Algebra 1 **Name:**_____

Section 5.4: Writing a Function Rule

Notes

In section 5.3, you analyzed a table of values to draw the graph of a function. In 5.4, you will take a table of values and try to write a function rule (equation) given that information.

Remember: INDEPENDENT variables are your "x" values (your "inputs")
DEPENDENT variables are your "y" values (your "outputs")

1) Write a Function Rule for each table:

a)

x	f(x)
1	5
2	6
3	7
4	8

b)

x	f(x)
1	-1
2	0
3	1
4	2

c)

x	f(x)
1	1
3	9
5	25
7	49

d)

x	f(x)
1	3
2	5
3	7
4	9

2) Writing a Function Rule from a Situation:

a) The journalism class makes $25 per page of advertising in the yearbook. If the class sells "p" pages of advertising, how much money will it earn?

b) The class sold 6 pages of advertising. How much money did the class make?

c) The choir spent $100 producing audio tapes of its last performance and will sell the tapes for $5.50 each. Write a rule to describe the choir's profit as a function of the number of tapes sold: t.

d) Write a function rule for the total distance d(n) traveled after "n" hours at a constant speed of 45 miles per hour. How far will you have traveled after 6 hours?

If you are given a graph and asked to write a function rule, make a table of points and figure out the rule from your table.

Always ask yourself: "What can I do to _____ to get _____?"

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Practice 5-4

Writing a Function Rule

Write a function rule for each table.

1.

x	f(x)
0	3
2	5
4	7
6	9

2.

x	f(x)
0	0
1	3
3	9
5	15

3.

x	f(x)
5	0
10	5
15	10
20	15

4. a. Write a function rule to calculate the cost of buying bananas at $.39 a pound.

b. How much would it cost to buy 3.5 pounds of bananas?

5. To rent a cabin, a resort charges $50 plus $10 per person.

a. Write a function rule to calculate the total cost of renting the cabin.

b. Use your rule to find the total cost for six people to stay in the cabin.

Write a function rule for each table.

6.

x	f(x)
−4	−2
−2	−1
6	3
8	4

7.

x	f(x)
−3	9
0	0
1	1
5	25

8.

x	f(x)
0	20
2	18
4	16
8	12

9. Pens are shipped to the office supply store in boxes of 12 each.

a. Write a function rule to calculate the total number of pens when you know the number of boxes.

b. Calculate the total number of pens in 16 boxes.

10. a. Write a function rule to determine the change you would get from a $20 bill when purchasing items that cost $1.25 each.

b. Calculate the change when five of these items are purchased.

c. Can you purchase 17 of these items with a $20 bill?

11. You invest $209 to buy shirts and then sell them for $9.50 each.

a. Write a function rule to determine your profit.

b. Use your rule to find your profit after selling 24 shirts.

c. How many shirts do you need to sell to get back your investment?

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Reteaching 5-4

Writing a Function Rule

OBJECTIVE: Writing rules for functions from tables and words

MATERIALS: None

You can write a rule for a function by analyzing a table of values. Look for a pattern in the data table. For each row, ask yourself, "What can I do to the first number to get the second number?" Write the patterns. Circle the pattern that works for all of the data in the table. This is the rule for the function.

Example

x	*f(x)*
1	3
2	4
3	5

← **Add 2 or multiply by 3.**

← **Add 2 or multiply by 2.**

← **Add 2.**

The function rule must be $f(x)$ equals x plus 2. The statement can be written as $f(x) = x + 2$.

Exercises

Analyze each table and then write the function rule.

1.

x	*f(x)*
0	0
1	3
2	6
3	9

2.

x	*f(x)*
0	−1
1	0
2	1
3	2

3.

x	*f(x)*
0	0
−1	1
3	9
5	25

Write a function rule for each situation.

4. the length $\ell(w)$ of a box that is two more than four times the width w.

5. the width $w(\ell)$ of a sheet of plywood that is one half the length ℓ.

6. the cost $c(a)$ of a pounds of apples at \$.99 per pound

7. the distance $d(t)$ traveled at 65 miles per hour in t hours

8. the value $v(q)$ of a pile of q quarters

9. a worker's earnings $e(n)$ for n hours of work when the worker's hourly wage is \$8.25

10. the distance $f(d)$ traveled in feet when you know the distance d in yards

EXAMPLE 1 Write a function rule for each table.

a.

x	$f(x)$
2	8
4	10
6	12
8	14

Ask yourself, "What can I do to 2 to get 8, 4 to get 10, . . . ?"
You add 6 to each x-value to get the $f(x)$ value.

Relate: $f(x)$ equals x plus 6

Write: $f(x) = x + 6$

A rule for the function is $f(x) = x + 6$.

b.

x	y
1	2
2	5
3	10
4	17

Ask yourself, "What can I do to 1 to get 2, 2 to get 5, . . . ?"
You multiply each x-value times itself and add 1 to get the y value.

Relate: y equals x times itself plus 1

Write: $y = x^2 + 1$

A rule for the function is $y = x^2 + 1$.

2 EXAMPLE The journalism class makes $25 per page of advertising in the yearbook. If the class sells n pages, how much money will it earn?

a. Write a function rule to describe this relationship.

Relate: money earned is 25 times number of pages sold

Define: Let n = number of pages sold.

Let $P(n)$ = money earned.

Write: $P(n) = 25 \cdot n$

The function rule $P(n) = 25n$ describes the relationship between the number of pages sold and the money earned.

b. The class sold 6 pages of advertising. How much money did the class make?

$P(n) = 25 \cdot n$

$P(6) = 25 \cdot 6$ Substitute 6 for n.

$P(6) = 150$ Simplify.

The class made $150.

3 EXAMPLE The choir spent $100 producing audio tapes of its last performance and will sell the tapes for $5.50 each. Write a rule to describe the choir's profit as a function of the number of tapes sold.

Relate: total profit is $5.50 times tapes sold minus cost of tape production

Define: Let t = number of tapes sold.

Let $P(t)$ = total profit.

Write: $P(t) = 5.5 \cdot t - 100$

The function rule $P(t) = 5.5t - 100$ describes the profit as a function of the number of tapes sold.

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5.4 Function Rule Writing

Directions: You and a Partner will work together to solve these relation and function rule problems. One partner will solve the problems on the left and the other partner will solve the problems on the right. When you are done, your answers will match BUT the answers will NOT be in the same order in both columns. GOOD LUCK!

X	Y
2	-8
4	-16
6	-24

X	F(x)
1	.5
2	1
3	1.5

The total cost of c ounces of candy if each ounce costs $2.79

X	Y
0	0
-1	4
-2	8

X	Y
10	10
20	0
30	-10

A babysitter chargers $8.50 per hour plus a flat fee of $10. Write a function rule describing the relationship.

X	F(x)
4	2
6	3
8	4

X	Y
1	-3
2	-6
3	-9

X	F(x)
0	0
-2	6
-4	12
-6	18

At a supermarket salad bar, the price of a salad depends on its weight. Salad costs $2.79 per ounce.

A carpenter builds a deck and has to purchase nails by the pound. Each pound of nails costs $6.50. The carpenter charges a fee of $10 for his work. Write a function rule describing the relationship.

X	Y
2	0
4	0
6	0

X	Y
0	0
-2	0
-3	0
5	0

X	F(x)
1	19
2	18
3	17