

Function Rules and Equations Notes

Find a Rule

A sequence can also be shown in a table. The table gives both the position of each term in the list and the value of the term.

List	Table			
8, 16, 24, 32, ...	1	2	3	4
	8	16	24	32

x Term
Position
y Value of Term



A **sequence** is a list of numbers in a specific order. Each number in the list is called a **term** of the sequence.

You can write an algebraic expression to describe a sequence. The value of each term can be described as a function of its position in the sequence.

In the table above, the position can be considered the input, and the value of the term as the output.

y

Example



3. Use words and symbols to describe the value of each term as a function of its position. Then find the value of the tenth term.

Position	1	2	3	4	<i>n</i>
Value of Term	3	6	9	12	■

1st 2nd 3rd 4th
3, 6, 9, 12, ...

Work Backward

You can check your rule by working backward. Divide each term by 3 to check the position.

★ Multiply the position by 3

$$\text{Function Rule} = 3x$$

$$10^{\text{th}} = 3(10) = 30$$

Got It? Do these problems to find out.

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the eighth term.

e.

Position	2	3	4	5	n
Value of Term	12	18	24	30	■

Multiply the position by 6
 $6n$ or $6x$

$$8^{\text{th}}: 6(8) = 48$$

f.

Position	3	4	5	6	n
Value of Term	7	8	9	10	■

Add the position by 4

$$n + 4 \text{ or } x + 4$$

$$8^{\text{th}}: 8 + 4 = 12$$

Show your work.

e. _____

f. _____



Example



4. The table shows the number of necklaces Ari can make, based on the number of hours she works. Write a function rule to find the number of necklaces she can make in x hours.

Hours (x)	Number of Necklaces
1	5
2	7
3	9
x	■

$$2x + 3$$

+1 ← $x2 = 2 + 3$ → +2
 +1 ← $x2 = 4 + 3$ → +2

$$\frac{\Delta y}{\Delta x} = \frac{\text{Change in } y}{\text{Change in } x}$$

Change in output
 Change in input

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

Function Equations

Example



1. Write an equation to represent the function shown in the table.

Input, x	1	2	3	4	5
Output, y	9	18	27	36	45

$$\text{Output} = \text{input} \times 9$$

$$y = 9x$$

$$\text{Output}(y) = \text{function rate}$$

Got It? Do this problem to find out.

- a. Write an equation to represent the function shown in the table.

Input, x	1	2	3	4	5
Output, y	16	32	48	64	80



$$y = 16x$$

$$\text{Output} = \text{input} \times 16$$



Examples



Martino constructed the graph shown, which shows the height of his cactus after several years of growth.

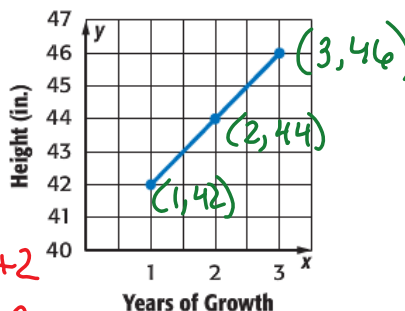
3. Make a function table for the input-output values.

The three input values are 1, 2, and 3. The corresponding output values are 42, 44, and 46.

Input (x)	Output (y)
1	42
2	44
3	46

$+1 \leftarrow$ $\rightarrow +2$
 $+1 \leftarrow$ $\rightarrow +2$
 $\frac{2}{1}$

Cactus Height



4. Write an equation from the graph that could be used to find the height y of the cactus after x years.

$$FR \rightarrow 2x + 40$$

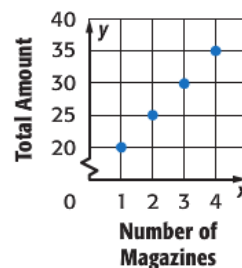
$$y = 2x + 40$$

Show your work.

Got It? Do this problem to find out.

Magazines (x)	Total (y)
1	20
2	25
3	30
4	35

d. The graph shows the total amount y that you spend if you buy one book and x magazines. Make a function table for the input-output values. Write an equation from the graph that could be used to find the total amount y if you buy one book and x magazines.



d. _____

$$Y = 5x + 15$$

Extension Problems:

2. Use words and symbols to describe the value of each term as a function of its position. Then find the value of the fifteenth term in the sequence.

(Example 3)

Position	1	2	3	4	n
Value of Term	2	4	6	8	■



3. The table at the right shows the fee for overdue books at a library, based on the number of weeks the book is overdue. Write a function rule to find the fee for a book that is x weeks overdue. (Example 4)

Weeks Overdue (x)	Fee (\$)
1	3
2	5
3	7
4	9
x	■

+1 < > +2

+1 < > +2

+1 < > +2

$$1(2) = 2 + ?$$

$$2(2) = 4 + ?$$

$$3(2) = 6 + ?$$

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

$$2x + 1$$

1. Write an equation to represent the function shown in the table. (Example 1)

Input (x)	0	1	2	3	4
Output (y)	0	4	8	12	16

Use words and symbols to describe the value of each term as a function of its position. Then find the value of the twelfth term in the sequence. (Examples 1–3)

1

Position	3	4	5	6	n
Value of Term	12	13	14	15	■

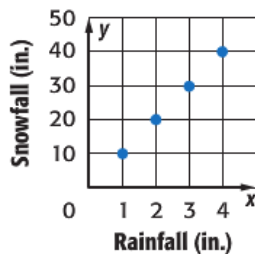
2.

Position	2	3	4	5	n
Value of Term	24	36	48	60	■

4. The table shows the amount it costs to rock climb at an indoor rock climbing facility, based on the number of hours. What is the rule to find the amount charged to rock climb for x hours? (Example 4)

Time (x)	Amount (\$)
1	13
2	21
3	29
4	37
x	■

3. The graph below shows the number of inches of rainfall x equivalent to inches of snow y . Make a function table for the input-output values. Write an equation from the graph that can be used to find the total inches of snow y equivalent to inches of rain x . (Examples 3 and 4)



Rain (x)	Snow (y)
