Name Key Class Date

2-1

Functions, Tables, and Graphs

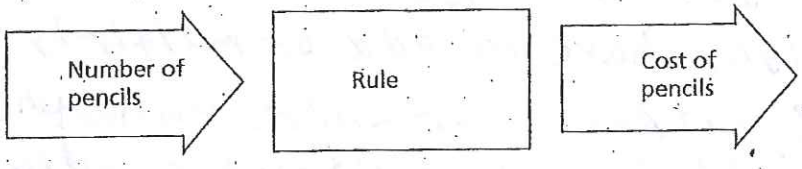
COMMON CORE CC.8.F.1

Essential question: *How do you represent a function with a table or graph?*

1 EXPLORE Understanding Relationships

Carlos needs to buy some new pencils from the school supply cabinet at school. Carlos asks his classmates if they know how much pencils cost. Angela says she bought 2 pencils for $0.50. Paige bought 3 pencils for $0.75, and Spencer bought 4 pencils for $1.00.

Carlos thinks about the rule for the price of a pencil as a machine. When he puts the number of pencils he wants to buy into the machine, the machine applies a rule and tells him the total cost of that number of pencils.



i.	2	?	$.5
ii.	3	?	$.75
iii.	4	?	$1
iv.	x	$.25x	
v.	12	$.25 • 12	$3

A Use the prices in the problem to fill in rows i–iii of the table.

B Describe any patterns you see. Use your pattern to determine the cost of 1 pencil.

# of pencils ↑ by 1, the cost ↑ by $.25
(1 pencil = $.25)

C Use the pattern you identified to write the rule applied by the machine. Write the rule as an algebraic expression and fill in row iv of the table.

D Carlos wants to buy 12 pencils. Use your rule to fill in row v of the table to show how much Carlos will pay for 12 pencils.

TRY THIS!

There are 6 pencil-top erasers in 2 packages of erasers. There are 9 erasers in 3 packages.

1a. Write a rule in words for the number of packages Carlos needs to buy to get x erasers. Then write the rule as an algebraic expression.

÷ # of erasers by 3

1b. How many packages does Carlos need to buy to get 18 erasers?

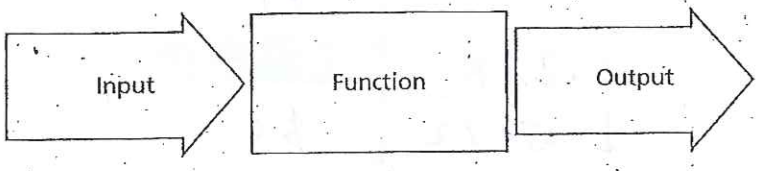
$\frac{18}{3} = 6$ packages

REFLECT

1c. How can you decide what operation to use in your rule?

If the output is greater than the input, you might have to add or multiply. If the output is smaller than the input, you might have to subtract or divide.

The rules in 1 are functions, and the machines are function machines. The value that is put into a function machine is the **input**. The result after applying the function machine's rule is the **output**. A **function** is a rule that assigns exactly one output to each input.



A table of values can represent a function if each input value is paired with only one output value.

2 EXAMPLE **Recognizing Functions**

Tell whether each relationship is a function.

A

Input	Output
15	70
60	88
75	95
45	80

Each input has only one output.

This relationship is a function.

B

Input	Output
14	60
13	55
14	57
15	52

The input 14 has more than one output.

This relationship is NOT a function.

The input values (x) and output values (y) of a function can be displayed in a table or written as ordered pairs (x, y). These ordered pairs can be graphed in the coordinate plane to show a graph of the function.

Some function rules can be written as equations such as $y = 2x$. By substituting values for x, you can generate corresponding y-values. The ordered pairs (x, y) are solutions of the equation.

3 EXAMPLE Graphing a Function

Graph the function $y = 2x + 3$.

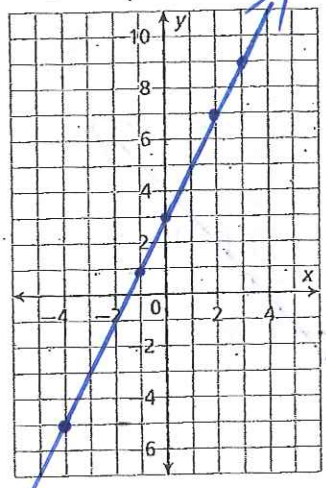
Create a table of values.

x	$2x + 3$	y
-4	$2(-4) + 3$	-5
-1	$2(-1) + 3$	1
0	$2(0) + 3$	3
2	$2(2) + 3$	7
3	$2(3) + 3$	9

Write ordered pairs.

(x, y)
$(-4, -5)$
$(-1, 1)$
$(0, 3)$
$(2, 7)$
$(3, 9)$

Graph the ordered pairs.



Draw a line through the points to represent all the possible x-values and their corresponding y-values.

PRACTICE

Fill in each table. In the row with x as the input, write a rule as an algebraic expression for the output. Then complete the last row of the table using the rule.

1.

Input	Output
Tickets	Cost ($)
2	40
5	100
7	140
8	160
x	$20x$
10	200

2.

Input	Output
Minutes	Pages Read
2	1
10	5
20	10
30	15
x	$\frac{x}{2}$
60	30

3.

Input	Output
Muffins	Cost ($)
1	2.25
3	6.75
6	13.50
12	27.00
x	$2.25x$
18	40.5

Tell whether each relationship is a function. Y = Function N = Not a Function

4.

Input	6	7	8	7	9
Output	75	80	87	88	95

N

5.

Input	1	2	3	4	5
Output	4	8	12	16	20

Y

6. (1, 3), (2, 5), (3, 0), (4, −1), (5, 5)

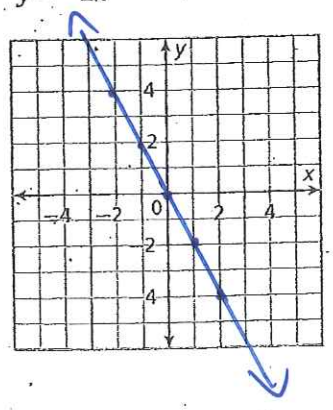
Y

7. (2, 7), (6, 4), (0, 3), (2, 6), (1, 5)

N

Graph each function on the coordinate plane.

8. $y = -2x$



9. $y = x - 3$