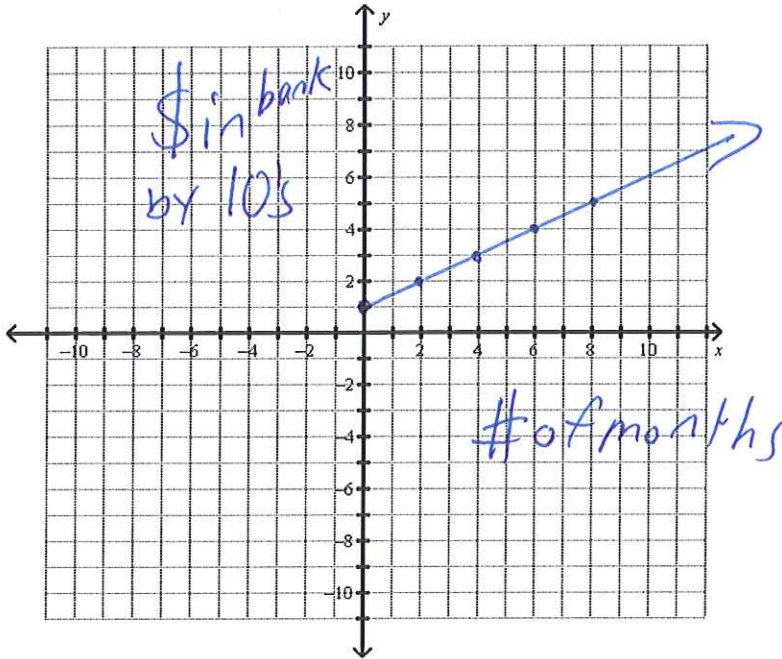


Non Linear

Create examples of each of the following...

Linear

Graph:



of months
↓
Total \$ in bank
↓

Table:

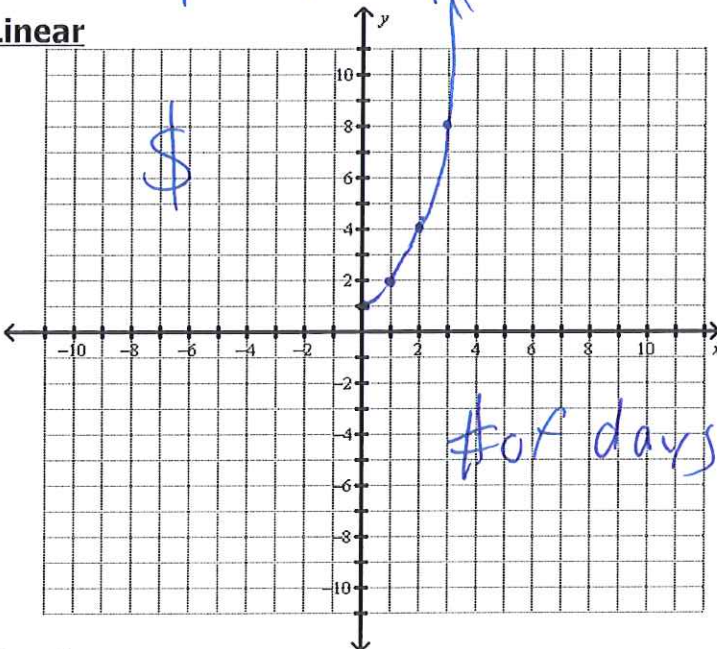
x	y
0	10
1	15
2	20
3	25
4	30
5	35

Situation: Lucas has \$10 in a piggy bank. He saves \$5 a month.

Equation: $y = 5x + 10$

Non - Linear

Graph:



of days
↓
Total \$

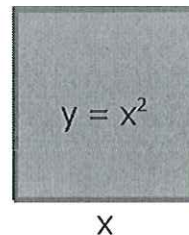
Table:

x	y
0	1
1	2
2	4
3	8
4	16
5	32

Situation: You have 1 dollar. It doubles every day.

Equation: $y = 2^x$

A square tile has side length of x inches. The equation $y = x^2$ gives the area y of the tile in square inches.



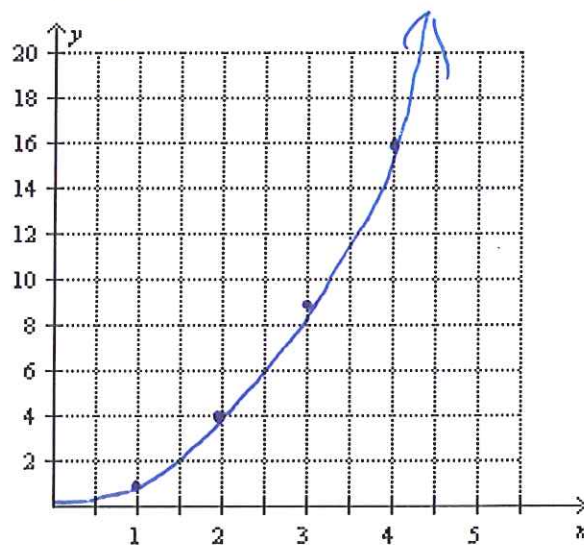
1. Do you think that $y = x^2$ will produce a graph that is a straight line (linear)? Why or why not?

No, the "x" is being squared.

2. Complete the table.

Side Length, x	1	2	3	4
Area, y	1	4	9	16

3. Plot the points, and then connect the points to represent all the possible x -values and their corresponding y -values. Label both the x -axis and the y -axis.



4. Decide whether the equation $y = x^2$ is a linear equation. Explain.

It does not.
The outputs are increasing but NOT by the same amount each time.

Area
in²
or
square
inches

Side Length (in)

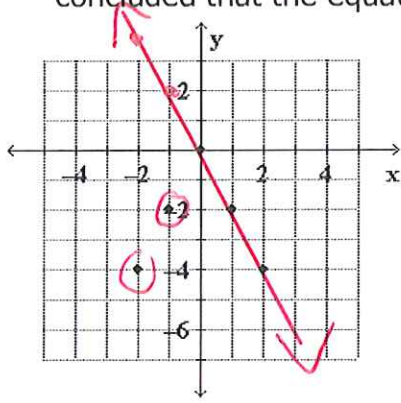
5. How is the equation, $y = x^2$ different from the linear equations you have graphed?

$y = x^2$ is a nice smooth curve.

6. Explain whether you think the equation $y = 2x^2 + 4$ is a linear equation.

Non-Linear. The "x" is being squared.

7. **Error Analysis** A student graphed several solutions of $y = -2x$ as shown. The student concluded that the equation is not a linear equation. Explain the student's error.



$$y = -2(-1)$$

$$y = -2(-2)$$

$$y = 2$$

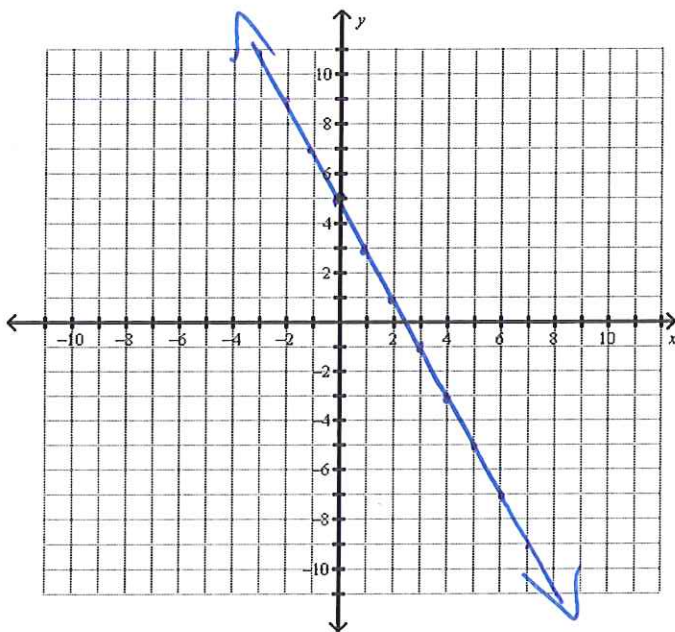
$$y = 4$$

The student multiplied incorrectly.

Graph solutions of each equation and tell whether the equation is linear or non-linear.

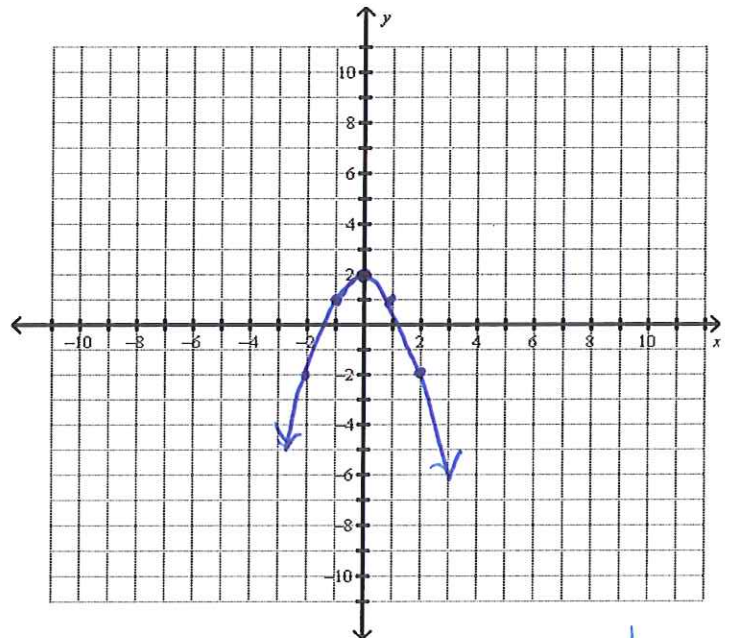
8. $y = 5 - 2x$ Linear or Non-linear

Input, x	-1	1	3	5
Output, y	7	3	-1	-5



9. $y = 2 - x^2$ Linear or Non-linear

Input, x	-2	-1	0	1	2
Output, y	-2	1	2	1	-2



$$y = 5 - 2(-1)$$

$$y = 5 - 2(1)$$

$$y = 5 + 2$$

$$y = 5 - 2$$

$$y = 7$$

$$y = 3$$

$$y = 5 - 2(3)$$

$$y = 5 - 2(5)$$

$$y = 5 - 6$$

$$y = 5 - 10$$

$$y = -1$$

$$y = -5$$

$$y = 2 - (-2)^2$$

$$y = 2 - (-1)^2$$

$$y = 2 - 4$$

$$y = 2 - 1$$

$$y = -2$$

$$y = 1$$

$$y = 2 - (0)^2$$

$$y = 2 - (1)^2$$

$$y = 2 - (2)^2$$

$$y = 2 - 0$$

$$y = 2 - 1$$

$$y = 2 - 4$$

$$y = 2$$

$$y = 1$$

$$y = -2$$

10. Olivia measured several rooms in her house in feet. She wants to express the measurements in inches. Write an equation relating feet x and inches y . Tell whether the equation is Linear or Non-linear.

Linear $y = 12x$

11. Natalie receives \$100 from her grandmother for her birthday. She also saves \$20 every month. Write an equation relating months x and total savings y . Tell whether the equation is Linear or Non-linear.

Linear $y = 20x + 100$

For 12 & 13, explain whether each equation is a linear equation.

12. $y = x^2 - 1$ Non-Linear. The "x" is being squared.

13. $y = 1 - x$ Linear. The output decreases by the same amount each time.

14. **Error Analysis:** A student claims that the equation $y = 7$ is not a linear equation because it does not have the form $y = mx + b$. Do you agree or disagree? Why?

Disagree. The equation $y = 7$ is a line. It is a horizontal when you graph it.