

4-8 Writing Equations from Patterns

(Pages 240–245)

Points that lie in a linear pattern can be described by an equation.

Writing Equations	First make a table of several ordered pairs from the graph of the relation. Next, find the common differences of the domain and range. Then, write an equation using the ratio of the differences. Check to see if you need to adjust your equation by adding or subtracting a quantity.
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Examples

a. Write an equation for the function.

x	6	4	2
y	3	2	1

Find the differences in domain and range values.

domain: $4 - 6 = -2$ and $2 - 4 = -2$

range: $2 - 3 = -1$ and $1 - 2 = -1$

$$\frac{\text{range differences}}{\text{domain differences}} = \frac{-1}{-2} \text{ or } \frac{1}{2}$$

This suggest $y = \frac{1}{2}x$ may describe the relation.

Check: If $x = 6$, then $y = \frac{1}{2}(6)$ or $3 \checkmark$

If $x = 4$, then $y = \frac{1}{2}(4)$ or $2 \checkmark$

Thus, $y = \frac{1}{2}x$ describes this relation.

b. Write an equation for the function.

x	2	1	0
y	5	2	-1

domain: $1 - 2 = -1$ and $0 - 1 = -1$

range: $2 - 5 = -3$ and $-1 - 2 = -3$

$$\frac{\text{range differences}}{\text{domain differences}} = \frac{-3}{-1} \text{ or } 3$$

This suggests $y = 3x$ may describe the relation.

Check: If $x = 2$, then $y = 3(2)$ or 6 $6 \neq 5$

This suggests that 1 should be subtracted from $3x$ to describe the relation correctly.

You can check to verify that the equation $y = 3x - 1$ describes the relation.

Practice

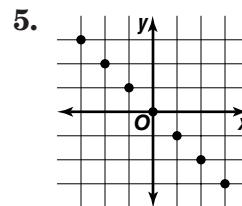
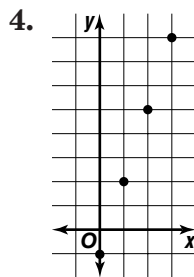
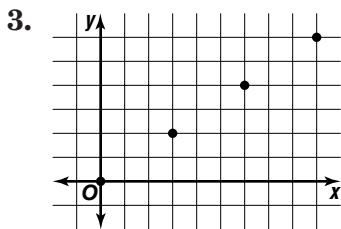
Write an equation for each function.

1.

x	4	8	12	16	20
h(x)	1	2	3	4	5

2.

x	2	4	6	8	10	12
f(x)	-1	-2	-3	-4	-5	-6



6. **Standardized Test Practice** The table shows the number of hours worked versus amount of pay. Write an equation in functional notation for the relation.

Hours	20	25	30	35
Pay (\$)	160	200	240	280

A $f(h) = 8h$

B $f(h) = \frac{1}{8}h$

C $f(h) = 5h$

D $f(h) = \frac{1}{5}h$

Answers: 1. $h(x) = \frac{1}{4}x$ 2. $f(x) = -\frac{1}{2}x$ 3. $y = \frac{3}{2}x$ 4. $y = 3x - 1$ 5. $y = x$ 6. A