

# Algebra 2

Name: \_\_\_\_\_

## (Winter 11) Unit 2 Review

Block: \_\_\_\_\_

Learned      Practiced      Mastered

L    P    M

### Standard W2: Identifying Characteristics of Nonlinear Functions


- W2.a) I can sketch graphs of parent functions.
- W2.b) I can identify the parent function and transformations from a graph or equation.
- W2.c) I can graph a function using parent shapes and transformations.
- W2.d) I can write an equation for a function given a graph.
- W2.e) I can describe characteristics of functions such as domain, range, symmetry, extrema, asymptotes, end behavior, and intervals of increasing or decreasing.

L    P    M

### Standard W3: Solving Nonlinear Equations


- W3.a) I can explain the reasoning for each step of solving an equation.
- W3.b) I can solve nonlinear equations using inverse operations, including quadratic, power, and radical functions.
- W3.c) I can solve rational equations.
- W3.d) I can solve exponential equations using the one-to-one property.
- W3.e) I can identify extraneous solutions

### Tracking Problem Set Completion

The best source of practice is to complete the problem sets from our lessons. Which problem sets have you completed?

- (Winter 07) Parent Functions
- (Winter 08) Transformations of Functions
- (Winter 09) Solving Equations with Powers
- (Winter 10) Rational and Exponential Equations
- (Winter 11) Unit 2 Review (This packet)

Another excellent source of learning is to review your Quiz W2 and do corrections

- Corrections on Quiz W2 Complete

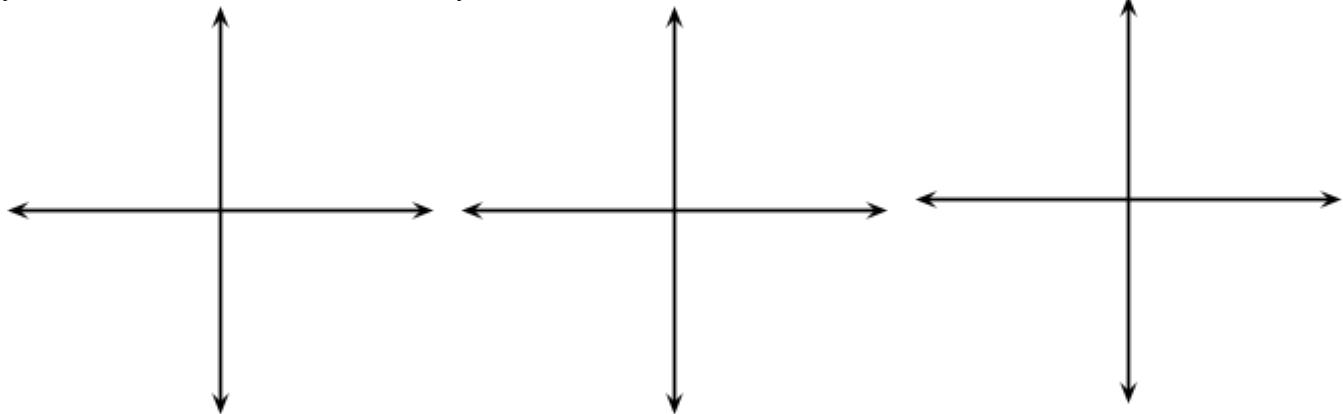
Also available is an optional DeltaMath assignment for W3

- DeltaMath - Solving Nonlinear Equations

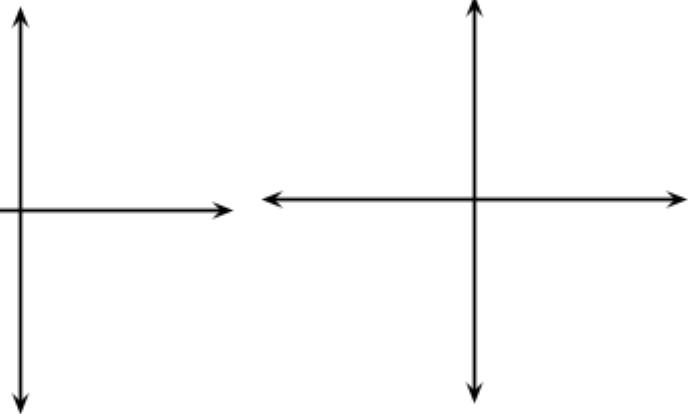
## Review Problems

Sketch graphs of each of the parent functions. Try to do it from memory instead of looking at your notes.

$$y = x^2$$

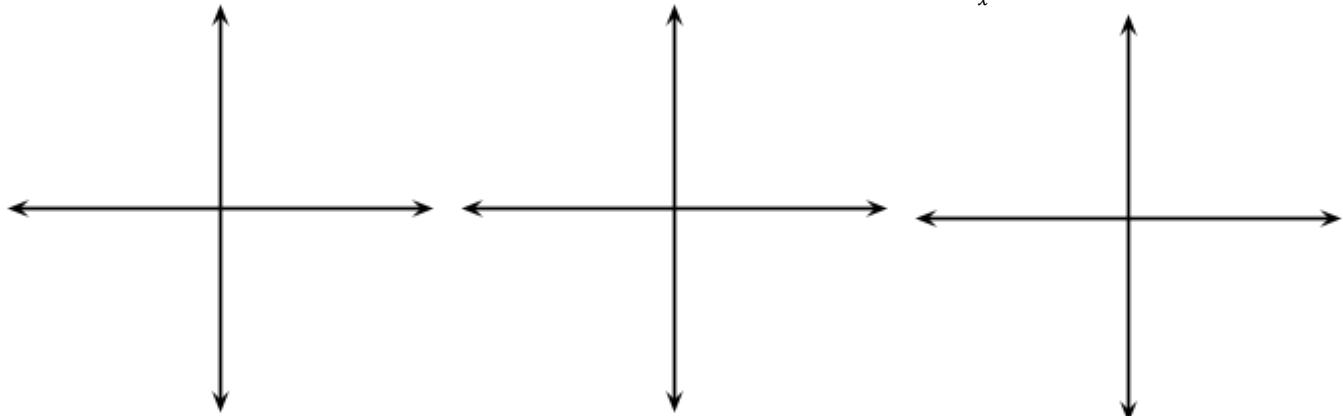


$$y = x^3$$

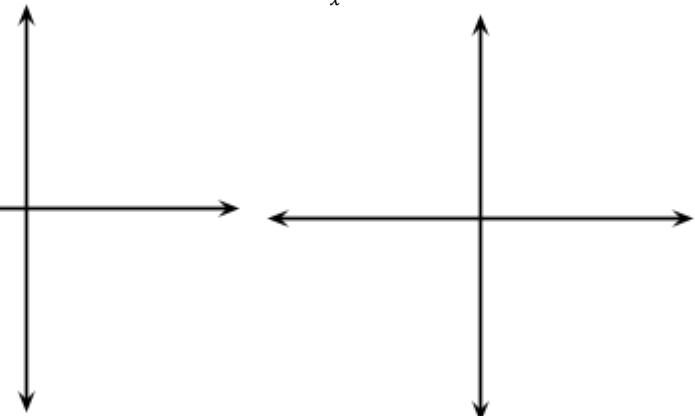


$$y = |x|$$

$$y = \sqrt{x}$$

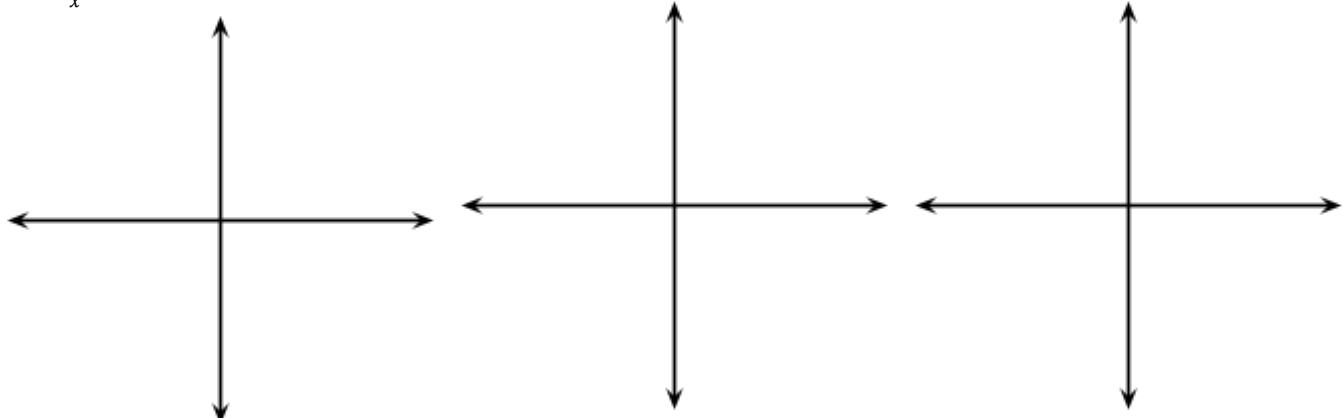


$$y = \sqrt[3]{x}$$

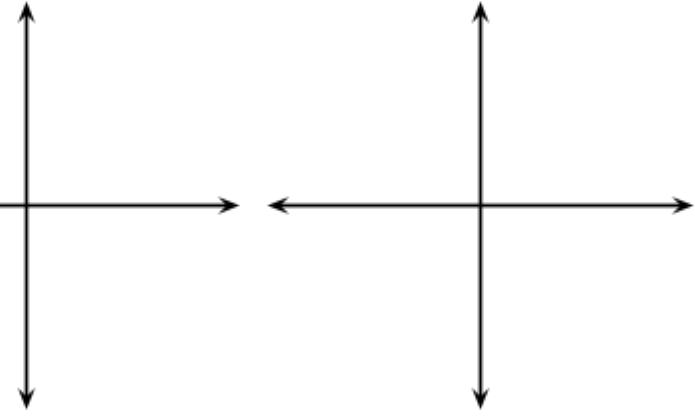


$$y = \frac{1}{x}$$

$$y = \frac{1}{x^2}$$



$$y = b^x \text{ where } b > 1$$



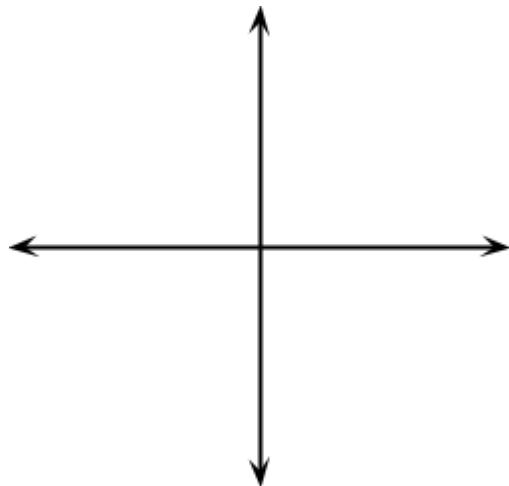
$$y = b^x \text{ where } 0 < b < 1$$

For each function, identify the parent function and describe the transformations using words. Then sketch a graph. Label at least two points on the graph with coordinates.

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

Parent function:

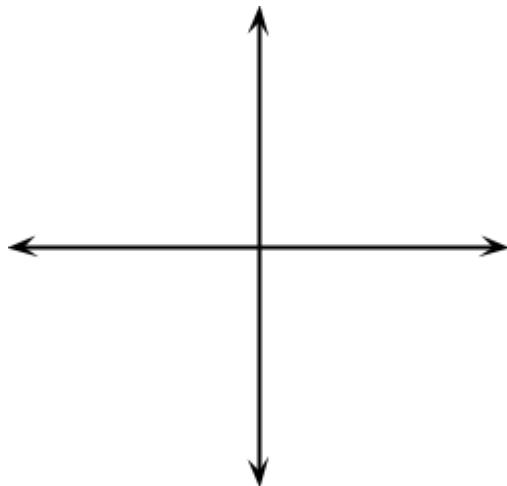
Transformations:



2.  $f(x) = 3^x - 1$

Parent function:

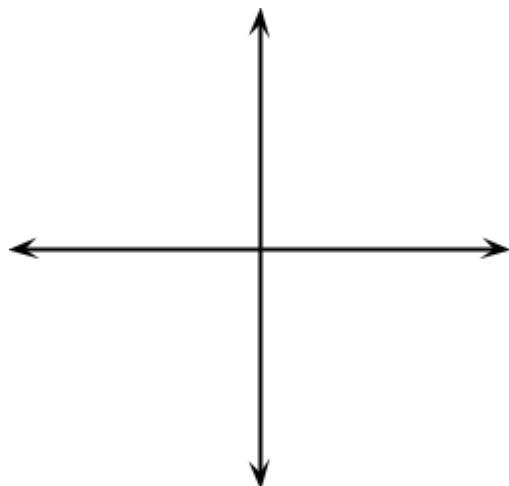
Transformations:



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

Parent function:

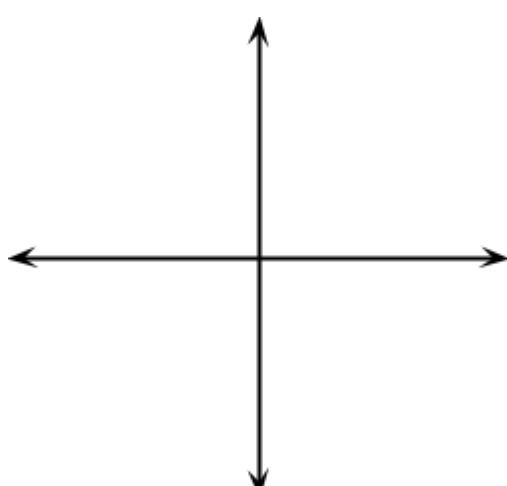
Transformations:



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

Parent function:

Transformations:



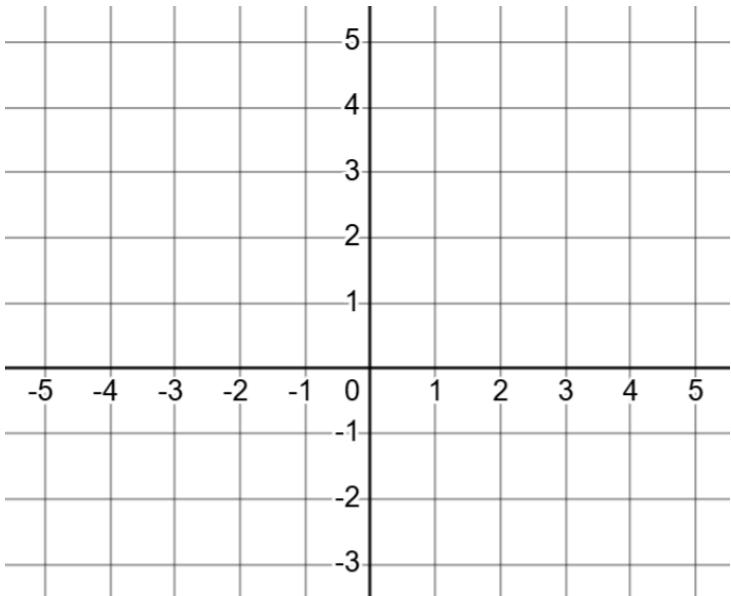
For each function, identify the parent function and describe the transformations using words. Then draw an accurate graph. Write the domain and range. Set up a table of values and label at least three points on the graph with coordinates.

5.  $f(x) = \frac{1}{2}|x - 1| - 2$

Parent function:

Transformations:

- 
- 
- 



Domain:

Range:

Table of values with calculations:

$x$	$y$

Find the  $x$ -intercepts of the graph. (Hint:  $x$ -intercepts are where  $y = 0$ , so you need to set up and solve an equation). Once you find the  $x$ -intercepts, label them on the graph.

$$6. \quad f(x) = -2(x + 2)^2 + 5$$

Parent function:

Transformations:

Domain:

Range:

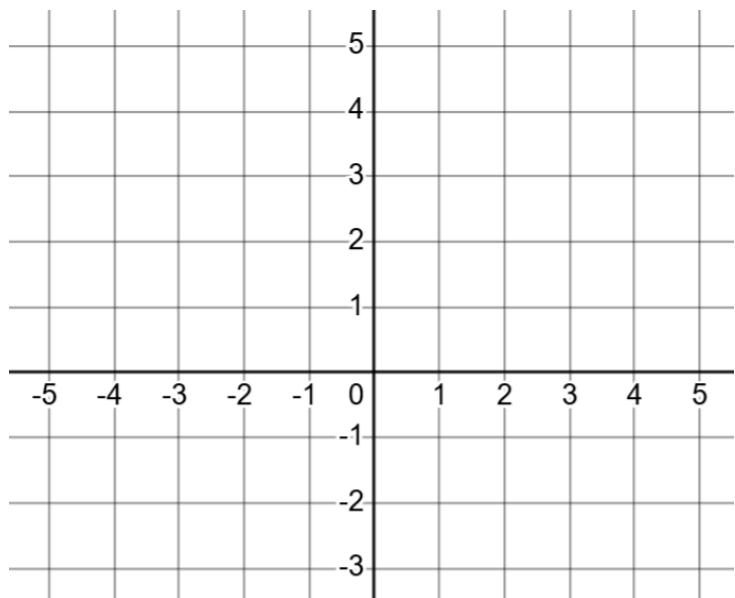


Table of values with calculations:

$x$	$y$

Find the  $x$ -intercepts of the graph:

Find the point(s) where  $f(x) = 2$

## Solving Equations

Solve each equation:

$$7. \ 3^{2x+5} = 81$$

$$8. \ 2(3x - 1)^2 + 1 = 9$$

$$9. \ \frac{5}{3x+2} = 4$$

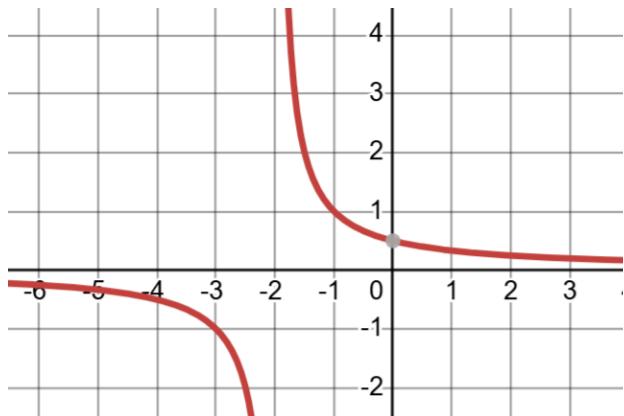
$$10. \ \sqrt{5 + 4x^2} - 2 = 3$$

$$11. \ 5 - 3(x + 1)^3 = 7$$

$$12. \ 5 \cdot 2^{x^2-3} = 80$$

Given each graph, write the parent function, the transformations that formed the graph, and then use that information to write the equation of the function shown:

13.

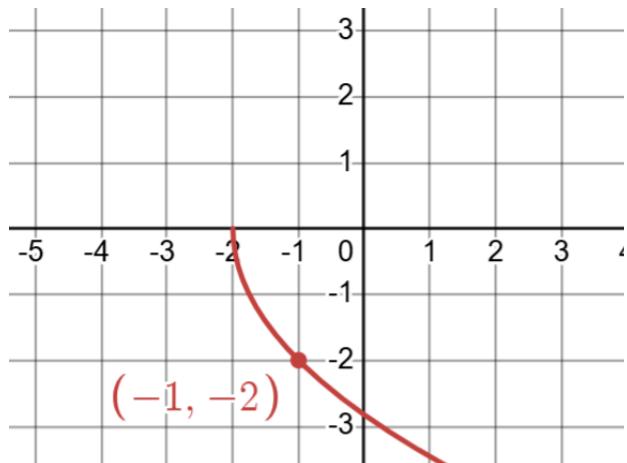


Parent function:

Transformations:

Equation:  $f(x) =$

14.

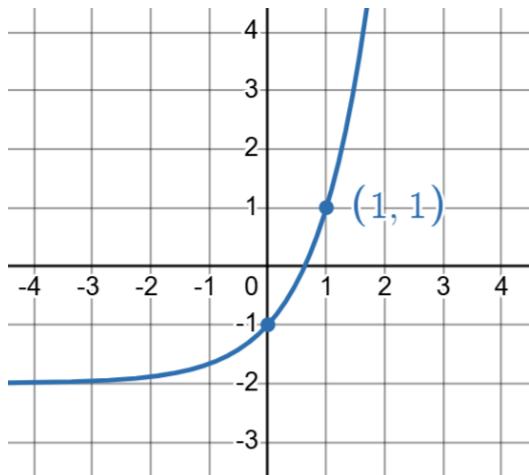


Parent function:

Transformations:

Equation:  $f(x) =$

15.

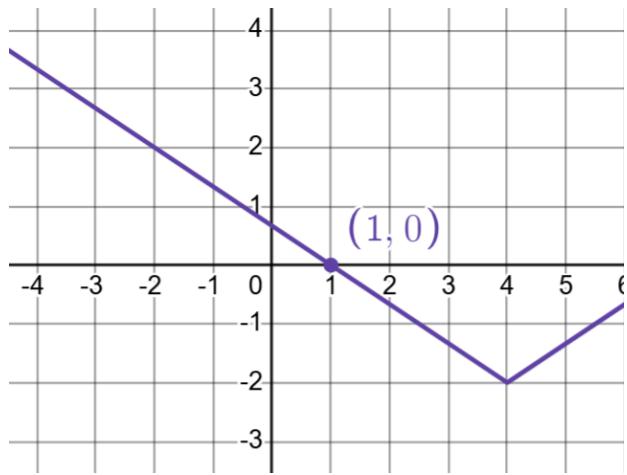


Parent function:

Transformations:

Equation:  $f(x) =$

16.



Parent function:

Transformations:

Equation:  $f(x) =$

$$17. 3^{5-\sqrt{x}} - 1 = 0$$

$$18. \sqrt{2 - 3x} = 4$$

$$19. \frac{6x-1}{2x-3} = 5$$

$$20. \sqrt[3]{\frac{2}{x-1}} = -4$$

$$21. \sqrt{2x+1} = \sqrt{3-x}$$

$$22. 3x^{2/3} - 1 = 107$$

## Capstone Questions

23. The gravitational force  $F$  between two bodies of mass  $m_1$  and  $m_2$  is given by Newton's Law of Universal Gravitation:

$$F = G \cdot \frac{m_1 m_2}{r^2}$$

Where  $G$  is a universal constant. Rearrange the equation to find  $r$  in terms of the other quantities.

24. When a block of mass  $m$  is connected to a spring, it can be set into simple harmonic motion (bouncing up and down). The period (time) it takes to bounce up and down is given by the equation

$$T = 2\pi\sqrt{\frac{m}{k}}$$

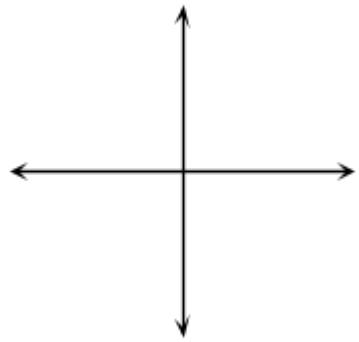
Where  $k$  is called the spring constant, and is a physical property of the spring. Rearrange this equation to isolate the mass  $m$  in terms of the other quantities.

25. Gray wolves were reintroduced to Yellowstone National Park in 1995 and 1996, with about 40 wolves brought from Canada, after being absent for nearly 70 years. Since then, they started breeding at a rate such that the population doubled every 10 years.

- a. Write a model for the number of wolves after  $t$  years. (Hint: Refer back to standard 5 from Fall trimester)
  
- b. According to your model, how long would it take for the wolf population to reach 1280? (Hint: Use your model from part a to set up and solve an equation)

26. Consider the function defined by  $f(x) = \frac{2}{(x-3)^2} + 1$

- a. What is the parent function for  $f$ ? Sketch a rough graph of the parent function on the axes to the right:



- b. What are the transformations of  $f$  from the parent function? Describe them in words:

i.

ii.

iii.

- c.  $f$  has vertical and horizontal asymptotes. Write the equation of each one:

Vertical asymptote:

Horizontal asymptote:

- d. Find the  $x$ -intercept(s) of  $f$  and plot it/them on the graph.

- e. Construct a table of values for at least three values. Show the calculations that you perform. Plot points from your table on the axes, then use them to draw an accurate graph. Be sure to draw the asymptotes on your graph as dashed lines.

