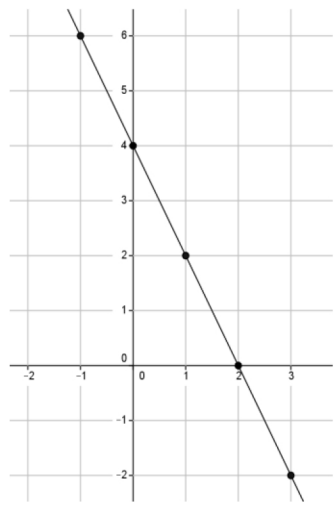
Name _____ Date _____

Graphs of Simple Nonlinear Functions

1. The graph below is the graph of a function. Do you think the function is linear or nonlinear? Show work in your explanation that supports your answer.



2. A function has the rule so that each input of x is assigned an output of $\frac{1}{2}x^2$. Do you think the graph of the function will be linear or nonlinear? What shape do you expect the graph to take? Explain.

1. A function has the rule so that each input of x is assigned an output of $x^2 - 4$.

   a. Do you think the function is linear or nonlinear? Explain.

   b. What shape do you expect the graph of the function to be?

   c. Develop a list of inputs and outputs for this function. Plot the inputs and outputs as points on the coordinate plane where the output is the y-coordinate.

   d. Was your prediction correct?

Input (x)	Output $(x^2 - 4)$
-3	
-2	
-1	
0	
1	
2	
3	

2. A function has the rule so that each input of x is assigned an output of $\frac{1}{x+3}$.

   a. Is the function linear or nonlinear? Explain.

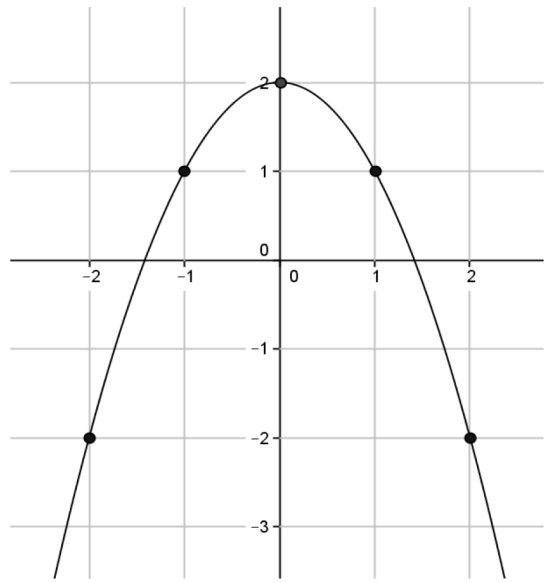
   b. What shape do you expect the graph of the function to take?

   c. Given the inputs in the table below, use the rule of the function to determine the corresponding outputs. Plot the inputs and outputs as points on the coordinate plane where the output is the y-coordinate.

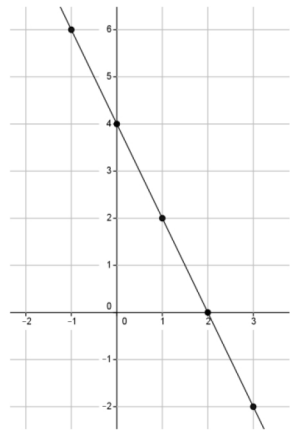
   d. Was your prediction correct?

Input (x)	Output $\left(\frac{1}{x+3}\right)$
-2	
-1	
0	
1	
2	
3	

3. Is the function that is represented by this graph linear or nonlinear? Explain. Show work that supports your claim.



1. **The graph below is the graph of a function. Do you think the function is linear or nonlinear? Show work in your explanation that supports your answer.**



Student work may vary. Accept any answer that shows the rate of change is not the same for two or more sets of coordinates.

The rate of change of the coordinates $(0, 4)$ *and* $(1, 2)$*:*

$$\frac{4-2}{0-1} = \frac{2}{-1}$$
$$= -2$$

The rate of change of the coordinates $(1, 2)$ *and* $(2, 0)$*:*

$$\frac{2-0}{1-2} = \frac{2}{-1}$$
$$= -2$$

When I check the rate of change for any two coordinates, they are the same; therefore, the graph of the equation is linear.

2. **A function has the rule so that each input of x is assigned an output of $\frac{1}{2}x^2$. Do you think the graph of the function will be linear or nonlinear? What shape do you expect the graph to be? Explain.**

The equation is nonlinear because the exponent of x is greater than 1. I expect the graph to be some sort of curve.

1. **A function has the rule so that each input of x is assigned an output of $x^2 - 4$.**

   a. **Do you think the function is linear or nonlinear? Explain.**

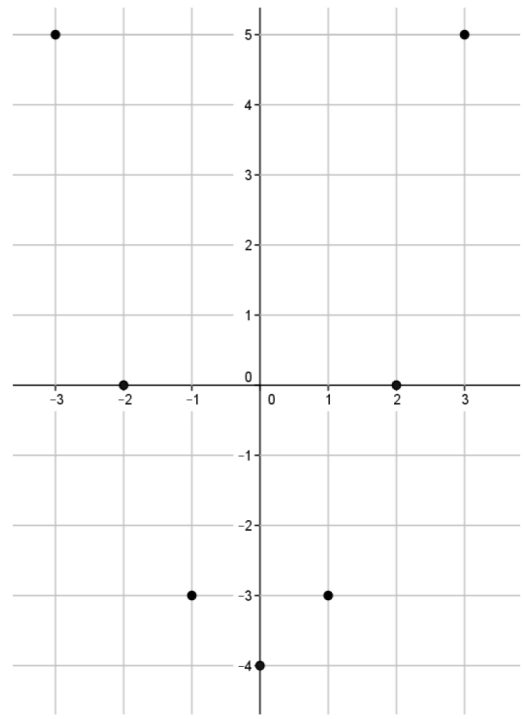
   No, I do not think the equation is linear. The exponent of x is greater than one.

   b. **What shape do you expect the graph of the function to be?**

   I think the shape of the graph will be a curve.

c. Develop a list of inputs and outputs for this function. Plot the inputs and outputs as points on the coordinate plane where the output is the y-coordinate.

Input (x)	Output $(x^2 - 4)$
-3	5
-2	0
-1	-3
0	-4
1	-3
2	0
3	5



d. Was your prediction correct?

Yes, the graph appears to be taking the shape of some type of curve.

2. A function has the rule so that each input of x is assigned an output of $\frac{1}{x+3}$.

a. Is the function linear or nonlinear? Explain.

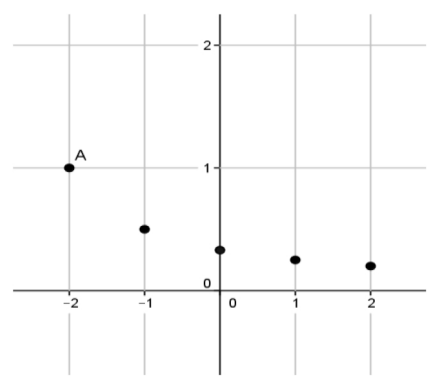
No, I do not think the function is linear. The exponent of x is less than one.

b. What shape do you expect the graph of the function to take?

I think the shape of the graph will be a curve.

c. Given the inputs in the table below, use the rule of the function to determine the corresponding outputs. Plot the inputs and outputs as points on the coordinate plane where the output is the y-coordinate.

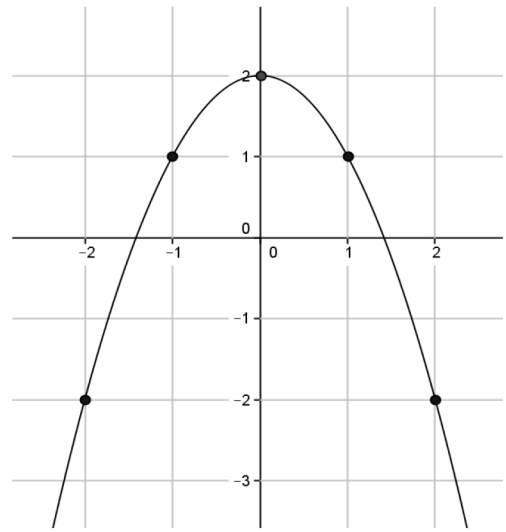
Input (x)	Output $\left(\frac{1}{x+3}\right)$
-2	1
-1	0.5
0	$0.3333\ldots$
1	0.25
2	0.2
3	$0.16666\ldots$



d. Was your prediction correct?

Yes, the graph appears to be taking the shape of some type of curve.

3. **Is the function that is represented by this graph linear or nonlinear? Explain. Show work that supports your conclusion.**



Student work may vary. Accept any answer that shows the rate of change is not the same for two or more sets of coordinates.

It does not appear to be linear.

The rate of change for the coordinates $(-2, -2)$ *and* $(-1, 1)$*:*

$$\frac{-2-1}{-2-(-1)} = \frac{-3}{-1} = 3$$

The rate of change for the coordinates $(-1, 1)$ *and* $(0, 2)$*:*

$$\frac{1-2}{-1-0} = \frac{-1}{-1} = 1$$

No, the graph is not linear; therefore, the function is not linear. When I check the rate of change for any two sets of coordinates, they are not the same.