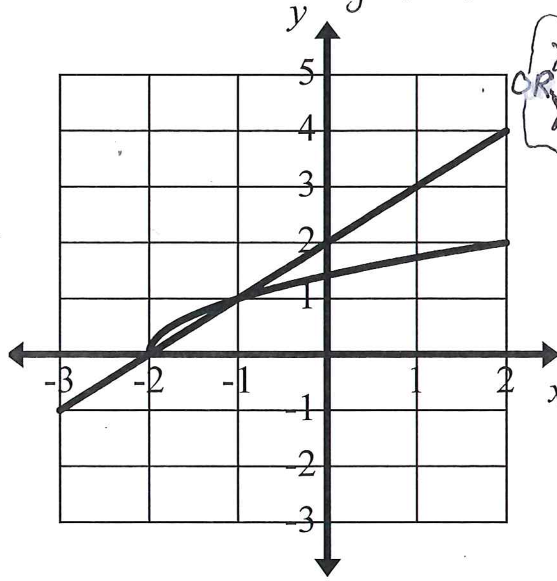
$\boxed{x=16}$



b) $(x+2)^{1/2}=x+2$

The solutions are at the 2 pts of intersection of $y=\sqrt{x+2}$ and $y=x+2$

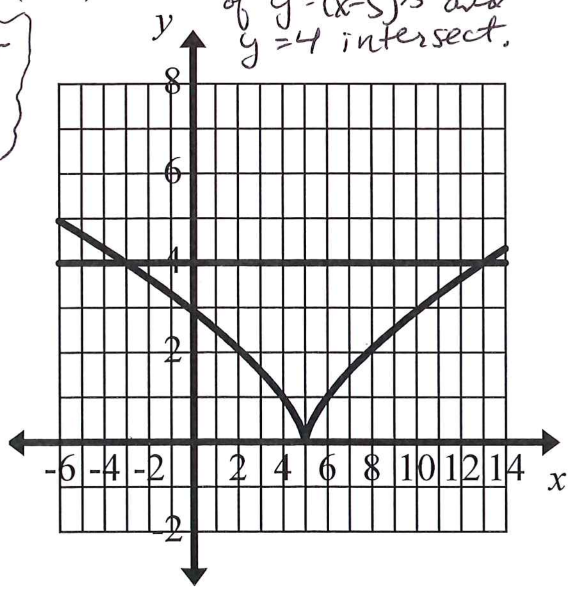
$\boxed{x=-2 \text{ OR } x=-1}$



c) $(x-5)^{2/3}=4$

There are 2 solutions where the graphs of $y=(x-5)^{2/3}$ and $y=4$ intersect.

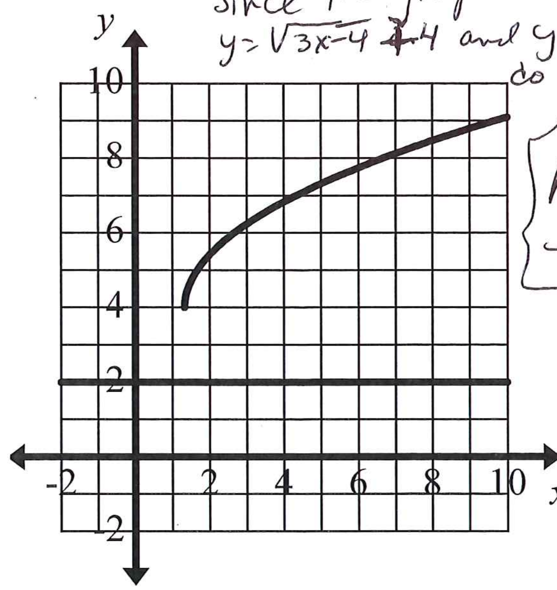
$\boxed{x=-3 \text{ or } x=13}$



d) $\sqrt{3x-4}+4=2$

There are no solutions since the graphs of $y=\sqrt{3x-4}\ \cancel{+4}+4$ and $y=2$ do not intersect.

$\boxed{\text{No Solution}}$



Name ______________________________ Period __________

7.3A *Solving Radical Equations and Equations with Rational Exponents*

1. (continued) For each equation, explain how to use the graph to solve the equation. Then identify the solution to the equation.

e) $\sqrt{x} = \sqrt{6-2x}$

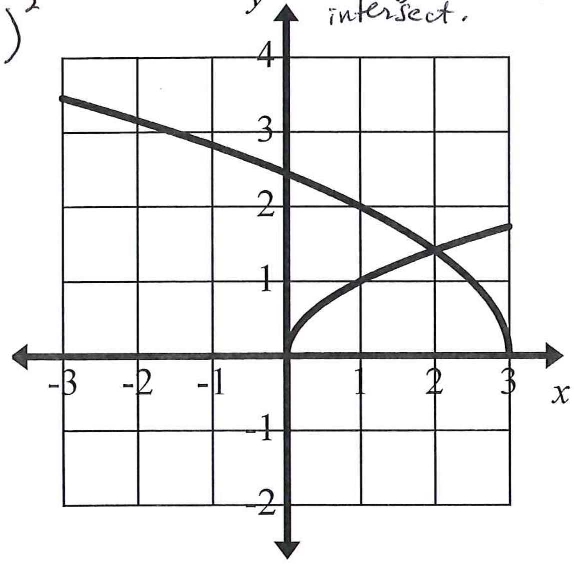
The solution appears to be $x=2$ where $y=\sqrt{x}$ and $y=\sqrt{6-2x}$ intersect.

$(\sqrt{x})^2 = (\sqrt{6-2x})^2$

$x = 6-2x$

$3x = 6$

$\boxed{x=2}$



f) $\sqrt[3]{4x-1} = 5$

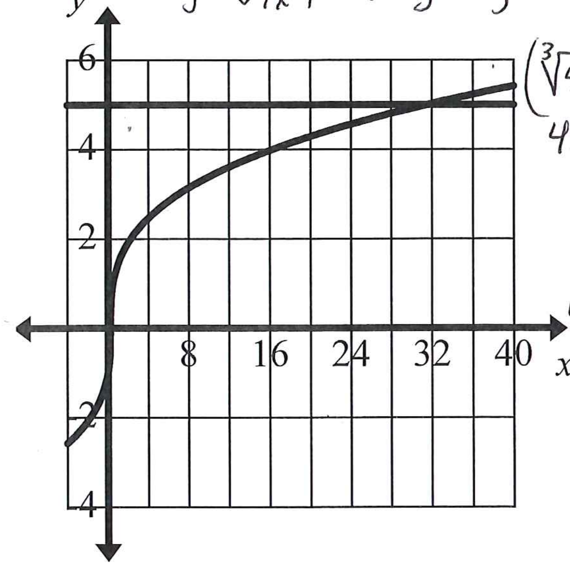
The solution is the x-coordinate of the pt. of intersection of $y=\sqrt[3]{4x-1}$ and $y=5$, so $x<32$.

$(\sqrt[3]{4x-1})^3 = (5)^3$

$4x-1 = 125$

$\frac{4x}{4} = \frac{126}{4}$

$\boxed{x=31.5}$



2. Use the graphing calculator to find the solution to each equation.

a) $\sqrt{x} = \sqrt{2x-6}$

$\boxed{x=6}$

b) $\cancel{216 = (81)^{3/2}}$

$216 = x^{3/2}$

$\boxed{x=36}$

c) $x = \sqrt{7x-5}$

$\boxed{x = 0.807 \text{ or } x = 6.193}$

d) $\sqrt{3x-7} = \sqrt{x-2}$

$\boxed{x = 2.5}$

e) $x = (2-x)^{1/2}$

$\boxed{x=1}$

f) $(5+2x)^{2/3} = 9$

$\boxed{x = -16 \text{ or } x = 11}$

g) $\frac{1}{2}x = \sqrt{5x-9}$

$\boxed{x = 2 \text{ or } x = 18}$

h) $(x+2)^{5/2} = -1$

NO SOLUTION

i) $\sqrt[3]{12+x} = -3$

$\boxed{x = -39}$

Name ______________________ Period __________

7.3A *Solving Radical Equations and Equations with Rational Exponents*

3. If a car is traveling at 40 mi/h, how far will it travel as the driver applies the brakes to a complete stop? Use the formula, $s = \sqrt{22d}$, where s represents the speed of the car in miles per hour and d represents the distance in feet

$(40)^2 = (\sqrt{22d})^2$

$\frac{1600}{22} = \frac{22d}{22}$

$\boxed{72.7 \text{ ft} = d}$

4. For each planet in the solar system, the length of its year is the time it takes the planet to revolve around the center star. The formula $E = 0.2x^{3/2}$ models the number of Earth days in a planet's year, E, where x is the average distance of the planet from the center star, in millions of kilometers. There are approximately 365 Earth days in the year of Planet C. What is the average distance of Planet C from the center star?

$365 = 0.2x^{3/2}$

$(1825)^{2/3} = (x^{3/2})^{2/3}$

$\boxed{149.3 = x \text{ million Km}}$

5. The speed that a tsunami (tidal wave) can travel is modeled by the equation $S = 365d^{1/2}$ where S is the speed of the tsunami in kilometers per hour and d is the average depth of the water in kilometers.

a) What is the speed of the tsunami when the average water depth is 0.512 kilometers? *(round to the nearest tenth)*

$S = 365(0.512)^{1/2}$

$\boxed{\text{Speed} = 261.2 \text{ Km/h}}$

b) A tsunami is found to be traveling at 120 kilometers per hour. What is the average depth of the water? *(round to three decimal places)*

$\frac{120}{365} = \frac{365d^{1/2}}{365}$

$(.328767)^2 = (d^{1/2})^2 \Rightarrow \boxed{d = 0.108 \text{ Km}}$

6. The formula $S = 2\pi\sqrt{\frac{L}{32}}$ represents the swing of a pendulum. S is the time in seconds to swing back and forth, and L is the length of the pendulum in feet.

a) How long does it take for a 3 foot pendulum to swing back and forth? (Round to three decimal places)

$S = 2\pi\sqrt{\frac{3}{32}}$ $\quad S = 2\pi(.306186)$

$\boxed{S = 1.924 \text{ seconds}}$

b) Find the length of a pendulum that makes one swing in 2.5 seconds. (Round to three decimal places.)

$\frac{2.5}{2\pi} = \frac{2\pi\sqrt{\frac{L}{32}}}{2\pi} \Rightarrow \left(\sqrt{\frac{L}{32}}\right)^2 = (0.39789)^2 \Rightarrow (32)\frac{L}{32} = 0.1583(32)$

$\boxed{L = 5.066 \text{ feet}}$

7. Look at problem ~~1c~~ 2c. Is it always possible to find an exact solution using the graph? What could we try if we could not find the exact solution by graphing?

No; Solve algebraically (2c is an example where graphing won't help because the answer is $\frac{7 \pm \sqrt{29}}{2}$)

Section 7.3A

7.3A Solving Radical Equations and Equations with Rational Exponents

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Name ______________________ Period __________

7.3B Solving Radical Equations and Equations with Rational Exponents

#1 – 8: Solve each equation algebraically. Check your solutions by graphing on your graphing utility.

1. $(\sqrt{x})^2 = (3)^2$

$x = 9$ ✓

Solution: $x = 9$

Does your solution check? Yes or No

2. $(\sqrt{x-1})^2 = (2)^2$

$x - 1 = 4$

$x = 5$ ✓

Solution: $x = 5$

Does your solution check? Yes or No

3. $\sqrt{2x-1} + 5 = 2$

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

$2x - 1 = 9$

$2x = 10$

$x = 5$

or $\sqrt{2x-1} = -3$ not possible

Solution: ~~$x = 5$~~ BuT $\boxed{\text{NO SOLUTION}}$

Does your solution check? Yes or No

4. $(x-1)^2 = (\sqrt{5x-9})^2$

$x^2 - 2x + 1 = 5x - 9$

$-5x + 9 \quad -5x + 9$

$x^2 - 7x + 10 = 0$

$(x-5)(x-2) = 0$

$x = 5$ or $x = 2$

Solution: $x = 5$ or $x = 2$

Does your solution check? Yes or No

5. $(x-3)^2 = (\sqrt{30-2x})^2$

$x^2 - 6x + 9 = 30 - 2x$

$+2x \quad -30 \quad -30 + 2x$

$x^2 - 4x - 21 = 0$

$(x-7)(x+3) = 0$

$x = 7$ or $x = -3$

Solution: $\boxed{x = 7}$ or ~~$x = -3$~~

Does your solution check? Yes or No

only one solution checks

6. $(\sqrt{5x+3})^2 = (\sqrt{3x+7})^2$

$5x + 3 = 3x + 7$

$2x = 4$

$x = 2$

Solution: $x = 2$

Does your solution check? Yes or No

Name ______________________ Period __________

7.3B *Solving Radical Equations and Equations with Rational Exponents*

#1 – 8 (continued): Solve each equation algebraically. Check your solutions by graphing on your graphing utility.

7. $\left(2\sqrt{x+8}\right)^2=\left(3\sqrt{x-2}\right)^2$

$4(x+8)=9(x-2)$

$4x+32=9x-18$

$\frac{50}{5}=\frac{5x}{5}$

$10=x$

Solution: $x=10$

Does your solution check? Yes or No

8. $\left(\sqrt{x+5}\right)^2=\left(\sqrt{x^2-15}\right)^2$

$x+5=x^2-15$

$-x-5 \quad -x-5$

$0=x^2-x-20$

$0=(x-5)(x+4)$

$x=5$ or $x=-4$

Solution: $x=5$ or $x=-4$

Does your solution check? Yes or No

9. For the problems above where the solution(s) did not check, check your solutions algebraically.

$\boxed{\#3}$ when $x=5$, $\sqrt{2x-1}+5=2$

$\sqrt{2(5)-1}$

$\sqrt{9}$

$3+5\neq 2$

$8\neq 2$

$\boxed{\#5}$ when $x=-3$, $x-3=\sqrt{30-2x}$

$(-3)-3=\sqrt{30-2(-3)}$

$-6=\sqrt{36}$

$-6\neq 6$

(only use principle root)

10. What does it mean for a solution to be extraneous?

a) Explain graphically. When graphing the two sides of the equation in y_1 and y_2, the two graphs do not intersect at the extraneous solution.

b) Explain algebraically. Using correct algebraic steps for solving an equation, one arrives at a solution, but it doesn't check when put back into the original equation.

11. Jeremy and Serge were comparing answers on last night's homework. This is their work on the problem. Who did the problem correctly? If they did the problem incorrectly, explain their mistake to them.

Jeremy's Work	Serge's Work (Correct)
$\sqrt{3x+1}+5=19$	$\sqrt{3x+1}+5=19$
$3x+1+25=361$	$\sqrt{3x+1}=14$
$3x+26=361$	$3x+1=196$
$3x=335$	$3x=195$
$x=\frac{335}{3}\approx 111.67$	$x=65$

Jeremy needed to isolate the radical by subtracting 5 from each side.

Name ______________________ Period __________

7.3B *Solving Radical Equations and Equations with Rational Exponents*

12. Latishia, Sango and Indy were comparing answers on last night's homework. This is their work on the problem. Who did the problem correctly? If they did the problem incorrectly, explain their mistake to them.

Latishia's Work	Sango's Work	Indy's Work
$\sqrt{x-2} = 2-x$	$\sqrt{x-2} = 2-x$	$\sqrt{x-2} = 2-x$
$x-2 = 4-4x+x^2$	$x-2 = 4+x^2$ ✓	$x-2 = 4-4x+x^2$
$0 = 6-5x+x^2$	$0 = 6-x+x^2$	$0 = 6-5x+x^2$
$x^2-5x+6=0$	$x^2-x+6=0$	$x^2-5x+6=0$
$(x-2)(x-3)=0$	$(x-3)(x+2)=0$	$(x-2)(x-3)=0$
Solution:	Solution:	Solution:
$x = 2$ *and* $x = 3$ ↑ extraneous	$x = 3$ *and* $x = -2$	$x = 2$
Check: $\sqrt{2-2} = 2-2$; $0 = 0$ ✓; $\sqrt{3-2} = 2-3$; $1 = -1$ no	Sango did not square the binomial correctly: $(2-x)^2 \neq 4+x^2$, Rather $(2-x)(2-x) = 4-2x-2x+x^2 = 4-4x+x^2$	Indy's work is CORRECT. It takes into consideration that $x=3$ is extraneous.

#13 – 24: Solve each equation. Check for extraneous solutions.

Hint: * A sq. root answer must be positive so an extraneous solution will result.

13. $\left(\sqrt{2x-6}\right) = (2)^2$

$2x-6=4$

$2x=10$

$\boxed{x=5}$

$\sqrt{2(5)-6} = 2$

$\sqrt{4}$

$2 = 2$ ✓

14. $3+(n+4)^{-1/4} = \dfrac{10}{3} - \dfrac{9}{3}$

-3

$\dfrac{1}{\sqrt[4]{n+4}} = \dfrac{1}{3}$

$\left(\sqrt[4]{n+4}\right)^4 = (3)^4$

$n+4 = 81$

$\boxed{n = 77}$

$3+(77+4)^{-1/4} = 10/3$

$3+(81)^{-1/4} = 3+\frac{1}{\sqrt[4]{81}} = 3+\frac{1}{3} = \frac{10}{3}$ ✓

15. $(4x+1)^{1/2} - 2 = -7$

$\left(\sqrt{4x+1}\right)^2 = (-5)^2$

$4x+1 = 25$

$4x = 24$

$x = 6$

$\boxed{\text{NO SOLUTION}}$

$(4(6)+1)^{1/2} - 2$

$25^{1/2} - 2$

$5-2 = -7$

$3 \neq -7$

16. $-4(x-2)^{1/2} + 2 = 18$

$\dfrac{-4(x-2)^{1/2}}{-4} = \dfrac{16}{-4}$

$(x-2)^{1/2} = -4$ * see hint above

$\left((x-2)^{1/2}\right)^2 = (-4)^2$

$x-2 = 16$

$x = 18$

doesn't check

$-4(18-2)^{1/2}+2 = 18$

$-4(16)^{1/2}$

$-4(4)+2$

$-16+2$

$-14 \neq 18$

$\boxed{\text{NO SOLUTION}}$

17. $\left(\sqrt[3]{4x-1}\right) = (3)^3$

$4x-1 = 27$

$4x = 28$

$\boxed{x=7}$

$\sqrt[3]{4(7)-1} = 3$

$\sqrt[3]{27}$

$3 = 3$ ✓

18. $-2(5x+1)^{1/3} = 8$

$\left((5x+1)^{1/3}\right)^3 = (-4)^3$

$5x+1 = -64$

$5x = -65$

$\boxed{x=-13}$

$-2(5(-13)+1)^{1/3} = 8$

$-2(-64)^{1/3}$

$(-2)(-4)$

$8 = 8$ ✓

Name ______________________ Period ________

7.3B Solving Radical Equations and Equations with Rational Exponents

#13 – 24 (continued): Solve each equation. Check for extraneous solutions.

19. $\left((-3x+2)^{1/3}\right)^3 = \left((-4x-6)^{1/3}\right)^3$

$-3x+2 = -4x-6$

$x+2 = -6$

$\boxed{x=-8}$

Ck: $(-3(-8)+2)^{1/3} = (-4(-8)-6)^{1/3}$

$26^{1/3} = 26^{1/3}$ ✓

20. $\left(\sqrt{x+2}\right)^2 = \left(\sqrt{4-x}\right)^2$

$x+2 = 4-x$

$2x = 2$

$\boxed{x=1}$

$\sqrt{1+2} = \sqrt{4-1}$

$\sqrt{3} = \sqrt{3}$ ✓

21. $(r-2)^2 = \left(\sqrt{5r-4}\right)^2$

$r^2-4r+4 = 5r-4$

$-5r+4 \quad -5r+4$

$r^2-9r+8 = 0$

$(r-8)(r-1) = 0$

$r=8$ or $r=1$

$\boxed{\text{only } r=8}$

$(8)-2 = \sqrt{5(8)-4}$

$6 = \sqrt{36}$

$6 = 6$ ✓

$1-2 = \sqrt{5(1)-4}$

$-1 \quad \sqrt{1}$

$-1 \neq 1$ Does not check

22. $\left(3\sqrt{x+6}\right)^2 = \left(\sqrt{x-2}\right)^2$

$9(x+6) = x-2$

$9x+54 = x-2$

$8x = -56$

$x = -7$

$3\sqrt{-7+6} \quad \sqrt{-7-2}$

$3\sqrt{-1} \quad \sqrt{-9}$

not real

$\boxed{\text{NO SOLUTION}}$

23. $x = \dfrac{\sqrt{10x+3}}{5}$

$(5x)^2 = \left(\sqrt{10x+3}\right)^2$

$25x^2 = 10x+3$

$25x^2-10x-3 = 0$

$(5x-3)(5x+1) = 0$

$\boxed{x=\frac{3}{5}}$ or $x = -\frac{1}{5}$ (extraneous)

$\frac{3}{5} = \dfrac{\sqrt{10(\frac{3}{5})+3}}{5} = \dfrac{\sqrt{6+3}}{5}$

$\frac{3}{5} = \frac{3}{5}$ ✓ $\quad\|\quad -\frac{1}{5} = \dfrac{\sqrt{10(-\frac{1}{5})+3}}{5}$

$-\frac{1}{5} \neq \frac{1}{5}$

24. $61 = -3 + x^{6/5}$

$(64)^{5/6} = \left(x^{6/5}\right)^{5/6}$

$\sqrt[6]{64^5} = x$

$2^5 = x$

$\boxed{32 = x}$

$61 = -3 + (32)^{6/5}$

$\sqrt[5]{32}^{\,6}$

$= -3 + 2^6$

$= -3 + 64$

$61 = 61$ ✓

#25 – 27: Solve each equation graphically or algebraically.

25. $\sqrt{2d+5} = \sqrt{(d-1)^2}$

$\left(\sqrt{2d+5}\right)^2 = \left(\sqrt{(d-1)^2}\right)^2$

$2d+5 = (d-1)^2$

$2d+5 = d^2-2d+1$

$0 = d^2-4d-4$

$d = \dfrac{4 \pm \sqrt{(-4)^2-4(1)(-4)}}{2(1)}$

$= \dfrac{4\pm\sqrt{32}}{2} = \dfrac{4\pm 4\sqrt{2}}{2} = 2 \pm 2\sqrt{2}$

26. $\left(\sqrt[3]{b-4}\right)^3 = \left(2\sqrt[3]{b-18}\right)^3$

$b-4 = 8(b-18)$

$b-4 = 8b-144$

$\dfrac{140}{7} = \dfrac{7b}{7}$

$\boxed{20 = b}$

27. $\sqrt{\sqrt{x+4}} = 5$

$\left((x+4)^{1/2}\right)^{1/2}$

$(x+4)^{1/4} = 5$

$\left((x+4)^{1/4}\right)^4 = (5)^4$

$x+4 = 625$

$\boxed{x = 621}$

#28 – 33: Which method (graphically or algebraically) would be most efficient in solving this problem? Why? DO NOT SOLVE

28. $\sqrt[4]{d^4+2d^2-2} = -d$

algebraically; raising to 4th power the d^4 on each side cancel.

29. $125 = (6-r)^{3/2}$

algebraically; $125^{2/3} = 25$ a nice integer!

30. $\sqrt{6b+1} - 3\sqrt{b} = -1$

graphically; squaring a binomial with radicals is messier.

31. $1 = \sqrt{\dfrac{b}{6}}$

algebraically; easy to do 1^2

32. $-3p^{2/3} - 9 = -36$

Algebraically; Dividing both sides by -3 yields $p^{2/3}+3 = 12$; a very easy to finish.

33. $\sqrt{6n-14} = n-1$

algebraically; squaring a binomial is easy now

34. Write a radical equation that has no solution.

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

Name ______________________________ Period __________

7.3B Solving Radical Equations and Equations with Rational Exponents

35. A function for the speed (in meters per second) at which a long jumper was running is given by $s = 11\sqrt{h}$, where h is the maximum height that the jumper reaches. What was the long jumper's maximum height if he was running at a speed of 8.5 meters per second? Round your answer to the nearest tenth of a meter.

$\frac{8.5}{11} = \frac{11\sqrt{h}}{11}$

$(.7727)^2 = (\sqrt{h})^2$

$\boxed{h \approx .6m}$

36. When firefighters are trying to put out a fire, the rate at which they can spray water on the fire depends on the nozzle pressure. You can find the flow rate f in gallons per minute (gal/min) using the function $f = \sqrt{p}$, where p is the nozzle pressure in pounds per square inch lb/in^2.

a) What is the flow rate when the pressure is 900 lbs/in^2?

$f = \sqrt{900}$

$\boxed{\text{flow rate is } 30 \text{ gal/min}}$

b) What is the pressure when the flow rate is 800 gal/min?

$(800)^2 = (\sqrt{p})^2$

$p = \boxed{\text{pressure is } 640{,}000 \text{ lb/in}^2}$

37. The time t in hours needed to cook a pot roast that weighs p pounds can be approximated by using the equation $t = 0.89p^{0.6}$. To the nearest hundredth of an hour, how long would it take to cook a pot roast that weighs 13 pounds?

$t = 0.89(13)^{0.6}$

$t = \boxed{\text{time is } 4.15 \text{ hours}}$

38. The function $f(x) = 27x^{1/3}$ models the number of plant species, $f(x)$, on an island in terms of the area, x, in square miles. What is the area of an island that has 105 species of plants?

$\frac{105}{27} = \frac{27x^{1/3}}{27}$

$(3.8)^3 = (x^{1/3})^3$

$\boxed{x = 58.8 \text{ sq. miles}}$

Section 7.3B

Name ______________________________ Period _________

7.3B Solving Radical Equations and Equations with Rational Exponents

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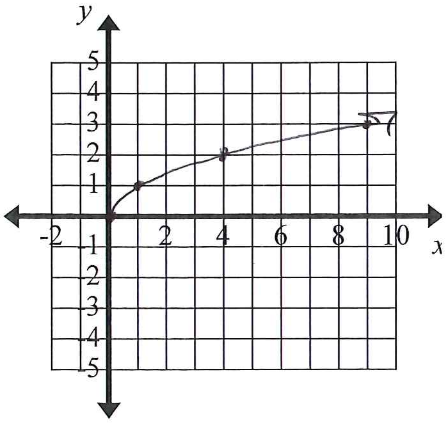
Name ______________________________ Period __________

Unit 7 *Review Materials*

1. Sketch a graph and state the domain and range of the following functions .

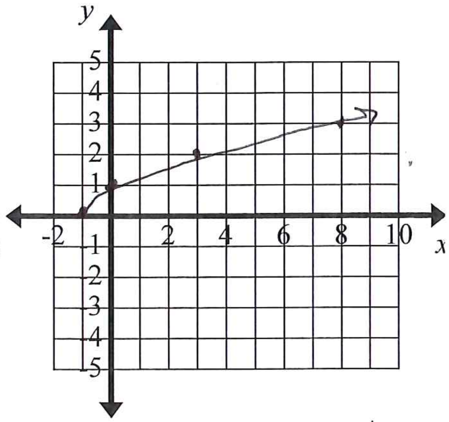
a) $y=\sqrt{x}$



Domain: $x \geq 0$

Range: $y \geq 0$

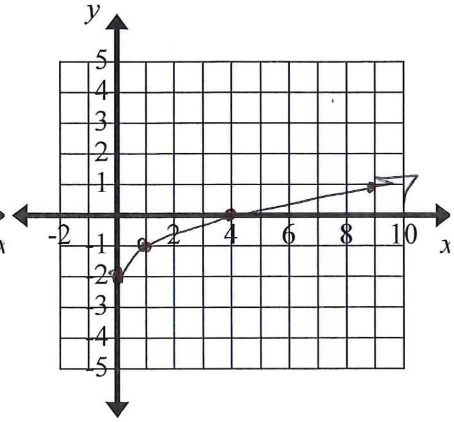
b) $y=\sqrt{x+1}$



Domain: $x \geq -1$

Range: $y \geq 0$

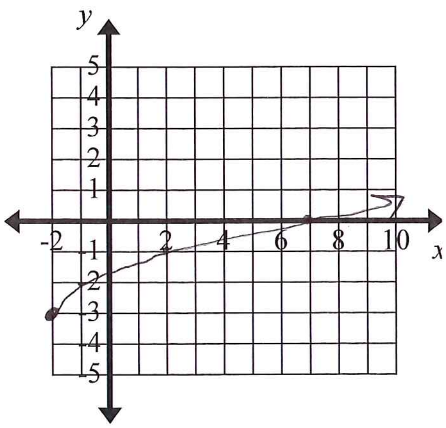
c) $y=\sqrt{x}-2$



Domain: $x \geq 0$

Range: $y \geq -2$

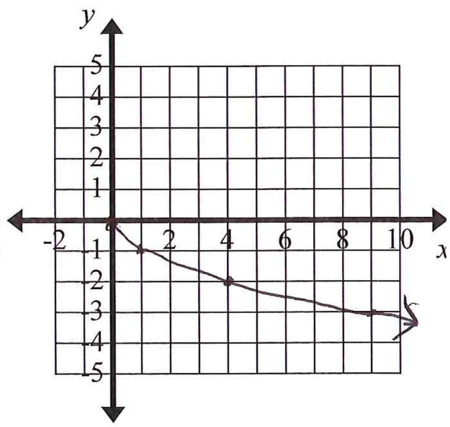
d) $y=\sqrt{x+2}-3$



Domain: $x \geq -2$

Range: $y \geq -3$

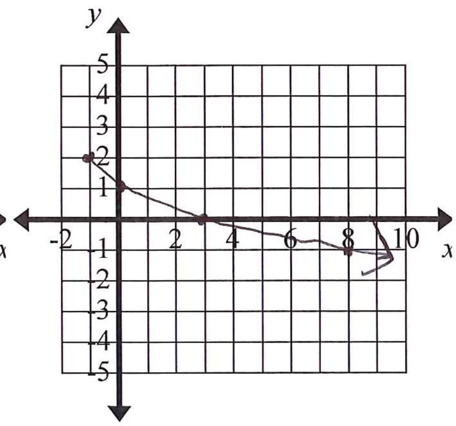
e) $y=-\sqrt{x}$



Domain: $x \geq 0$

Range: $y \leq 0$

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



Domain: $x \geq -1$

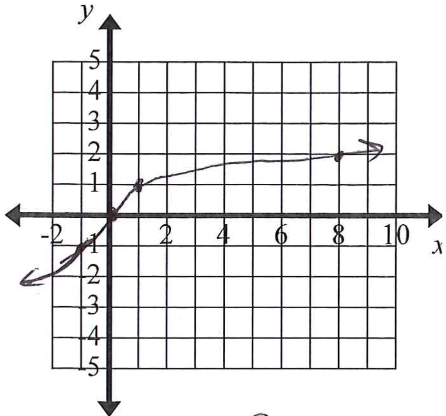
Range: $y \leq 2$

2. Write a **square root** function that has the following domain and range. Domain: $x \geq -2$ and Range: $y \geq 6$.

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

3. Sketch a graph and state the domain and range of the following functions .

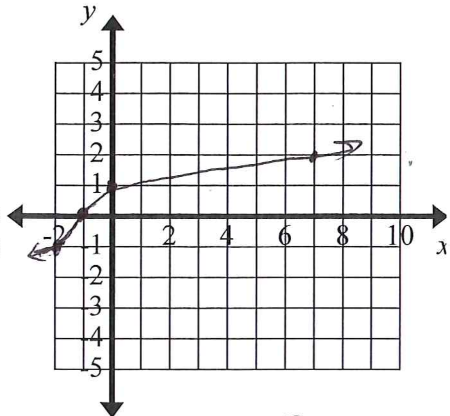
a) $y = \sqrt[3]{x}$



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

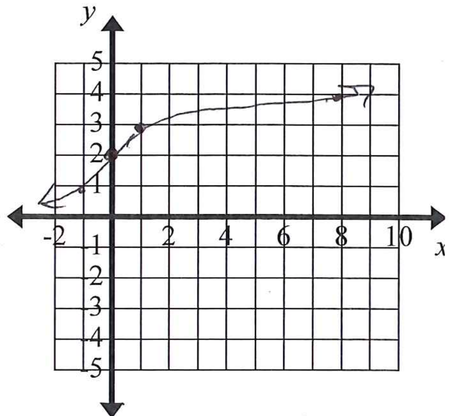
b) $y = \sqrt[3]{x+1}$



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

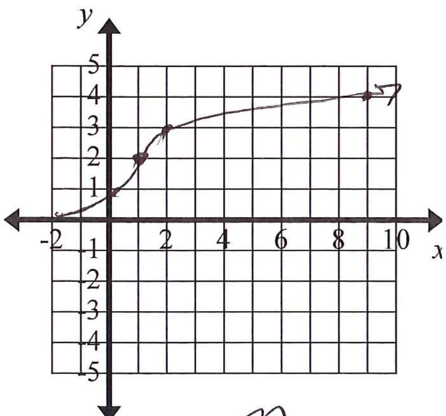
c) $y = \sqrt[3]{x} + 2$



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

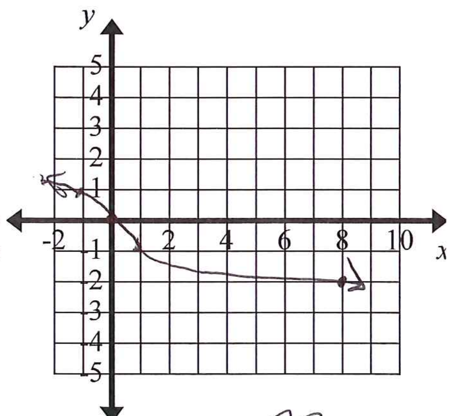
d) $y = \sqrt[3]{x-1} + 2$



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

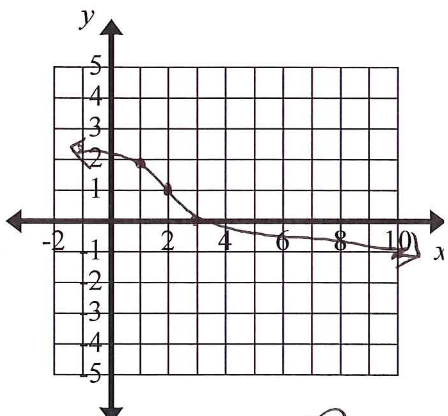
e) $y = -\sqrt[3]{x}$



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

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



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

Name ________________ Period __________

Unit 7 *Review Materials*

#4 – 11: Simplify each expression. Your answer should contain only positive exponents.

Negative Exponent $x^{-9} = \frac{1}{x^9}$	**4)** 7^{-2} $\frac{1}{7^2}$ $\frac{1}{49}$	**5)** $(5x)^{-3}$ $\frac{1}{(5x)^3}$ $\frac{1}{125x^3}$	**6)** $10x^3 \cdot 5x^{-8}$ $50 \cdot x^{-5}$ $\frac{50}{x^5}$
~~Negative~~ Exponent Rational $x^{2/9} = \sqrt[9]{x^2}$ $= \left(\sqrt[9]{x}\right)^2$	**7)** $49^{3/2}$ $\left(\sqrt{49}\right)^3$ 7^3 343	**8)** $(-25)^{1/2}$ $\sqrt{-25}$ $\sqrt{-1 \cdot 25}$ $5i$	**9)** $\left(x^4\right)^{5/6}$ $x^{4\left(\frac{5}{6}\right)}$ $x^{10/3} = \sqrt[3]{x^{10}} =$ $\sqrt[3]{x^9 \cdot x}$ $x\sqrt[3]{x}$

10. $\dfrac{\left(4m^2n^3\right) \cdot m^{-6}n^3}{5m^2n}$

$\dfrac{4m^{-4}n^6}{5m^2n}$

$\boxed{\dfrac{4n^5}{5m^6}}$

11. $\left(\dfrac{\left(2x^4y^3z^5\right)\left(3x^{-3}y^{-3}z^2\right)}{2x^{-4}y^0z^{-2}}\right)^3$

$\dfrac{(6xy^0z^7)^3}{(2x^{-4}z^{-2})^3} = \dfrac{6^3x^3(1)^3z^{21}}{2^3x^{-12}z^{-6}} =$

$\dfrac{216x^3z^{21}}{8x^{-12}z^{-6}} = 27x^{3-(-12)}z^{21-(-6)}$

$= \boxed{27x^{15}z^{27}}$

12. Rewrite with a radical, and evaluate: $9^{-3/2}$ $\boxed{\frac{1}{27}}$

$\frac{1}{9^{3/2}}$

$\frac{1}{(\sqrt{9})^3} = \frac{1}{3^3}$

13. Convert to rational exponent form, and simplify: $\sqrt{36x^8}$ $= \boxed{6x^4}$

$(36x^8)^{1/2}$

$36^{1/2}x^{8(\frac{1}{2})}$

$6x^4$

Name ______________________ Period ________

Unit 7 *Review Materials*

14. Convert to rational exponent form, and simplify. $\sqrt[6]{x^6y^{-12}z^8}$ $\frac{xz^{1/3}}{y^2}$

$(x^6y^{-12}z^8)^{1/6} = xy^{-2}z^{4/3}$

$= \frac{x(z^{3/3} \cdot z^{1/3})}{y^2}$

15. Simplify. $\left(\sqrt{16x^5}\right)^2$ $16x^5$

$\left(\sqrt[\cancel{2}]{16x^5}\right)^{\cancel{2}}$

16. Simplify. $\left(\frac{16}{81x^4}\right)^{3/4}$ $\frac{8}{27x^3}$

$\frac{16^{3/4}}{81^{3/4} \cdot x^{4 \cdot \frac{3}{4}}}$ $\frac{\left(\boxed{\sqrt[4]{16}}\right)^3}{\left(\sqrt[4]{81}\right)^3 x^3}$

$\frac{2^3}{3^3x^3} = \frac{8}{27x^3}$

17. Simplify. $\left(a^{2/3}a^{2/3}\right)^{3/4}$ a

$\left(a^{4/3}\right)^{3/4}$

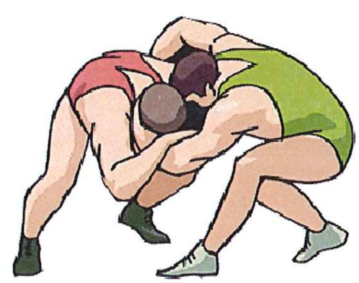
a^1

18. Convert to radical form, and evaluate. $(-125)^{-1/3}$ $\frac{1}{\sqrt[3]{-125}}$ = $\frac{-1}{5}$

$\frac{1}{(-125)^{1/3}}$

$\frac{1}{\sqrt[3]{-125}}$

19. For high school wrestling, the wrestling mat has a square area of $1444c^8d^4$ square feet. What is the length of one side of the wrestling mat?



$s = \sqrt{1444c^8d^4}$

$s = \boxed{38c^4d^2 \text{ feet}}$

20. The population in New Town, MN is represented by the expression $3.32x^{5/3}$ where x is the number of homes in New Town. What is the population of 500 homes?

$P = 3.32(500)^{5/3}$

$P \approx 104,573$ people

Name ______________________________ Period __________

Unit 7 *Review Materials*

#21 – 24: Solve each equation algebraically. Confirm your solution(s) graphically. Check for extraneous solutions.

21. $\left(\sqrt{3x-4}\right)^2 = (2)^2$

$3x - 4 = 4$

$3x = 8$

$\boxed{x = \frac{8}{3}}$ ✓

22. $\left(\sqrt{x+2}\right)^2 = (x+2)^2$

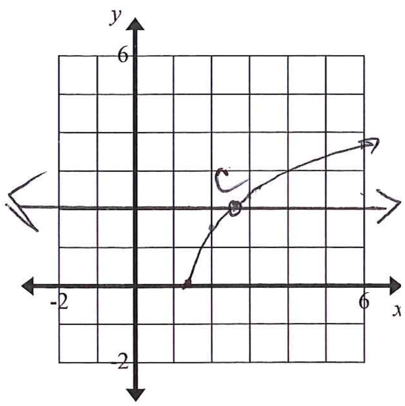
$x + 2 = x^2 + 4x + 4$

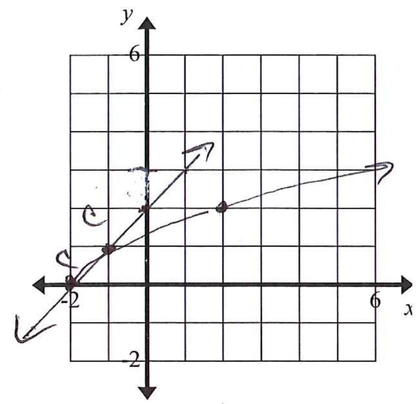
$-x - 2 \qquad -x - 2$

$0 = x^2 + 3x + 2$

$0 = (x+1)(x+2)$

$\boxed{x = -1 \text{ or } x = -2}$





23. $\left(\sqrt[3]{4x-1}\right)^3 = (3)^3$

$4x - 1 = 27$

$4x = 28$

$\boxed{x = 7}$

24. $\left((4x+5)^3\right)^{1/3} = \left(x^6\right)^{1/3}$

$4x + 5 = x^2$

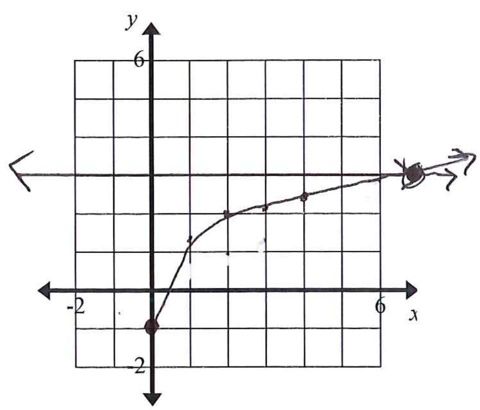
$0 = x^2 - 4x - 5$

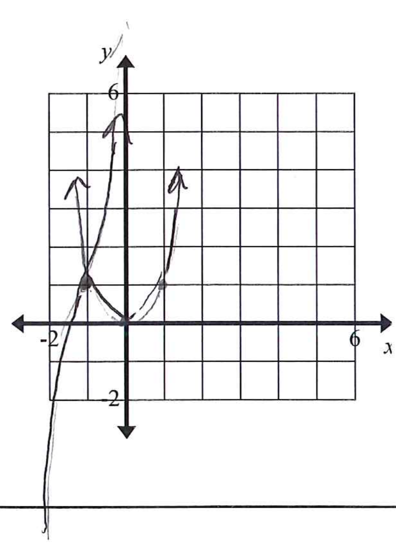
$(x+1)(x-5)$

$x = -1$ or $x = 5$

visible

Table confirms
Intersection also
at $(5, 15{,}625)$





Unit 7 Review

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