Alg. 2 Unit 10
Day 1 Worksheet – Function Operations

Name:_____
Date:_____Period:_____

Perform the function operations using the functions below.

$f(x)=x^2-4$ $g(x)=3x^2$ $h(x)=3x-1$ $k(x)=x^2+3x-10$

1) $f(x)+k(x)$

$2x^2+3x-14$

2) $h(x)-k(x)$

$-x^2+9$

3) $\dfrac{k(x)}{f(x)}$

$\dfrac{x+5}{x+2}$

$f(x)=x^2-4$ $g(x)=3x^2$ $h(x)=3x-1$ $k(x)=x^2+3x-10$

4) $\dfrac{f(x)}{k(x)}$

$\dfrac{x+2}{x+5}$

5) $f(x)\bullet h(x)$

$3x^3-x^2-12x+4$

6) $g(x)-f(x)$

$2x^2+4$

$f(x)=x^2-4$ $g(x)=3x^2$ $h(x)=3x-1$ $k(x)=x^2+3x-10$

7) $f(x)\bullet k(x)$

$x^4+3x^3-14x^2-12x+40$

8) $\dfrac{k(x)}{g(x)}$

$\dfrac{x^2+3x-10}{3x^2}$

9) $g(x)\bullet k(x)$

$3x^4+9x^3-30x^2$

State the domain for problems 7 – 9.

10) Domain #7 $\mathbb{R}$

11) Domain #8 $\mathbb{R}$ *except* $x\neq 0$

12) Domain #9 $\mathbb{R}$

Perform the function operations for the functions below.

$a(x) = -2x$ $\qquad$ $b(x) = \frac{3x^2}{2}$ $\qquad$ $c(x) = x^2 + x - 2$

13) $\frac{a(x)}{c(x)}$ $\qquad$ $\frac{-2x}{x^2 + x - 2}$

14) $a(x) \bullet b(x)$ $\qquad$ $-3x^3$

15) $a(x) - c(x)$ $\qquad$ $-x^2 - 3x + 2$

State the domain for problems 13 – 15.

16) Domain #13 $\mathbb{R}$ *except* $x \neq -2, x \neq 1$

17) Domain #14 $\mathbb{R}$

18) Domain #15 $\mathbb{R}$

Alg. 2 Unit 10 Name:_____

Day 2 Worksheet – Composition of Functions Date:_____Period:_____

Perform the function compositions below using the following functions.

$b(x)=\sqrt{3x}$ $c(x)=2x^2-3$ $d(x)=-x^2$ $j(x)=-2x^{\frac{1}{2}}$

1) $c(b(x))$

$6x-3$

2) $c\circ c$

$8x^4-24x^2+15$

3) $c(j(x))$

$8x-3$

$b(x)=\sqrt{3x}$ $c(x)=2x^2-3$ $d(x)=-x^2$ $j(x)=-2x^{\frac{1}{2}}$

4) $d(b(x))$

$-3x$

5) $d\circ j$

$-4x$

6) $c(d(x))$

$2x^4-3$

State the domain for problems 4 – 6.

7) Domain #4 $x\geq 0$

8) Domain #5 $x\geq 0$

9) Domain #6 $\mathbb{R}$

$b(x)=\sqrt{3x}$ $c(x)=2x^2-3$ $d(x)=-x^2$ $j(x)=-2x^{\frac{1}{2}}$

Evaluate the following composite functions for the given value.

10) $d(c(3))$

-225

11) $(j\circ b)(27)$

-6

12) $c(j(6))$

45

Perform the function compositions below using the following functions.

$g(x) = 8x^{\frac{1}{2}}$ $\quad$ $h(x) = x^2 - 9$ $\quad$ $k(x) = 3 - 2x$

13) $k\left(k\left(x\right)\right)$

$4x - 3$

14) $h\left(g\left(x\right)\right)$

$64x - 9$

15) $h \circ k$

$4x^2 - 12x$

$g(x) = 8x^{\frac{1}{2}}$ $\quad$ $h(x) = x^2 - 9$ $\quad$ $k(x) = 3 - 2x$

Evaluate the following composite functions for the given value.

16) $h\left(g\left(9\right)\right)$

567

17) $\left(g \circ h\right)\left(5\right)$

32

18) $\left(g \circ k\right)\left(-12\right)$

$24\sqrt[3]{3}$

Alg. 2 Unit 10
Day 3 Worksheet – Inverse Functions

Name:_____
Date:_____Period:_____

Graph the following functions on your calculator and determine if they are functions or not.

1. $y=(x-2)^{\frac{1}{2}}+4$

Function

2. $f(x)=\pm|x+2|$

Function

3. $y=3\cos(x)$

Function

Find the inverse of the following functions.

4. $y=-2x-6$

$f^{-1}(x)=\dfrac{-x-6}{2}$

5. $f(x)=\dfrac{x}{3}+1$

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

6. $y=3(x-2)$

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

7. $y=\dfrac{1}{4}x+7$

$f^{-1}(x)=4x-28$

8. $g(x)=\dfrac{x-3}{4}-5$

$g^{-1}(x)=4x+23$

9. $d(t)=-2(t+4)-3$

$d^{-1}(t)=\dfrac{-x-3}{2}-4$

10. $y = x^2 - 9$

$f^{-1}(t) = \pm\sqrt{x+9}$

11. $f(x) = 2x^3 + 6$

$f^{-1}(t) = \sqrt[3]{\frac{x-6}{2}}$

12. $g(x) = 2x^2$; when $x \geq 0$

$g^{-1}(t) = \sqrt{\frac{x}{2}}$

13. $f(x) = \frac{x^4}{4} - 3$

$f^{-1}(t) = \pm\sqrt[4]{4x+12}$

14. $y = \sqrt{x-2}$

$f^{-1}(t) = x^2 + 2$

15. $h(t) = 30 - 3t^2$; when $x < 0$

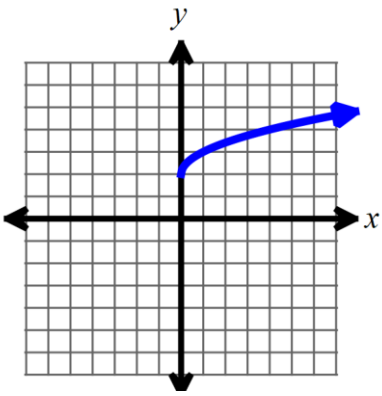
$h^{-1}(t) = \sqrt{\frac{-t+30}{3}}$

Alg. 2 Unit 10 Name:_____

Day 4 Worksheet – Graph Square Root Functions Date:_____Period:_____

<u>Graph the following radical functions using a table, and then state the domain and range.</u>

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



Domain:

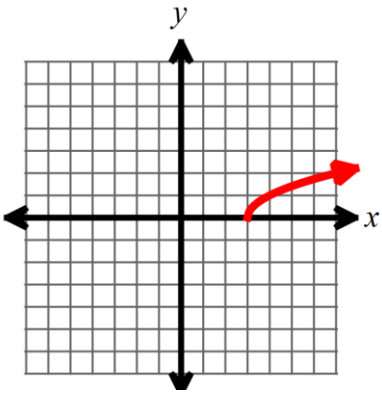
$x \geq 0$

Range:

$y \geq 2$

x	0	1	2	3
y	0	1	4	9
a	None			

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



Domain:

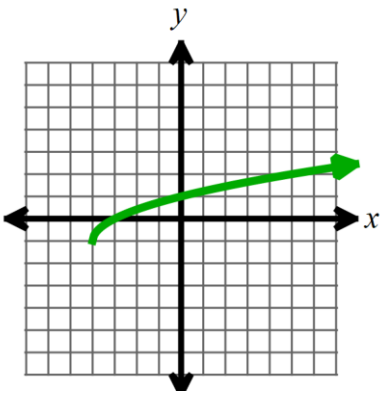
$x \geq 3$

Range:

$y \geq 0$

x	0	1	2	3
y	0	1	4	9
a	None			

3. $g(x)=(x+4)^{\frac{1}{2}}-1$



Domain:

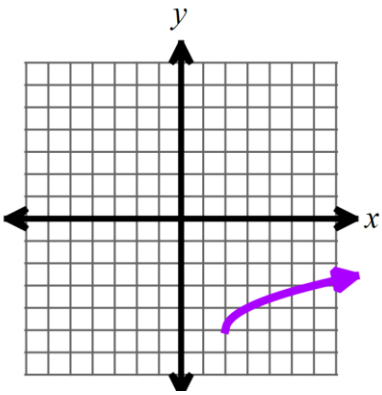
$x \geq -4$

Range:

$y \geq -1$

x	0	1	2	3
y	0	1	4	9
a	None			

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



Domain:

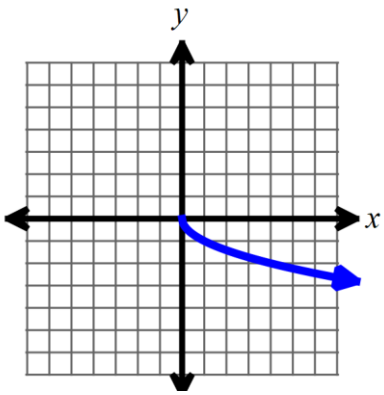
$x \geq 2$

Range:

$y \geq -5$

x	0	1	2	3
y	0	1	4	9
a	None			

5. $f(x) = -\sqrt{x}$



Domain:

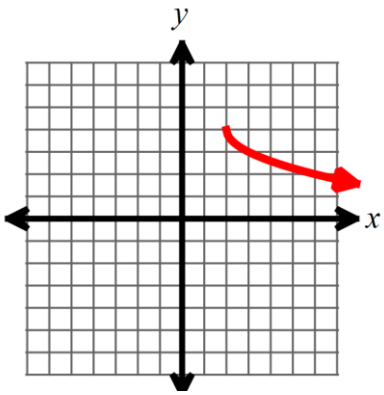
$x \geq 0$

Range:

$y \leq 0$

x	0	1	2	3
y	~~0~~	~~1~~	~~4~~	~~9~~
a	0	-1	-4	-9

6. $y = -(x-2)^{\frac{1}{2}} + 4$



Domain:

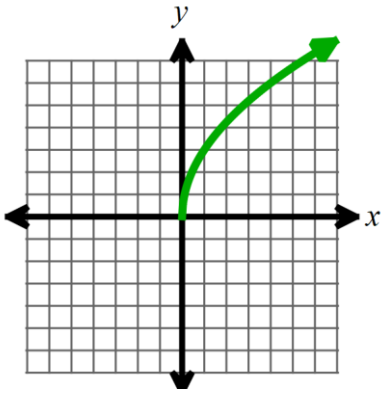
$x \geq 2$

Range:

$y \leq 4$

x	0	1	2	3
y	~~0~~	~~1~~	~~4~~	~~9~~
a	0	-1	-4	-9

7. $h(x) = 3x^{\frac{1}{2}}$



Domain:

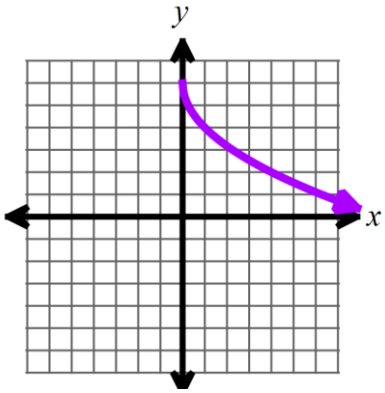
$x \geq 0$

Range:

$y \geq 0$

x	0	1	2	3
y	~~0~~	~~1~~	~~4~~	~~9~~
a	0	3	12	27

8. $y = -2x^{\frac{1}{2}} + 6$



Domain:

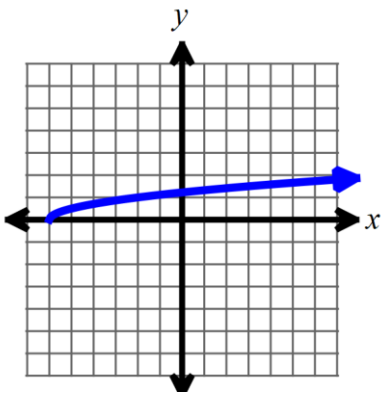
$x \geq 0$

Range:

$y \leq -6$

x	0	1	2	3
y	~~0~~	~~1~~	~~4~~	~~9~~
a	0	-2	-8	-18

9. $y=\frac{1}{2}\sqrt{x+6}$



Domain:

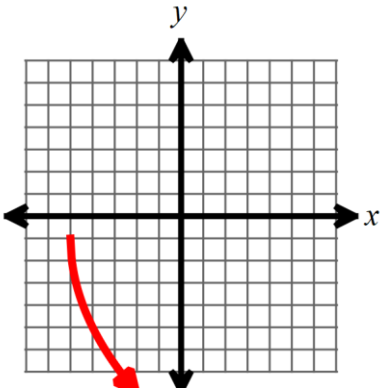
$x \geq -6$

Range:

$y \geq 0$

x	0	1	2	3
y	0	1	4	9
a	0	.5	2	4.5

10. $f(x)=-4\sqrt{x+5}-1$



Domain:

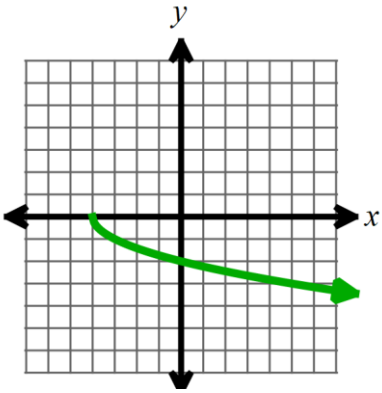
$x \geq -5$

Range:

$y \leq -1$

x	0	1	2	3
y	0	1	4	9
a	0	-4	-16	-36

11. $y=-(x+4)^{0.5}$



Domain:

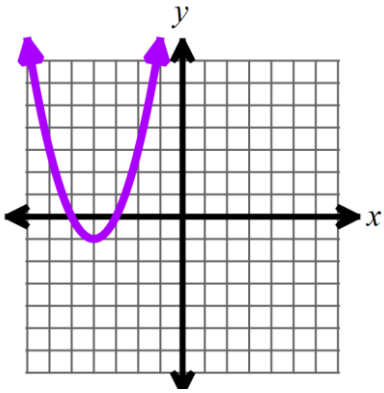
$x \geq -4$

Range:

$y \geq 0$

x	0	1	2	3
y	0	1	4	9
a	0	-1	-4	-9

12. $g(x)=(x+4)^2-1$



Domain:

$\mathbb{R}$

Range:

$y \geq -1$

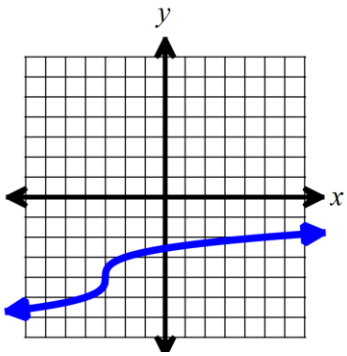
x	0	1	2	3
y	0	1	4	9
a	None			

Alg. 2 Unit 10 Name:_____

Day 5 Worksheet – Graph Cube Root Functions Date:_____Period:_____

<u>Graph the following radical functions using a table, and then state the domain and range.</u>

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



Domain:

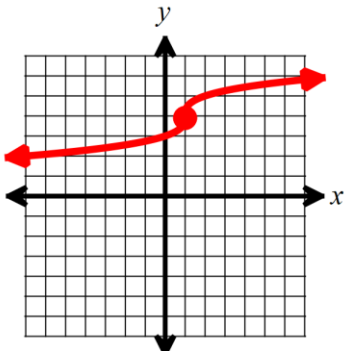
ARN

Range:

ARN

x				
y				
a				

2. $f(x)=(x-1)^{\frac{1}{3}}+4$



Domain:

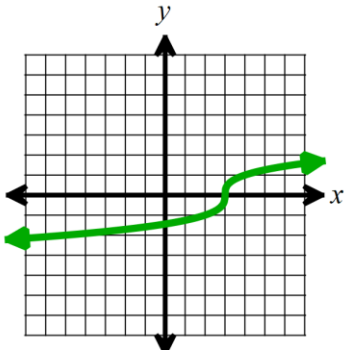
ARN

Range:

ARN

x				
y				
a				

3. $f(x)=(x-3)^{\frac{1}{3}}$



Domain:

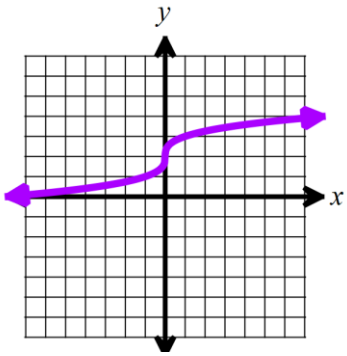
ARN

Range:

ARN

x				
y				
a				

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



Domain:

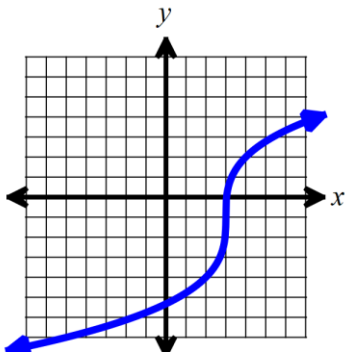
ARN

Range:

ARN

x				
y				
a				

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



Domain:

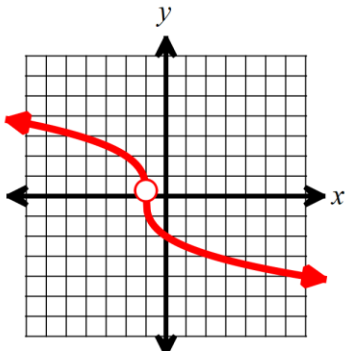
$(-\infty,\infty)$

Range:

$(-\infty,\infty)$

x				
y				
a				

6. $f(x)=-2(x+1)^{\frac{1}{3}}$



Domain:

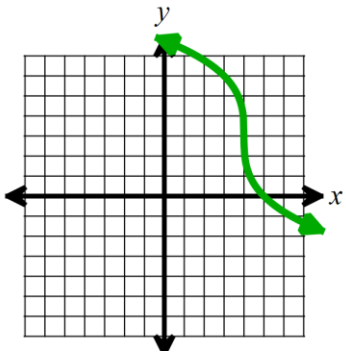
$(-\infty,\infty)$

Range:

$(-\infty,\infty)$

x				
y				
a				

7. $y=-\sqrt[3]{x-4}-1$

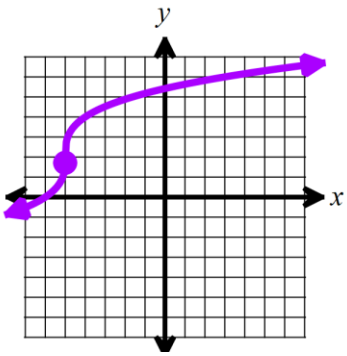


Domain: $(-\infty,\infty)$

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

x				
y				
a				

8. $f(x)=2(x+5)^{\frac{1}{3}}+2$

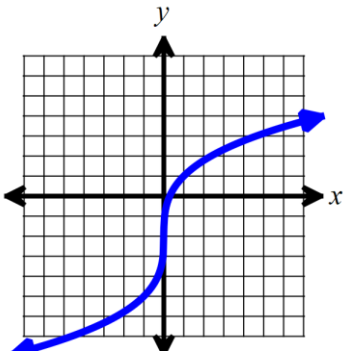


Domain: $(-\infty,\infty)$

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

x				
y				
a				

9. $f(x)=3x^{\frac{1}{3}}-2$

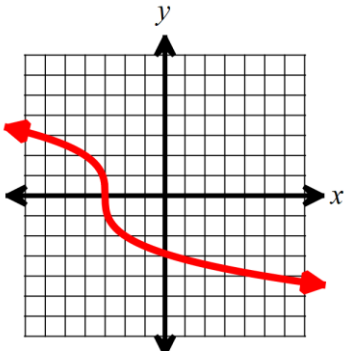


Domain: $(-\infty,\infty)$

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

x				
y				
a				

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

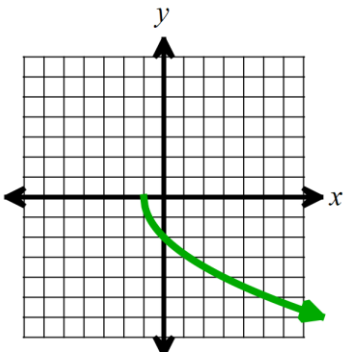


Domain: $(-\infty,\infty)$

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

x				
y				
a				

11. $f(x)=-2(x+1)^{\frac{1}{2}}$

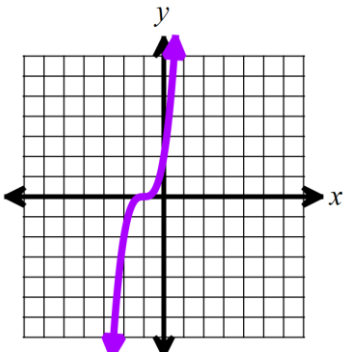


Domain: $x\geq -1$

Range: $y\leq 0$

x				
y				
a				

12. $f(x)=-2(x+1)^{3}$



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

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

x				
y				
a				

Algebra 2 Name:_____

Unit 10 Review of Days 1 – 6

<u>Perform the function operations using the functions below.</u>

$f(x)=2x^2$ $g(x)=x^2-9$ $h(x)=5x+10$ $k(x)=x^3-16x$

1) $h(x)-k(x)$

$-x^3+21x+10$

2) $\dfrac{f(x)}{k(x)}$

$\dfrac{2x}{x^2-16}$ *or* $\dfrac{2x}{(x-4)(x+4)}$

3) $f(g(x))$

$2x^4-36x^2+162$

4) $g(g(-3))$

-9

<u>State the domain for problems 7 – 9.</u>

5) Domain #2_____

ARN except

$x\neq 4, x\neq -4$

Find the inverse of the following functions.

6) $g(x)=\dfrac{x+2}{3}-4$

$g^{-1}(x)=3x+10$

7) $y=x^2-36$

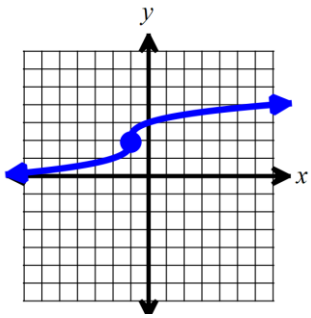
$y=\pm\sqrt{x+36}$

8) $g(x)=3(x-2)^2$; when $x\geq 0$

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

Graph the function and state the domain and range.

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



Domain:

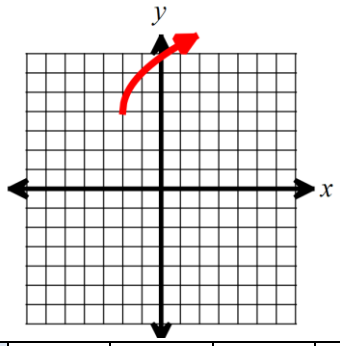
$(-\infty,\infty)$

Range:

$(-\infty,\infty)$

x				
y				
a				

10. $y=2(x+3)^{\frac{1}{2}}+4$

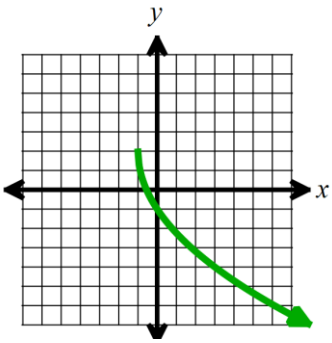


Domain: $x\geq 2$

Range: $y\geq 4$

x				
y				
a				

11. $f(x) = -3\sqrt{x+1} + 2$



Domain: $x \le -1$

Range: $y \le 2$

x					
y					

12. If the graph of $y = \frac{1}{3}\sqrt[3]{x}$ is shifted up 3 units, what is the equation of the translated graph?

a. $y = \frac{1}{3}\sqrt[3]{x-3}$

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

c. $y = \frac{1}{3}\sqrt[3]{x+3}$

d. $y = \frac{1}{3}\sqrt[3]{x} - 3$

<u>State the domain and range of the following functions without graphing.</u>

13. $f(x) = \sqrt{x+25} - 16$

Domain: $x \ge -25$
Range: $y \ge -16$

14. $f(x) = \frac{1}{3}\sqrt[3]{x+16} - 4$

Domain: *ARN*
Range: *ARN*

15. $f(x) = -5(x+12)^{\frac{1}{2}} + 100$

Domain: $x \ge -12$
Range: $y \le 100$

16. In order to compete in the America's Cup sailboat race, a boat must satisfy the rule $b + 1.25\sqrt{s} - 9.8\sqrt[3]{d} = 16$, where *b* is the length (in meters) of the boat, *s* is the area (in square meters) of the sails, and *d* is the volume (in cubic meters) of water displaced by the boat. If Mr. Foster has a boat that is 20 meters long, and displaces 27 cubic feet of water, what area must his sails have?

$s = 412.9m^2$

Mixed Review:

Simplify the expressions and assume all variables are positive.

17. $\sqrt[5]{96\mathrm{m}^7\mathrm{n}^5\mathrm{p}^3}$

18. $9\sqrt{32}-7\sqrt{18}+2\sqrt{50}$

19. $\sqrt{\dfrac{36x^5}{121x^7}}$

$2mn\sqrt{3m^2p^3}$

$25\sqrt{2}$

$\dfrac{6}{11x}$

20. Solve: $3x^3-3x^2-60x=0$

$x=0,5,-4$

Alg. 2 Unit 10 **Name:**_____

Day 7 Worksheet – Solve Radical Functions **Date:**_____**Period:**_____

<u>Solve the following radical equations.</u>

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

2. $\sqrt[3]{x-9}=6$ $x=225$

3. $\sqrt{4x+1}+8=13$ $x=6$

4. $\sqrt[3]{5x-6}+1=3$ $x=\frac{14}{5}$

5. $2\sqrt[3]{4x}+8=4$ $x=-2$

6. $\frac{1}{2}\sqrt[3]{5x}+4=6$ $x=\frac{64}{5}$

7. $\sqrt{-x^2-14x}=7$ $x=-7$

8. $\sqrt{x^2+9x+14}=6$ $x=-11,2$

9. $\sqrt{-5x+24}=x$ $x=3$

10. $\sqrt[3]{9x}=x$ $x=-3,0,3$

11. $2\sqrt[4]{2x-8}+1=9$ $x=132$

12. $\sqrt[3]{x+7}=5$ $x=118$

13. $\sqrt{x+4}-\sqrt{2x+9}=0$ *No Solution*

14. $\sqrt{x^2}-\sqrt{3x-2}=0$ $x=1,2$

Alg. 2 Unit 10 Name:_____

Day 8 Worksheet – Solve More Radical Equations Date:_____Period:_____

<u>Solve the following radical equations.</u>

1. $\sqrt{x+25}+4=8$ $x=-9$

2. $2\sqrt[3]{x-3}=4$ $x=11$

3. $\sqrt{10x+9}=x+3$ $x=0,4$

4. $\sqrt{7x+15}=x+1$ $x=7$

5. $(x+3)^{5/2}=32$ $x=1$

6. $(x+2)^{3/4}-1=7$ $x=14$

7. $-\frac{2}{3}x^{1/5} = -2$ $x = 243$

8. $(x+2)^{1/3} + 3 = 7$ $x = 62$

9. $(4x+24)^{\frac{1}{2}} = x - 2$

$x = 10$

10. $\sqrt{2x+5} = \sqrt{x+7}$

$x = 2$

11. $\sqrt{x+6} - 2 = \sqrt{x-2}$ $x = 3$

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

Alg. 2 Unit 10 Name:_____

Day 9 Worksheet – Solve Radicals (Calculator) Date:_____Period:_____

Solve the radical equations algebraically.

1. $\sqrt{x-3}=7$

$x=52$

2. $\sqrt{x^2-10}=\sqrt{x+2}$

$x=4$

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

$x=6$

Solve the radical equations using a table.

4. $\sqrt{2x-5}=3$ $x=7$

5. $\sqrt{7x-5}-4=6$ $x=15$

6. $\sqrt{6x+6}=2\sqrt{x+4}$

$x=5$

Solve the radical equations using a graph.

7. $\sqrt{11x+3}=5$

$x=2$

8. $3\sqrt{x+4}=9.7$

$x=6.45$

9. $\sqrt[3]{x+2}=3\sqrt{x}-4$

$x=3.72$

10. On a clear day, the approximate distance, *d*, in feet that a sightseer standing at the top of a building, *h* feet tall can see is given by $d=6397.23\sqrt{h}$. On a clear day, a sightseer at the top of a building can see a distance of 191,916 feet. What is the height of the building that the sightseer is on top of?

$h=900\ ft$

Algebra 2 Unit 10 Review #1 **Name:_____**

Date:_____Period:_____

Perform the indicated operations using the functions $f(x)=2x+4$ and $g(x)=3x^2+2x-8$.

1. $g(x)-f(x)$

$3x^2-12$

2. $\frac{g(x)}{f(x)}$ and state the domain

$\frac{3x^2+2x-8}{2x+4}$ or $\frac{3x-4}{2}$

$\mathbb{R}$ *execpt* $x \neq -2$

Perform the indicated operations using the functions $f(x)=2x+4$ and $g(x)=3x^2+2x-8$.

3. $f(g(x))$

$6x^2+4x-12$

4. $(f \circ f)(x)$

$4x+12$

Evaluate the following functions $f(x)=2x+4$ and $g(x)=3x^2+2x-8$ for the values indicated below.

5. $g(g(-3))$

525

6. $(g \circ f)(-6)$

168

Write the equation for the inverse of each function.

7. $y=-3x+17$

$y=\frac{-x+17}{3}$

8. $y=x^6-7$

$y=\pm\sqrt[6]{x+7}$

9. $2x-y=6$

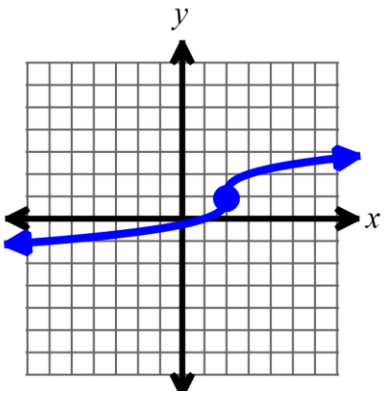
$y=\frac{x+6}{2}$

10. $y=-\frac{1}{4}x^3+3$

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

Graph the function and state the domain and range.

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

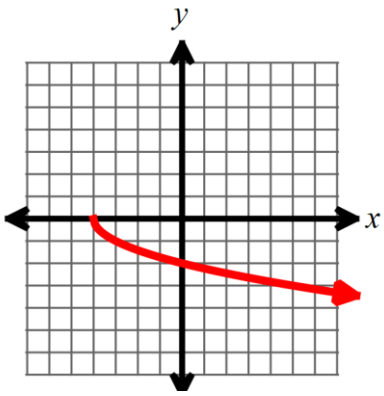


Domain: $\mathbb{R}$

Range: $\mathbb{R}$

x					
y					

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

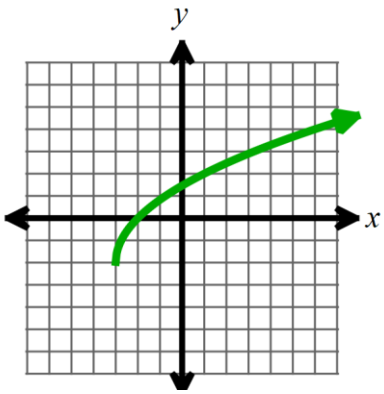


Domain: $x \geq -4$

Range: $y \leq 0$

x					
y					

13. $y=2(x+3)^{\frac{1}{2}}-2$

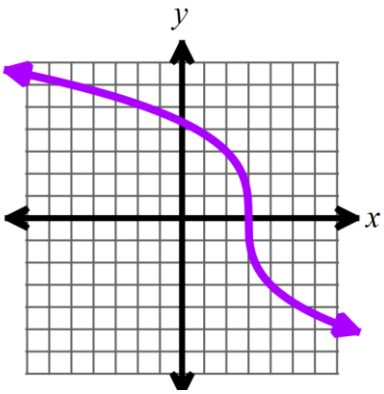


Domain: $x \geq -3$

Range: $y \geq -2$

x					
y					

14. $g(x)=-3(x-3)^{\frac{1}{3}}$



Domain: $\mathbb{R}$

Range: $\mathbb{R}$

x					
y					

State the domain and range of the following functions.

15. $y=-\sqrt{x+6.2}-\frac{15}{2}$

D: $x \geq 6.2$

R: $y \leq \frac{15}{2}$

16. $f(x)=(x-55)^{\frac{1}{3}}$

D: $\mathbb{R}$

R: $\mathbb{R}$

17. Which of the follow statements are true for the function $(x) = -\sqrt{x+5}$?
Select all that apply.

F. as $x \to +\infty,\ f(x) \to +\infty$

G. as $x \to +\infty,\ f(x) \to -\infty$

H. $f(x)$ is decreasing

I. $f(x)$ is increasing

J. $Domain$: $\{x|all\ real\ numbers\}$

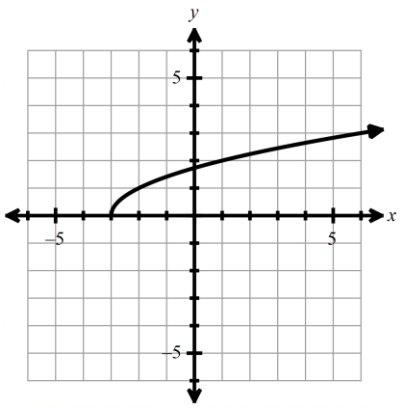
K. $Domain$: $\{x|x \geq -5\}$

L. $Range$: $\{y|all\ real\ numbers\}$

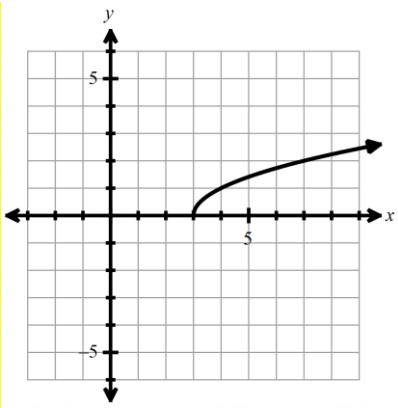
M. $Range$: $\{y|y \leq 0\}$

18. Which of the following represents the graph of $y = \sqrt{x-3}$

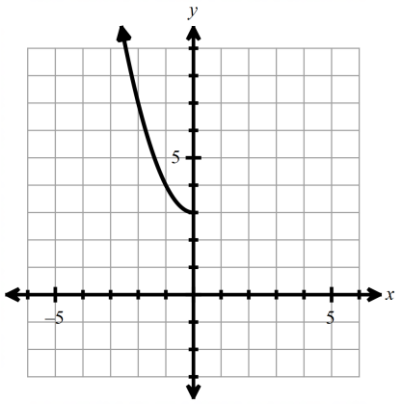
A.



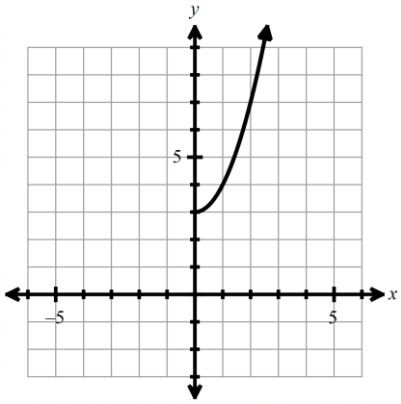
C.



B.



D.



19. Solve: $(x^2 - 4x + 516)^{2/3} = 64$

A. $x = -2, 2$

B. $x = -2$

C. $x = 2$

D. *no real solution*

20. The height (h, in centimeters) of a baby boy from birth to age 24 months can be modeled $h = 7.7\sqrt{t} + 50$, where t is the age of the baby (in months). How old is a baby that is 72 cm tall? Round your answer to the nearest tenth.

A. 1.4 *months*

B. 1.7 *months*

C. 7.3 *months*

D. 8.2 *months*

21. Find $f(x) - g(x)$ and $f(x) + g(x)$ for $\begin{cases} f(x) = 5x^2 + 6x - 4 \\ g(x) = 3x^2 - 5x + 24 \end{cases}$

A. $f(x) - g(x) = 2x^2 + 11x - 28$
$f(x) + g(x) = 8x^2 + x + 20$

B. $f(x) - g(x) = 2x^2 + 1x + 20$
$f(x) + g(x) = 8x^2 + x + 20$

C. $f(x) - g(x) = 2x^2 + 11x - 28$
$f(x) + g(x) = 8x^2 + 11x - 20$

D. $f(x) - g(x) = -2x^2 - 11x + 28$
$f(x) + g(x) = 8x^2 + x + 20$

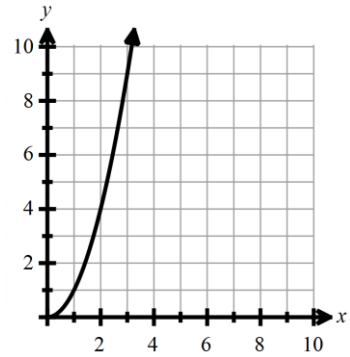
22. Which point lies on the graph of the inverse of the function shown below?

A. $(-1, -1)$

B. $(-2, 4)$

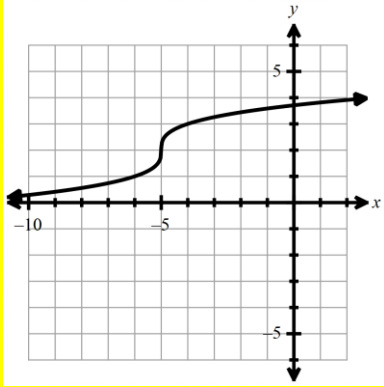
C. $(4, 12)$

D. $(9, 3)$

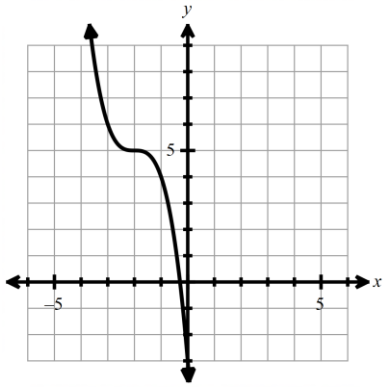


23. Translate the graph of $f(x) = \sqrt[3]{x}$ two units up and five units left. Which of the following is the graph after the translations?

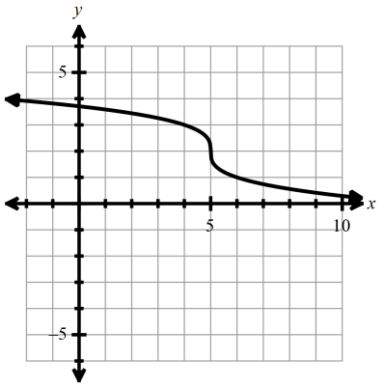
A.



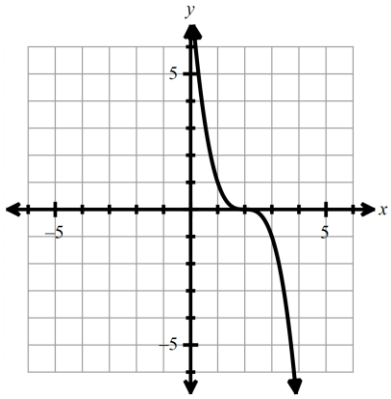
C.



B.



D.



24 Solve: $\sqrt{5x+9} - 10 = 12$

A. $x = 95$

B. $x = 47$

C. $x = -1$

D. *no real solution*

25. Find $g \circ h$ and $h \circ g$ for $g(x) = 5x$ and $h(x) = 3x + 8$

A. $g(h(x)) = 40 - 15x$
$h(g(x)) = 8 - 15x$

B. $g(h(x)) = 15x + 40$
$h(g(x)) = 15x + 8$

C. $g(h(x)) = 15x^2 + 40$
$h(g(x)) = 15x^2 + 8$

D. $g(h(x)) = 15x^2 + 40x$
$h(g(x)) = 15x^2 + 8$

26. Find the inverse function of $f(x) = -7x + 6$.

A. $f^{-1}(x) = 7x - 6$

B. $f^{-1}(x) = \dfrac{-x + 6}{7}$

C. $f^{-1}(x) = 7x + 6$

D. $f^{-1}(x) = \dfrac{x - 6}{7}$

27. Find the inverse function of $g(x) = x^2 + 5$, over the domain $x \geq 0$.

A. $g^{-1}(x) = \sqrt{x - 5}$

B. $g^{-1}(x) = \sqrt{x} - 5$

C. $g^{-1}(x) = x^2 - 5$

D. $g^{-1}(x) = \pm\sqrt{y - 5}$