

# Algebra 1

Chapter 4

Section 4-3

May 13-10:02 PM

## Linear and Nonlinear Functions

### **Linear Function**

A linear function is a function whose graph is a nonvertical line or part of a nonvertical line.

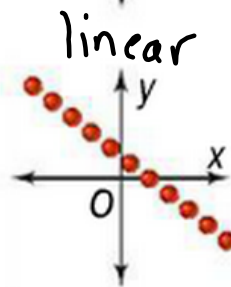
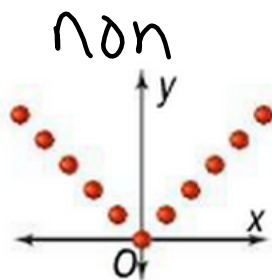
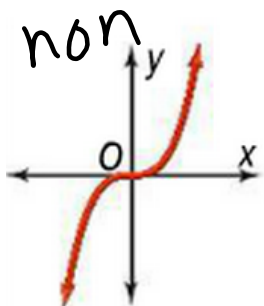
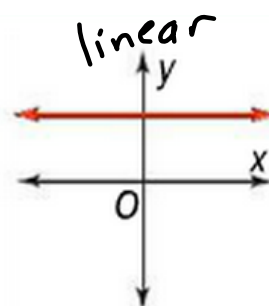
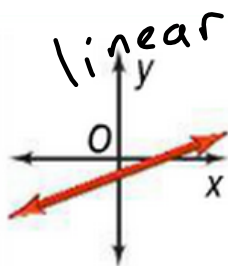
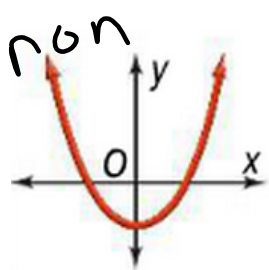
### **Nonlinear Function**

A nonlinear function is a function whose graph is not a line or part of a line.

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## Linear and Non-linear Functions

Which of the following functions are linear?



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## Review: Exponents

$$2^6 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 64$$

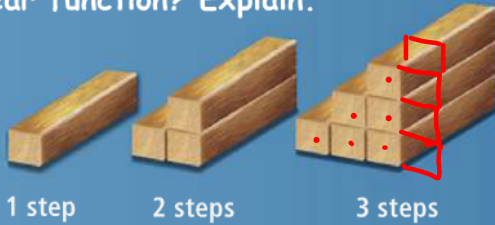
$$10^3 = 10 \cdot 10 \cdot 10 = 1,000$$

$$5^3 = 125$$

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### More Table Relationships

The table shows the relationship between the number of steps in the staircase below and the number of blocks needed to build the staircase. Copy and complete the table. Is the relationship a function? If so, is it a linear function? Explain.



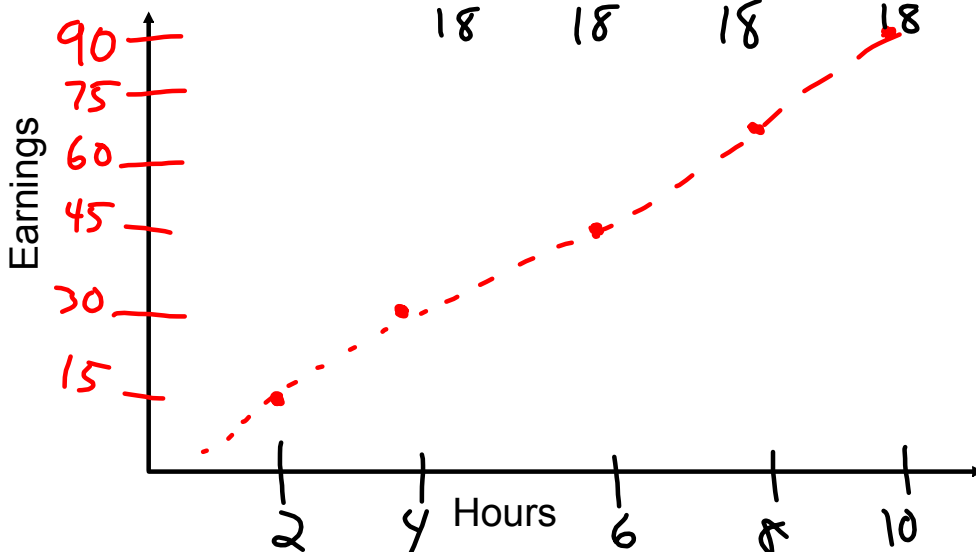
Number of Steps	Number of Blocks	Ordered Pair
1	1	(1, 1)
2	3	(2, 3)
3	6	(3, 6)
4	10	(4, 10)
5	15	(5, 15)

It is a function!  
Not linear!

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A student's earnings  $E$ , in dollars, is a function of the number  $h$  of hours worked. Graph the function shown by the table. Tell whether the function is *linear* or *nonlinear*.

Hours, $h$	2	4	6	8	10
Earnings (\$), $E$	18	36	54	72	90



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## Functions

A bacteria population of 250 doubles in size every hour. Describe the relationship between the bacteria,  $b$ , and hours,  $h$ , during the first five hours in a table, a graph and an equation.

TABLE

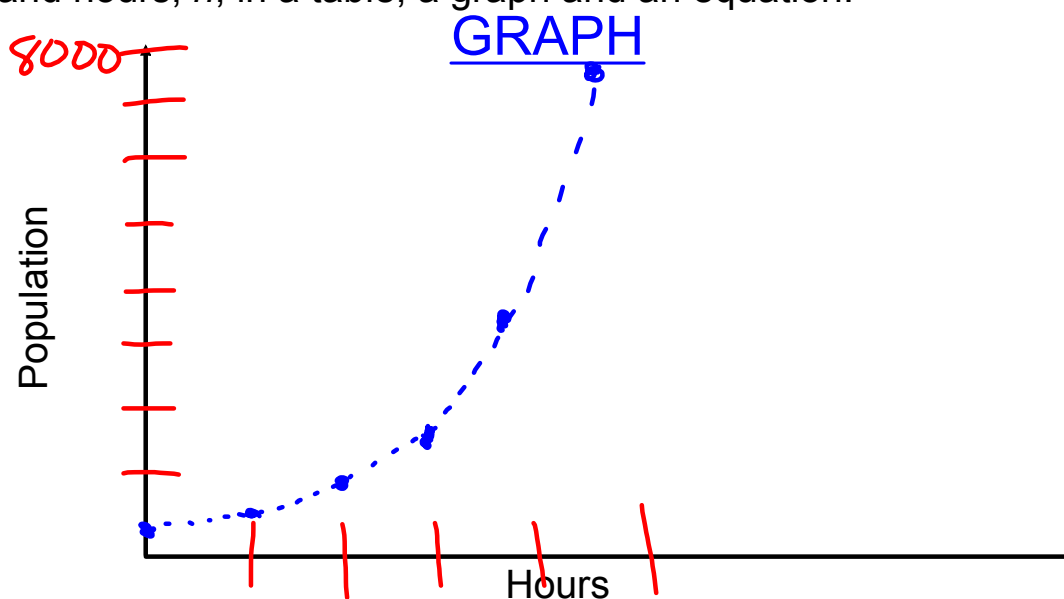
$h$	$b$
0	250
1	500
2	1000
3	2000
4	4000
5	8000

*Note: In the original image, blue arrows labeled 'x2' point from each row to the next, indicating doubling.*

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## Functions

A bacteria population of 250 doubles in size every hour. Describe the relationship during the first five hours between the bacteria,  $b$ , and hours,  $h$ , in a table, a graph and an equation.



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## Functions

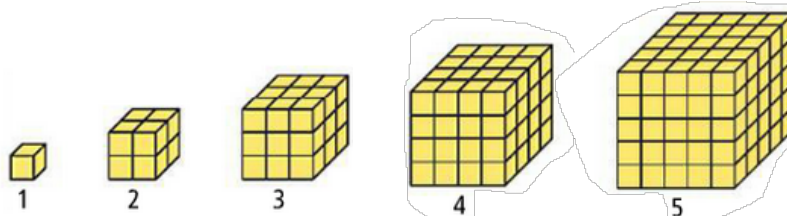
A bacteria population of 250 doubles in size every hour. Describe the relationship during the first five hours between the bacteria,  $b$ , and hours,  $h$ , in a table, a graph and an equation.

### EQUATION

$$b = 250 \cdot 2^h$$

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For the pattern of blocks, fill in the rest of the table. Then write an equation for the relationship of  $x$  and  $y$ .



Number of Blocks on Edge, $x$	Total Number of Blocks, $y$	Ordered Pair $(x, y)$
1	1	(1, 1)
2	8	(2, 8)
3	27	(3, 27)
4	64	(4, 64)
5	125	(5, 125)

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For the pattern of blocks, fill in the rest of the table. Then write an equation for the relationship of  $x$  and  $y$ .

Number of Blocks on Edge, $x$	Total Number of Blocks, $y$	Ordered Pair $(x, y)$
1	1	(1, 1)
2	8	(2, 8)
3	27	(3, 27)
4	64 ■	(4, 64)
<u>5</u>	125 ■	(5, 125)

$$y = x^3$$

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