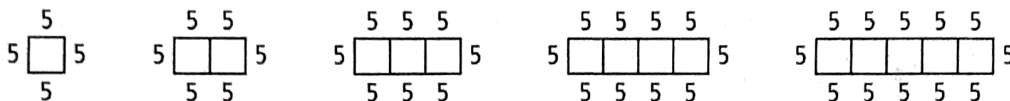


Patterns and Linear Functions

A relationship can be represented in a table, as ordered pairs, in a graph, in words, or in an equation.

Problem

Consider the relationship between the number of squares in the pattern and the perimeter of the figure. How can you represent this relationship in a table, as ordered pairs, in a graph, in words, and in an equation?



Table

For each number of squares determine the perimeter of the figure. Write the values in the table. Remember to focus on the perimeter of the figure, not the squares.

Independent

Number of squares x	1	2	3	4	5
Perimeter y	20	30	40	50	60

dependent

10 16 16 10

slope $\frac{y}{x} = \frac{10}{1} = 10$

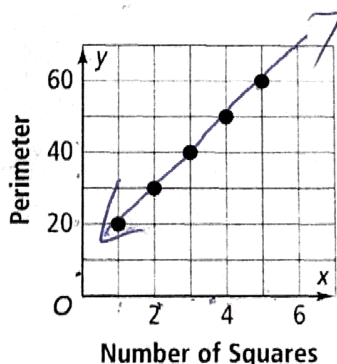
Ordered Pairs

Let x represent the number of squares and y represent the perimeter. Use the numbers in the table to write the ordered pairs.

(1, 20), (2, 30), (3, 40), (4, 50), (5, 60)

Graph

Use the ordered pairs to draw the graph.



Words

The pattern shows the perimeter is the number of squares times 10 plus 10.

Equation

Write an equation for the words.

$$y = 10x + 10$$

$y = mx + b$
 $y = 10x + 10$

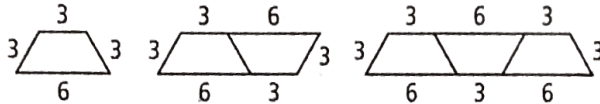
2-2 Reteaching (continued)

Patterns and Linear Functions

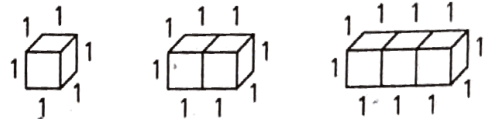
Exercises

Consider each pattern.

1.



2.



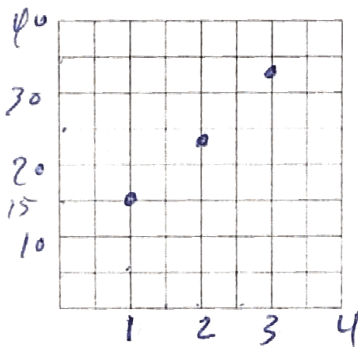
- a. Make a table to show the relationship between the number of trapezoids and the perimeter.

Number of Trapezoids	0	1	2	3	4
Perimeter	6	15	24	33	42

- b. Write the ordered pairs for the relationship.

$(1, 15)$ $(2, 24)$ $(3, 33)$ slope 9

- c. Make a graph for the relationship.



- d. Use words to describe the relationship.

The perimeter is 6 more than 9 times the number of trapezoids.

- e. Write an equation for the relationship.

$$y = mx + b$$

$$y = 9x + 6$$

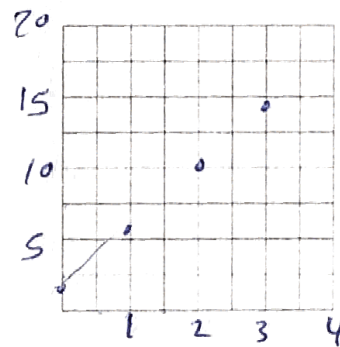
- a. Make a table to show the relationship between the number of cubes and the surface area.

Number of Cubes	0	1	2	3	4
Surface Area	2	6	10	14	18

- b. Write the ordered pairs for the relationship.

$(0, 2)$ $(1, 6)$ $(2, 10)$ $(3, 14)$ slope 4

- c. Make a graph for the relationship.



- d. Use words to describe the relationship.

The surface area of 2 more than 4 times the number of cubes.

- e. Write an equation for the relationship.

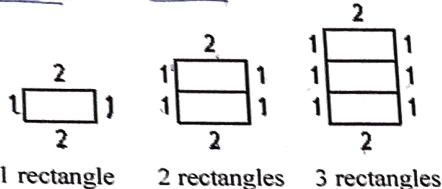
$$y = 4x + 2$$

2-2 Practice

Form K

Patterns and Linear Functions

1. For the diagram below, find the relationship between the number of shapes and the perimeter of the figure they form. Represent this relationship using a table, words, an equation, and a graph.



1 rectangle 2 rectangles 3 rectangles

slope $\frac{2}{1} = 2$ $b = 4$

$y = mx + b$

$y = 2x + 4$

Rectangles	1	2	3	4	5	6	n
Perimeter	6	8	10	12	14	16	

Independent variable: Rectangles
Dependent variable: Perimeter

The perimeter of the shapes is twice the number rectangles plus four.

For each table, determine whether the relationship is a function. Then represent the relationship using words, an equation, and a graph.

2.

x	y
0	2
1	3
2	4
3	5

1. Function

slope $\frac{y}{x} = \frac{1}{1} = 1$

$y = mx + b$

$y = 1x + 2$

3.

x	y
0	5
1	7
2	9
3	11

1. Function

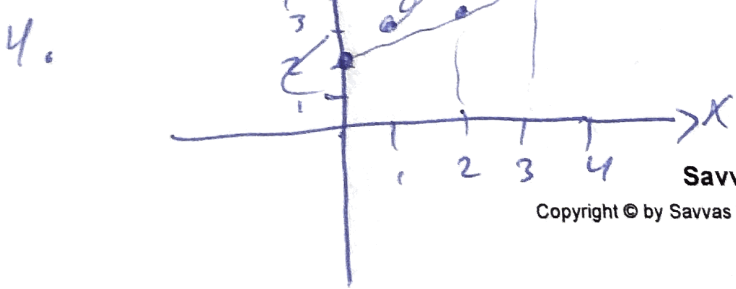
slope $\frac{y}{x} = \frac{2}{1} = 2$

$b = 5$

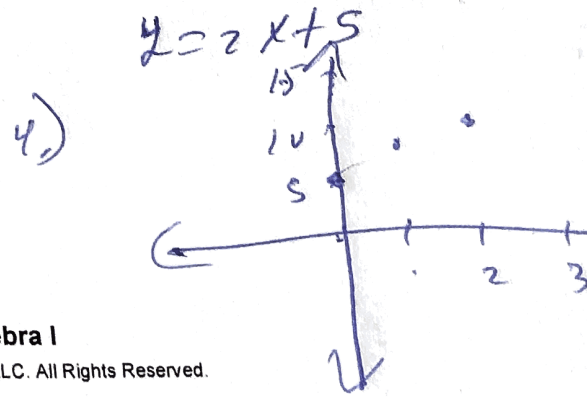
$y = mx + b$

$y = 2x + 5$

3. Each y-value is 2 more than the x-value



3. Each y-value is 5 more than twice the x-value



2-2 Practice (continued)

Form K

Patterns and Linear Functions

For each table, identify the dependent and independent variables. Then describe the relationship using words, an equation, and a graph.

4.

x	y
0	-2
1	-1
2	0
3	1

$\frac{y}{x} \frac{1}{1} = 1$

$y = mx + b$

$y = 1x - 2$

5.

n	m
0	1
1	-2
2	-5
3	-8

Independent n
dependent m

$m = -3n + 1$

The value of m is -3 times the value of n plus 1.

Independent variable x
dependent y

$y = x - 2$

The value of y is the value of x minus 2

Independent - dependent

$\frac{y}{x} \frac{-3}{1} = -3$

slope = -3

$y = mx + b$

$y = -3x + 1$

6. Reasoning Graph the set of ordered pairs (0, 6), (1, 4), (2, 2), (3, 0). Determine whether the relationship is a linear function. Explain how you know.