

Algebra 2

Name _____

Worksheet 8 Day 1**For #1-6, if $f(x) = 3x - 5$, $g(x) = \frac{1}{2}x^2 + 3$, and $h(x) = x^3 - 2x$, then find the following.**

1. $f(4)$

2. $h(-2)$

3. $g(-8)$

4. Find x if $f(x) = -11$

5. Find x if $g(x) = 21$

6. Find x if $f(x) = -8$

For #4-12, if $f(x) = -2x + 9$, $g(x) = 3x$, and $h(x) = 7x - 13$, then find the following.

7. $f(g(x))$

8. $h(g(x))$

9. $g(h(x))$

10. $h(h(x))$

11. $g(h(1))$

12. $f(x) \cdot h(x)$

13. $f(h(x))$

14. $f(x) + g(x) - h(x)$

15. $h(x) - f(x)$

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

17. Find $g(h(x))$ and $h(g(x))$ for $g(x) = 5x$ and $h(x) = 3x + 8$

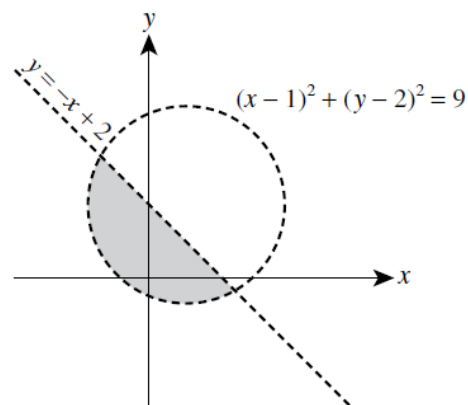
- A. $g(h(x)) = 40 - 15x$ and $h(g(x)) = 8 - 15x$
- B. $g(h(x)) = 15x + 40$ and $h(g(x)) = 15x + 8$
- C. $g(h(x)) = 15x^2 + 40$ and $h(g(x)) = 15x^2 + 8$
- D. $g(h(x)) = 15x^2 + 40x$ and $h(g(x)) = 15x^2 + 8x$

18. Find the x-coordinates of the system $\begin{cases} x^2 + 7x - 9y = -3 \\ 3x - 3y = -9 \end{cases}$

19. If $x:y = 5:2$ and $y:z = 3:2$, what is the ratio of $x:z$?

20. The shaded region in the graph below represents the solution set to which of the following systems of inequalities?

- A. $\begin{cases} y < -x + 2 \\ (x - 1)^2 + (y - 2)^2 < 9 \end{cases}$
- B. $\begin{cases} y > -x + 2 \\ (x - 1)^2 + (y - 2)^2 < 9 \end{cases}$
- C. $\begin{cases} y > -x + 2 \\ (x - 1)^2 + (y - 2)^2 > 9 \end{cases}$
- D. $\begin{cases} y < -x + 2 \\ (x - 1)^2 + (y - 2)^2 > 9 \end{cases}$
- E. $\begin{cases} (y - 2) < 3 \\ (x - 1) > 3 \end{cases}$

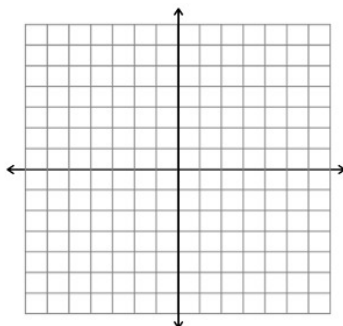


Algebra 2
Worksheet 8 Day 2

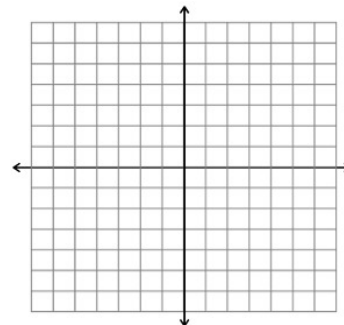
Name: _____

For #1 – 8 , find the inverse of each function. For #1 – 2, graph both functions on the same coordinate plane.

1. $y = 2x + 6$



2. $y = x - 7$



3. $y = x^2 - 3$ if $x \geq 0$

4. $h(x) = 9x^2$ if $x \geq 0$

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

6. $g(x) = 5x + 12$

7. $f(x) = 16x^2 - 6$ if $x \geq 0$

8. $y = -\frac{3}{2}x - 1$

For #9-12, determine if the functions are inverses. Justify your reasoning.

9. $f(x) = 3x - 5$ and $g(x) = \frac{1}{3}x + \frac{5}{3}$

10. $f(x) = \sqrt{x} + 7$ and $g(x) = x^2 - 7$ if $x \geq 0$.

11. $f(x) = 6x - 11$ and $g(x) = \frac{1}{6}x + 11$ 12. $f(x) = x^2 + 9$ and $g(x) = \sqrt{x-9}$ if $x \geq 0$

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

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

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

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

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

For #14-17, if $f(x) = 6x^2$, $g(x) = -x + 4$, and $h(x) = x - 8$, then find the following.

14) $g(f(x))$

15) $f(h(x))$

16) $f(-4)$

17) $g(x) - h(x)$

18. You can find the volume of an irregular shaped solid object by completely submerging it in water and calculating the volume of water that the object displaces. You completely submerge a solid object in a rectangular tank that has a base 40 centimeters by 30 centimeters and is filled with water to a depth of 20 centimeters. The object sinks to the bottom, and the water level goes up 0.25 centimeters. What is the volume, in cubic centimeters, of the object?

Algebra 2
Worksheet 8 Day 3

Name: _____

1) Which of the following expressions does **not** simplify to 7?

A. $49^{\frac{1}{2}}$

C. $\sqrt{49}$

B. 49^2

D. $49^{0.5}$

Simplify:

2) $3^3\sqrt{64}$

3) $27^{\frac{1}{3}}$

4) $\sqrt[3]{135}$

5) $169^{\frac{1}{2}}$

6) $-5^3\sqrt{8x^6}$

7) $(81x^4)^{\frac{1}{4}}$

8) $2^3\sqrt{250x^3y^{10}}$

9) $\sqrt[3]{-81a^{12}b^{31}}$

10) $\sqrt[4]{16x^{10}y^8z^5}$

11) $\sqrt[6]{64a^5b^{12}}$

12) $10(75x^6y^7z)^{\frac{1}{2}}$

13) $\sqrt{-90t^{26}}$

14) $(27y^{12}z^8)^{\frac{1}{3}}$

15) $3\sqrt[3]{2} - \sqrt[3]{128}$

16) $5\sqrt[4]{3} + 2\sqrt[4]{243} + \sqrt[4]{81}$

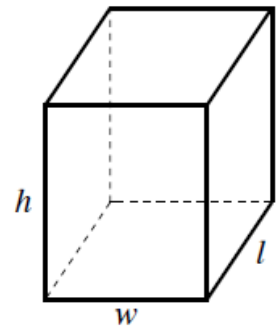
17) $-6\sqrt[5]{y} - 10y^{\frac{1}{5}}$

18) $3\sqrt{5} - 11\sqrt{20}$

19) $2\sqrt{x^4} - 7x^2 + 3x\sqrt{9x^2}$

20) A formula for the surface area (A) of the rectangular solid shown below is $A = 2lw + 2lh + 2wh$ where l represents length; w , width, and h , height. By doubling each of the dimensions (l, w and h), the surface area will be multiplied by what factor?

- A. 2
- B. 4
- C. 6
- D. 8
- E. 12



21) A dog eats 7 cans of food in 3 days. At this rate, how many cans of food does a dog eat in $3 + d$ days?

- F. $\frac{7}{3} + d$
- G. $\frac{7}{3} + \frac{d}{3}$
- H. $\frac{7}{3} + \frac{7}{3d}$
- J. $7 + \frac{d}{3}$
- K. $7 + \frac{7d}{3}$

22) Kelly asked 120 students questions about skiing. The results of the poll are shown in the table. After completing the poll, Kelly wondered how many of the students polled had skied both cross-country *and* downhill. How many of the students polled indicated that they had skied both cross-country *and* downhill?

Question	Yes	No
1. Have you skied either cross-country or downhill?	65	55
2. If you answered Yes to Question 1, did you ski downhill?	28	37
3. If you answered Yes to Question 1, did you ski cross-country?	45	20

Algebra 2
Worksheet 8 Day 4

Name: _____

For #1 – 11, solve each equation. Check for extraneous solutions. If needed, write your answers in simplified radical form.

1. $\sqrt[3]{x} - 9 = -1$

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

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

4. $\sqrt{10x - 9} = x$

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

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

7. $\frac{1}{3}\sqrt[3]{x + 1} = 2$

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

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

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

A. $x = 95$

B. $x = 47$

C. $x = -1$

D. *no solution*

11. Solve: $-7\sqrt{8x + 3} = 14$

A. $x = -\frac{1}{8}$

B. $x = \frac{1}{8}$

C. $x = \frac{5}{8}$

D. *no solution*

12. Only tenth-, eleventh-, and twelfth-grade students attend Washington High School. The ratio of tenth graders to the school's total student population is 86:255, and the ratio of eleventh graders to the school's total student population is 18:51. If 1 student is chosen at random from the entire school, which grade is that student most likely to be in? Explain your answer.



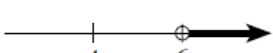
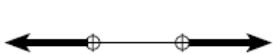
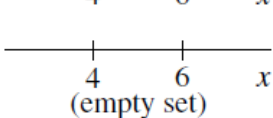
13. Which of the following is the solution statement for the inequality shown below?

$$-5 < 1 - 3x < 10$$

- F. $-5 < x < 10$
- G. $-3 < x$
- H. $-3 < x < 2$
- J. $-2 < x < 3$
- K. $x < -3$ or $x > 2$

14. Which of the following number line graphs show the solution set to the inequality

$$|x - 5| < -1$$

- F. 
- G. 
- H. 
- J. 
- K. 

Algebra 2
Worksheet 8 Day 5

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For #1 – 9, for each radical function $y = a\sqrt[n]{x-h} + k$, describe the transformation from the parent function $y = \sqrt[n]{x}$, identify the domain and range, sketch the graph, and identify the end behavior.

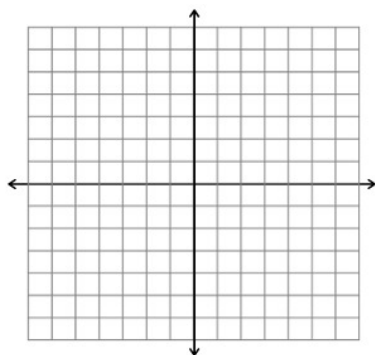
1) $y = -3\sqrt{x}$

Transformation:

Domain:

Range:

End Behavior:



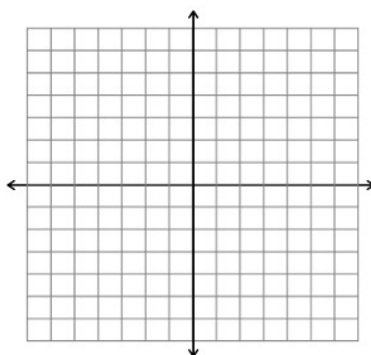
2) $f(x) = \frac{1}{4}\sqrt{x}$

Transformation:

Domain:

Range:

End Behavior:



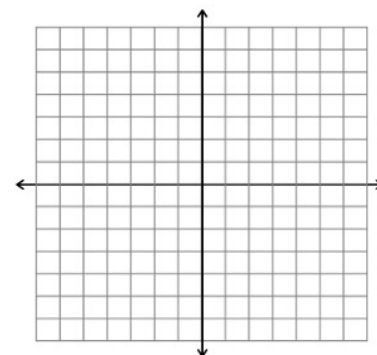
3) $y = 4\sqrt[3]{x}$

Transformation:

Domain:

Range:

End Behavior:



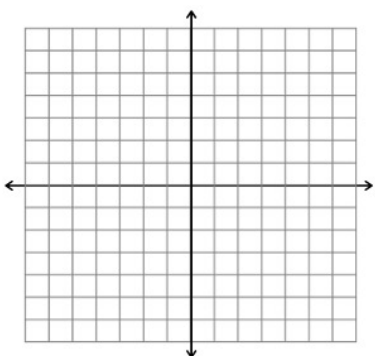
4) $y = 3\sqrt{x+2} - 4$

Transformation:

Domain:

Range:

End Behavior:



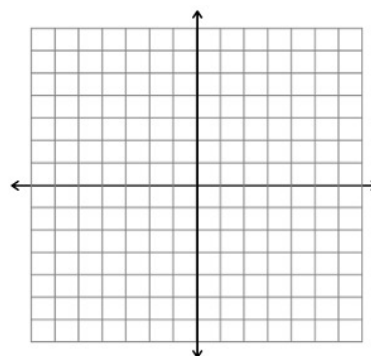
5) $y = \sqrt[3]{x+4} - 1$

Transformation:

Domain:

Range:

End Behavior:



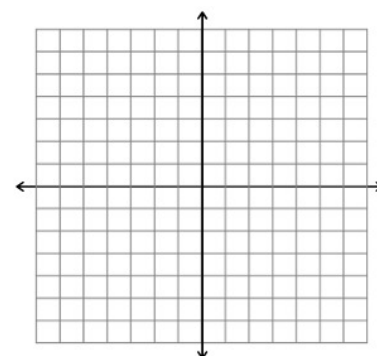
6) $y = -\sqrt{x} + 2$

Transformation:

Domain:

Range:

End Behavior:



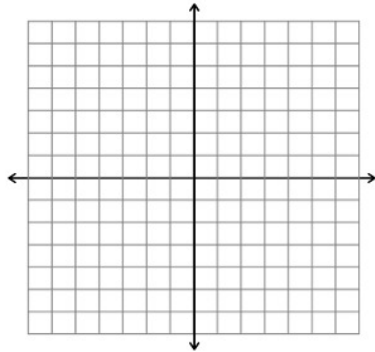
$$7) y = \frac{1}{3}\sqrt{x-2} + 3$$

Transformation:

Domain:

Range:

End Behavior:



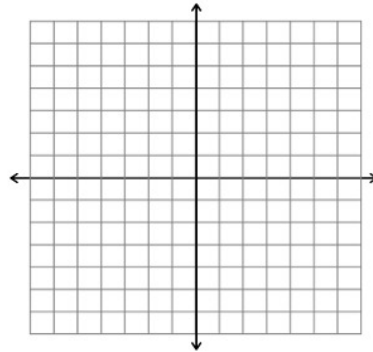
$$8) y = -\sqrt[3]{x-1}$$

Transformation:

Domain:

Range:

End Behavior:



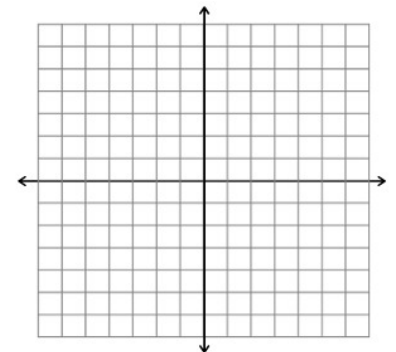
$$9) y = 2\sqrt[3]{x} + 2$$

Transformation:

Domain:

Range:

End Behavior:



10) Translate the graph of $y = \sqrt{x}$ down one unit and left 3 units. Write the equation of the graph after the transformation.

11) Describe how the function $g(x) = -\sqrt[3]{x-5} - 2$ is transformed from the parent function.

12) If the function $g(x) = 2\sqrt{x+1} - 2$ were translated right 2 units, down three units and reflected vertically, what would the resulting function be?

13) If the function $g(x) = -\sqrt[3]{x} + 3$ were translated left 6 units and up 5 units, what would the resulting function be?

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Unit 8 Practice Test

Given the functions $f(x) = -3x + 1$, $g(x) = 6x$, and $h(x) = 2x^2 - 7$, perform the indicated operations.

1) $h(g(x))$

2) $f(x) - h(x)$

3) $f(x) \cdot g(x)$

4) $g(f(x))$

5) $f(f(x))$

6) $f(-1)$

7) Solve for x if $t(x) = 7x^2 - 6$ and $t(x) = 15$

8) Find the inverse of $y = \frac{1}{2}x + 3$.

9) Find the inverse of $f(x) = x^2 + 3$ if $x \geq 0$.

10) Determine if $f(x) = 2x + 9$ and $g(x) = \frac{1}{2}x - 9$ are inverses. Justify your reasoning.

11) Determine if $f(x) = 9x^2$ and $g(x) = \frac{\sqrt{x}}{3}$ are inverses if $x \geq 0$. Justify your reasoning.

Simplify:

$$12) \sqrt[4]{1250x^{24}y^{31}}$$

$$13) -2\sqrt{100x^7}$$

$$14) (216x^{13}y^6z^{17})^{\frac{1}{3}}$$

$$15) \sqrt[3]{-128a^7b^2c^3}$$

$$16) \sqrt[3]{2} + 3\sqrt[3]{162} - 2\sqrt[3]{128}$$

$$17) 4\sqrt{16a^3} - 3a\sqrt{a}$$

$$18) -2(x^6y^9)^{\frac{1}{3}}$$

$$19) \sqrt{4x^7y^5} + 9x^2\sqrt{x^3y^5} - 5xy\sqrt{x^5y^3}$$

Solve each equation. Check for extraneous solutions.

$$20) \sqrt{6x + 1} = \sqrt{2x + 13}$$

$$21) -5\sqrt[3]{x - 1} = 40$$

$$22) \sqrt{9x + 90} - 6 = x$$

$$23) \sqrt[3]{x - 3} + 12 = 7$$

$$24) \sqrt[4]{x} = -3$$

$$25) \sqrt{-3x - 5} = x + 3$$

$$26) x = \sqrt{5x - 6}$$

$$27) -4\sqrt{24x} = 12$$

For #28 – 30: For each radical function $y = a^n\sqrt{x-h} + k$, describe the transformation from the parent function $y = \sqrt[n]{x}$, identify the domain and range, sketch the graph, and identify the end behavior.

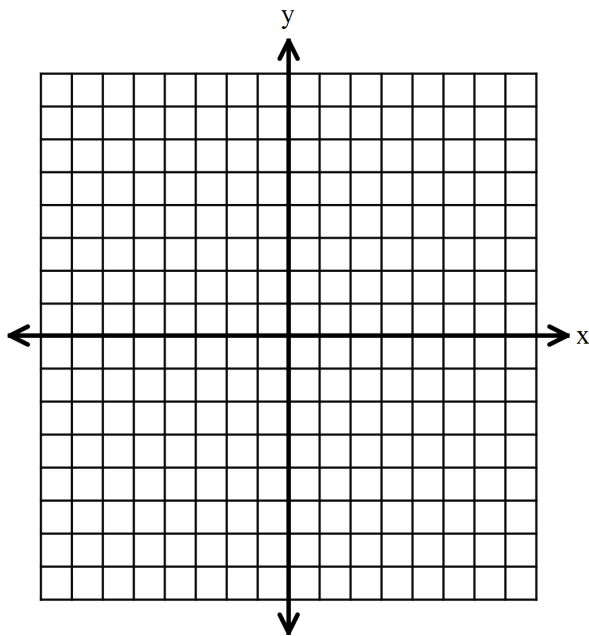
28) $y = -\sqrt{x-4} - 2$

Transformation:

Domain:

Range:

End behavior:



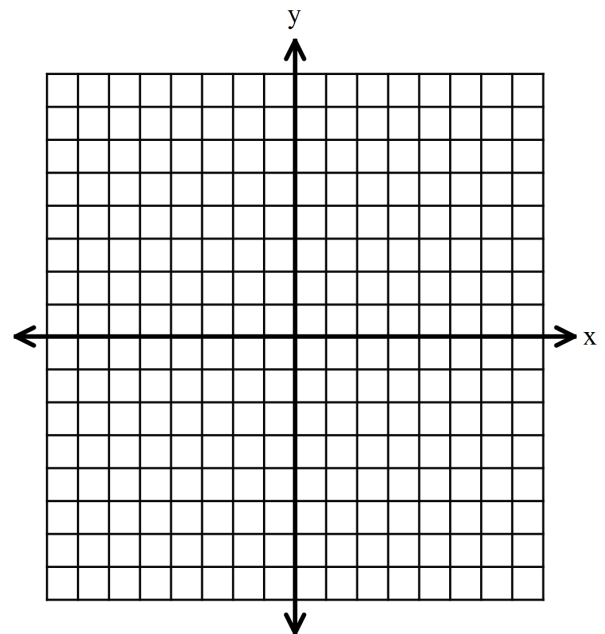
29) $y = \frac{1}{3}\sqrt[3]{x} + 5$

Transformation:

Domain:

Range:

End behavior:



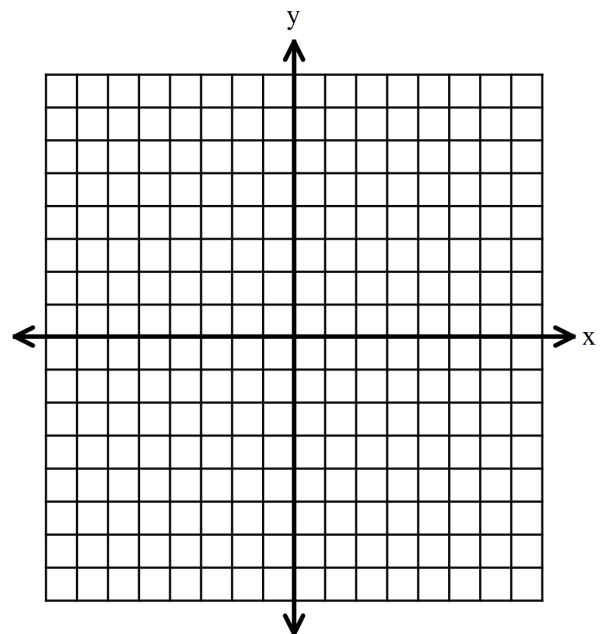
30) $y = \sqrt[3]{x+4} - 1$

Transformation:

Domain:

Range:

End behavior:



31. State the Domain and Range of each function:

a) $g(x) = 6 + \sqrt{x + 3}$

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

32. Which statement describes the end behavior of the function $f(x) = -\sqrt{x + 5}$?

A. as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$

C. as $x \rightarrow -\infty$, $f(x) \rightarrow +\infty$

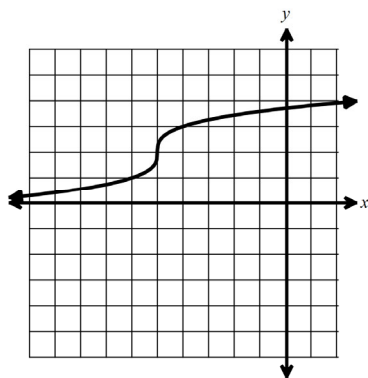
B. as $x \rightarrow +\infty$, $f(x) \rightarrow -\infty$

D. as $x \rightarrow +\infty$, $f(x) \rightarrow +\infty$

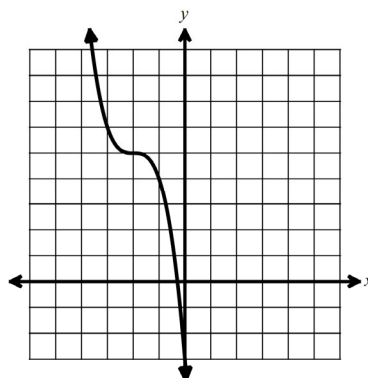
33. If the function $f(x) = -3\sqrt{x + 4} - 6$ were translated left eight units and down three units, what would the resulting function be?

34. 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?

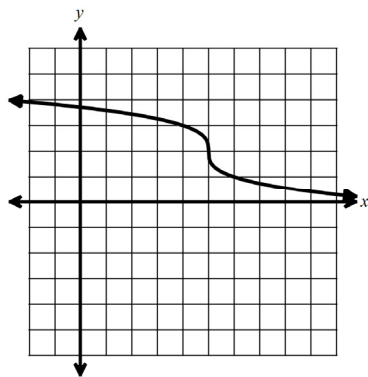
A.



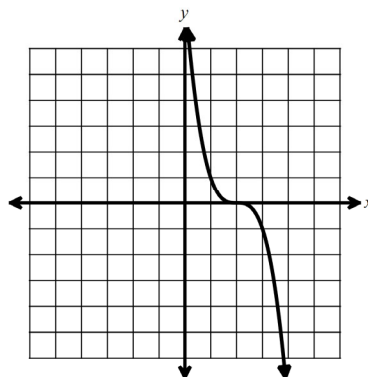
C.



B.



D.



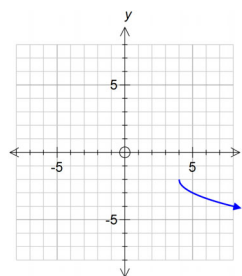
Practice Test Answers:

- 1) $72x^2 - 7$ 2) $-2x^2 - 3x + 8$ 3) $-18x^2 + 6x$ 4) $-18x + 6$
 5) $9x - 2$ 6) 4 7) $x = \pm\sqrt{3}$ 8) $y^{-1} = 2x - 6$
 9) $y^{-1} = \sqrt{x - 3}$ 10) No, because $f(g(x)) \neq g(f(x)) \neq x$.
 11) yes, because $f(g(x)) = g(f(x)) = x$ 12) $5x^6|y^7|\sqrt[4]{2y^3}$ 13) $-20|x^3|\sqrt{x}$
 14) $6x^4y^2z^5\sqrt{xz^2}$ 15) $-4a^2c^3\sqrt{2ab^2}$ 16) $-7\sqrt[3]{2} + 9\sqrt[3]{6}$ 17) $13|a|\sqrt{a}$
 18) $-2x^2y^3$ 19) $6|x^3|y^2\sqrt{xy}$ 20) $x = 3$ 21) $x = -511$
 22) $x = 6$ 23) $x = -122$ 24) no solution 25) $x = -2$
 26) $x = 2, 3$ 27) no solution

28) Transformation: reflected, right 4, down 2

Domain: $[4, \infty)$; Range $(-\infty, -2]$

As $x \rightarrow \infty, f(x) \rightarrow -\infty$

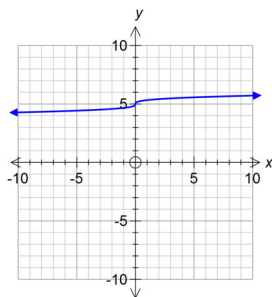


29) Transformation: compression, up 5

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

As $x \rightarrow \infty, f(x) \rightarrow \infty$

As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

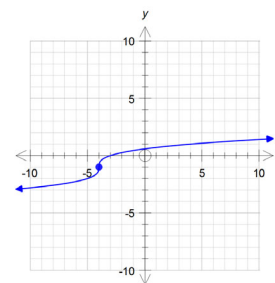


30) Transformation: left 4, down 1

Domain: $[-\infty, \infty)$; Range: $(-\infty, \infty)$

As $x \rightarrow \infty, f(x) \rightarrow \infty$

As $x \rightarrow -\infty, f(x) \rightarrow -\infty$



31) a) D: $x \geq -3$, R: $y \geq 6$

b) D: all real numbers R: all real numbers

32) B

33) $f(x) = -3\sqrt{x + 12} - 9$

34) A