Unit 8 Lesson 1 – Solving Radical Equations **Name: ______________________**

Radical Equation: An equation with a ______________________ inside the _______________.

Example:

When we solve equations in math we use ________________ operations to help us get the ________________ by itself.

Steps:

- ___________________ the square root
- Undo the square root.
  - How do you UNDO a square root?
- Solve for x. Depending on the problem, this might be solving a _______ equation or a ________________ equation. What method(s) might be the best choices to solve a quadratic equation?
- Ensure you do not have any extraneous solutions.
  - How do we make sure all of our solutions are correct?

Examples:

1. $\sqrt{x} = 8$
2. $\sqrt{x+3} = 5$
3. $\sqrt{x} + 9 = 3$
4. $\sqrt{3x} + 5 = 17$
5. $2\sqrt{x-1} = 18$
6. $\sqrt{\frac{x}{5}} = 3$
7. $\sqrt{x+2} = \sqrt{x-6}$
8. $\sqrt{x} = \sqrt{2x-7}$
9. $\sqrt{x^2-5} = \sqrt{x+1}$

Unit 8 Lesson 1 HW (ODDS)
Unit 8 Lesson 2 HW (EVENS) **Name: ______________________________**

Solve each radical equation. Show all work! Be sure to check your answers for extraneous solutions (on paper & DESMOS)

1. $2 = \sqrt{4m}$
2. $\sqrt{\frac{v}{8}} = 9$
3. $3 = \sqrt{r+1}$
4. $\sqrt{n^2} = 9$
5. $-3 = \sqrt{x+4} - 7$
6. $\sqrt{x} + 7 = 0$
7. $10 = \sqrt{x-1}$
8. $10 + \sqrt{\frac{n}{3}} = 16$
9. $\sqrt{10a+4} = 8$
10. $7 = \sqrt{2-b} + 5$
11. $\sqrt{n} = \sqrt{2n-5}$
12. $\sqrt{18-3n} = \sqrt{n^2}$
13. $\sqrt{22-2k} = \sqrt{\frac{k}{5}}$
14. $v = \sqrt{4v+5}$
15. $2x = \sqrt{24x-20}$
16. $\sqrt{3r+8} - \sqrt{9r+8} = 0$
17. $8n = 7n + \sqrt{12-n}$
18. $\frac{b}{2} = \sqrt{\frac{5b-6}{4}}$

Use DESMOS to solve (work is not necessary).

19. $v + 10 = \sqrt{10-v}$
20. $b + 3 = \sqrt{6b+25}$

Examples:

1. $x = \sqrt{56 - x}$

You Try:

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

3. $\sqrt{-14 + 9x} - x = 0$

4. $\sqrt{-7 + 8x} - x = 0$

5. $x - 6 = \sqrt{21 - 4x}$

Is there a way to find the solution to these equations using DESMOS?

5. $x - 6 = \sqrt{21 - 4x}$

Take the left side of the equation and set it equal to y. What type of function is this?

Take the right side of the equation and set it equal to y. What type of function is this?

Do these functions intersect?

If not, there is NO SOLUTION

If they intersect, the x value of the point of intersection is the solution.

6. $\sqrt{6x - 29} = x - 4$

7. $x = \sqrt{4x - 24} + 6$

8. $-x + \sqrt{6x - 17} = -2$

9. $5\sqrt{x - 4} - x = 0$

10. $2\sqrt{3x - 4} - 7 = x - 7$

Unit 8 Lesson 3 Notes – The Square Root Function

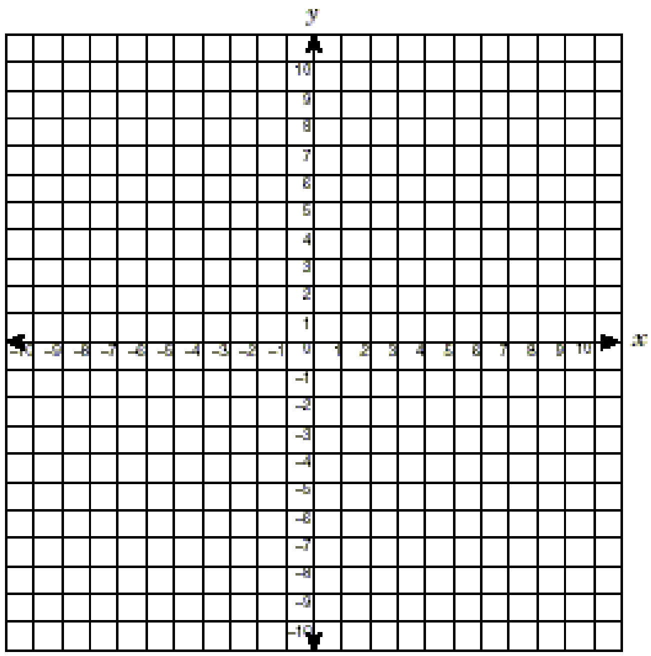
We previously studied a quadratic that in its most basic form is ______________

Inverse Operations are operations that ___________________ or " _________" each other.

When we studied quadratics previously we learned that to undo squaring (second power) we must ___________________.

Complete the table to help you graph the function $y = \sqrt{x}$ (the Square Root Parent Function).

x	y
-9	
-4	
-1	
0	
1	
4	
9	



Key Features:

Anchor Point: _______________

Max or Min

x-intercept(s): _______________

y-intercept: _______________

Domain: _______________

Range: _______________

Increasing: _______________

Decreasing: _______________

$$y = a\sqrt{x-h} + k$$

Part A: The Effect of *a*

1. $y = -\sqrt{x}$

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

Increasing:

Decreasing:

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

Part B: The Effect of *h*

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

Part C: The Effect of *k*

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

Part D: Putting it all together

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

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

What was the transformation?

Domain:

Range:

x-intercept:

y-intercept:

Examples: Describe the transformations from the parent graph of $y = \sqrt{x}$.

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

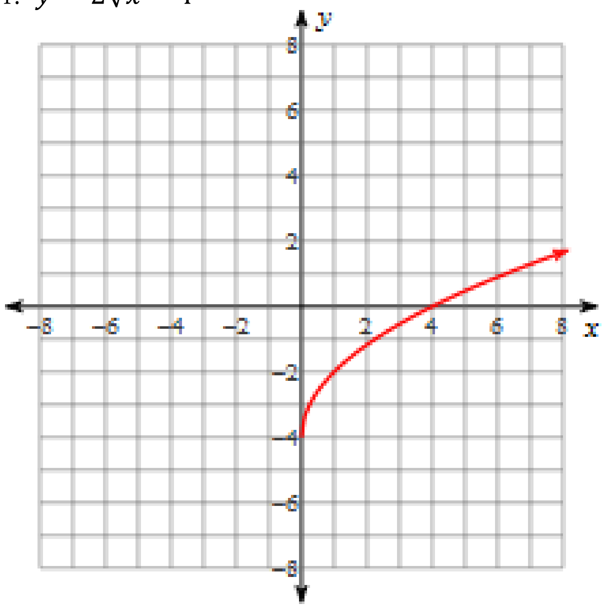
b. $y = 3\sqrt{x-5} + 2$

c. $y = -\frac{1}{2}\sqrt{x} + 3$

 Name: ______________________________

Use the graph provided to identify key features of the function

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



Key Features:

Transformations: ______________________________

x-intercept(s): ________________

y-intercept: ________________

Anchor Point: ________________

Maximum or Minimum

Domain: ________________

Range: ________________

Increasing: ________________

Decreasing: ________________

Use Desmos to graph each function and identify the key features.

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

Description of Transformation(s):

Domain: Range:

x – intercept: y – intercept:

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

Description of Transformation(s):

Domain: Range:

x – intercept: y – intercept:

4. $y = 4\sqrt{x}$

Description of Transformation(s):

Domain: Range:

x – intercept: y – intercept:

5. $y = \frac{1}{2}\sqrt{x}$

Description of Transformation(s):

Domain: Range:

x – intercept: y – intercept:

Write the equation that represents the transformations from the parent graph $y = \sqrt{x}$.

6. Up 3 units, left 2 units

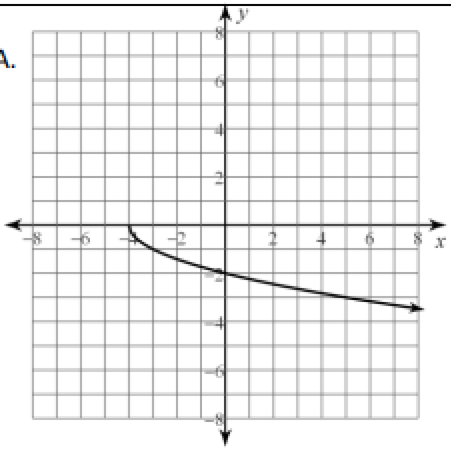
7. Reflected over the x-axis, right 2 units

8. Vertical compression by a scale factor of $\frac{4}{5}$, right 4 units, down 8 units

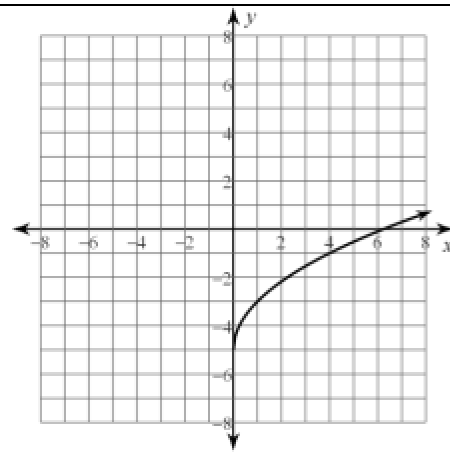
9. Vertical stretch by a scale factor of 7, reflected over the x-axis, left 10 units

Identify which graph(s) have the following characteristics. Choose all that apply.

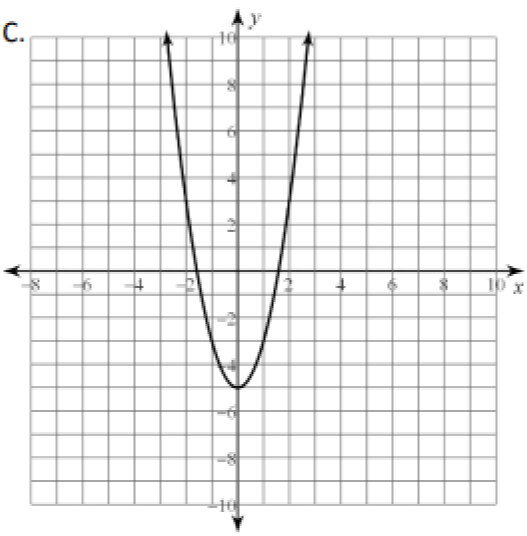
A.



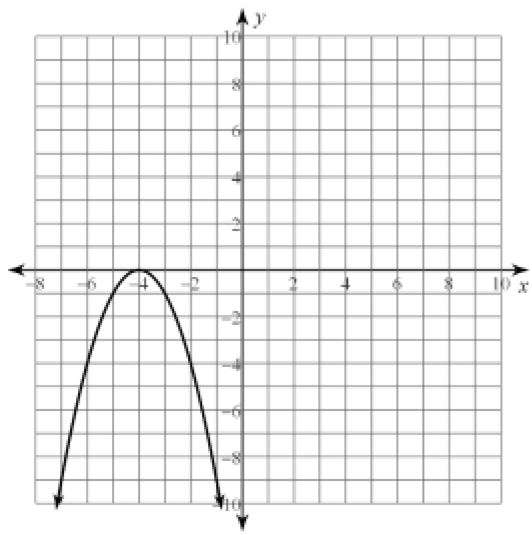
B.



C.



D.



10. Has a minimum

11. Has a maximum

12. Has a vertex

13. Has a y-intercept

14. Has exactly 1 zero

15. Has a line of symmetry

16. Is symmetric about the y-axis

17. Has a domain of all real numbers

18. Has a range of all real numbers

19. As x increase, y rises and then falls

20. Has a positive a value

21. As x increases, y decreases slowly for all values of x.

Unit 8 Lesson 4 – Rational Exponents and Radicals

I. Radical Vocabulary

$$\sqrt[3]{27}$$

Note: When taking a square root you do not need to write $\sqrt[2]{16}$. When you write $\sqrt{16}$ it is understood that the index is 2.

Rational Exponent: ____

Example:

Examples:

Rewrite each rational exponent as a radical.

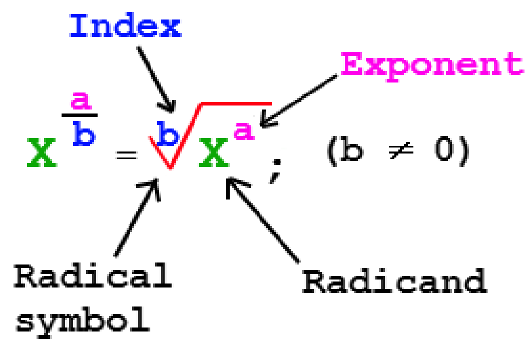
1. $5^{\frac{1}{2}} =$
2. $5^{\frac{1}{3}} =$
3. $5^{\frac{2}{3}} =$
4. $6^{\frac{3}{5}} =$
5. $m^{\frac{3}{2}} =$
6. $p^{\frac{1}{2}} =$
7. $12x^{\frac{5}{6}} =$
8. $(12x)^{\frac{5}{6}} =$
9. $(xy)^{\frac{1}{2}} =$

Rewrite each radical as a rational exponent.

10. $\sqrt[3]{a} =$
11. $\sqrt[2]{x^3} =$
12. $\sqrt[2]{16y} =$
13. $\sqrt[3]{7b^2} =$
14. $\sqrt[3]{x^4} =$
15. $\sqrt[3]{27x^3y^5z} =$
16. $\sqrt[5]{y^2} =$
17. $4 \cdot \sqrt[5]{n^{10}} =$

Unit 8 Lesson 4 Homework and Review

1. Rational exponents can be re-written as radicals!



In radical form, **b** is the ________________.

In exponential form, **b** is the ________________________ of the exponent.

In radical form, **a** is the ________________.

In exponential form, **a** is the ________________________ of the exponent.

2. Given the expression $\sqrt[3]{54}$, write an expression utilizing a rational exponent that would yield the same numerical value.

3. Rewrite each expression with a rational exponent.

a. $\left(\sqrt[5]{63}\right)^3$ b. $\sqrt[6]{127^4}$ c. $\left(\sqrt[3]{-25}\right)^4$ d. $\left(\sqrt{2x}\right)^5$

e. $\left(\sqrt[3]{-7x^2y}\right)^2$ f. $\sqrt[4]{9x}$ g. $\sqrt[3]{(5xy)^2}$ f. $9\left(\sqrt[4]{x^5}\right)$

4. Rewrite each expression in radical form.

a. $(-57)^{\frac{4}{3}}$ b. $13^{\frac{3}{2}}$ c. $(204^5)^{\frac{1}{8}}$ d. $(3x)^{\frac{4}{3}}$

e. $(3x)^{2.5}$ f. $(-27x^3y)^{\frac{2}{5}}$ g. $(7x)^{\frac{1}{2}}$ h. $8(x)^{\frac{3}{4}}$

5. Solve each square root equation. Be sure to check for extraneous solutions.

a. $\sqrt{9a+3} = \sqrt{4a-7}$ b. $7 = \sqrt{x+16} + 2$

c. $x = \sqrt{12-x}$ d. $-x = \sqrt{x+20}$

e. Desmos: $\sqrt{6x+19} = 2 + x$ f. Desmos: $x - 4 = \sqrt{10-3x}$

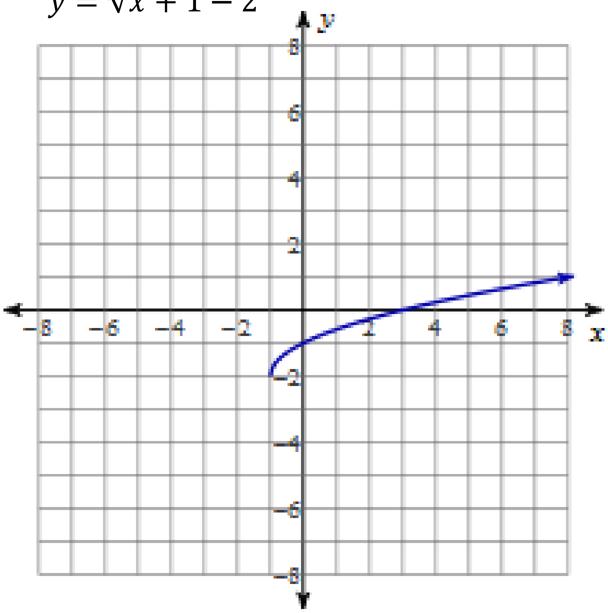
6. Write the equation that represents the transformations from the parent graph $y = \sqrt{x}$.

   a. Translated 4 units up, vertical compression by a scale factor of 2/3, and reflected over the x-axis.

   b. Translated left 3 units, vertical stretch by a scale factor of 4, down 6 units.

7. Use the graph provided to identify key features of the function.

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



Transformations: ______________________________

Anchor Point: ___________

X-Intercept: ___________

Y- Intercept: ___________

Maximum or Minimum (Circle)

Domain: ___________

Range: ___________

Increasing: ___________

Decreasing: ___________

8. Use Desmos to graph each function and identify the key features.

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

Transformation(s):

Domain: Range:

x – intercept: y – intercept:

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

Transformation(s):

Domain: Range:

x – intercept: y – intercept:

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

Transformation(s):

Domain: Range:

x – intercept: y – intercept:

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

Transformation(s):

Domain: Range:

x – intercept: y – intercept: