

# 4-2

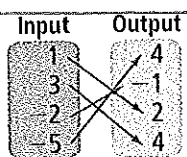
## Patterns and Linear Functions



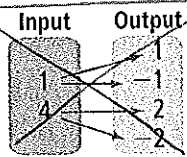
### Vocabulary

#### Review

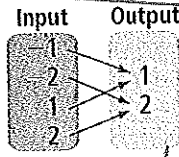
1. A **function** is a relationship that pairs each input value with exactly one output value. Cross out the relationship below that does NOT show a function.



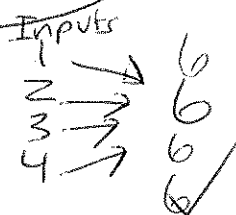
good



Not a Function!



good



#### Vocabulary Builder

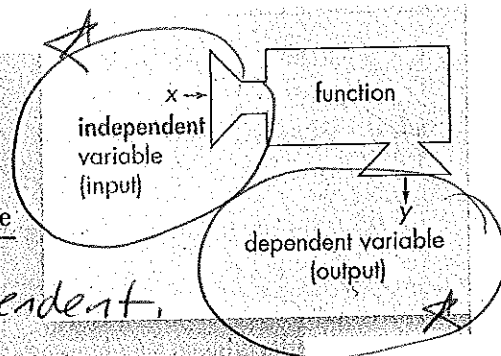
**independent** (adjective) in dee PEN dent

Related Words: dependent, input, output

Definition: An **independent** variable is a variable whose value determines the value of another variable, called the **dependent** variable.

Math Usage: In the diagram, the independent variable,  $x$ , is called the **input** of the function. The dependent variable,  $y$ , is called the **output** of the function.

Example: When showing the relationship between amount of sunlight and amount of plant growth, the **independent** variable is the amount of sunlight.



#### Use Your Vocabulary

Write **I** if the first value is **independent** of the second value. Write **D** if the first value is **dependent** on the second value.

D 2. the growth of a plant and the light the plant receives

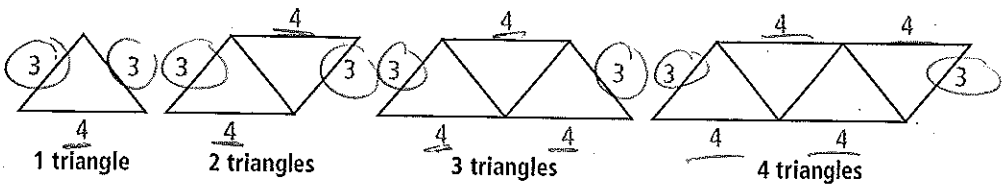
I 3. the speed of a swimmer and the depth of a pool

D 4. the number of books a shelf holds and the length of the shelf



# Problem 1 Representing a Geometric Relationship

**Got It?** In the diagram below, what is the relationship between the number of triangles and the perimeter of the figure they form? Represent this relationship using a table, words, an equation, and a graph.



5) Define the variables. words

Let  $x =$  Triangles  
ind.

Let  $y =$  Perimeter  
dep.

6. Complete the table.

Number of triangles $x = \text{ind.}$	1	2	3	4
Perimeter $y = \text{dep.}$	10	14	18	22

7. Complete the model below.

Relate perimeter is 4 times number of triangles plus 6

\* Write  $P = 4x + 6$

8. Write an equation to represent the relationship you wrote in Exercise 7.

\*  $P = 4x + 6$

9. Use the table to list the points you will plot.

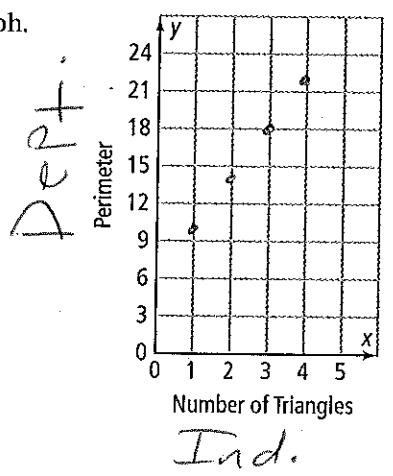
(1, 10)

(2, 14)

(3, 18)

(4, 22)

10. Now plot the points on the graph.



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## Problem 2 Representing a Linear Function

**Got It?** Is the relationship in the table at the right a linear function? Describe the relationship using words, an equation, and a graph.

Ind.				
Input $x$	0	1	2	3
Output $y$	8	10	12	14
Dep.		$+2$	$+2$	$+2$

11. Describe the pattern in the table in words.

Starts at 8 and goes up by 2

12. **Multiple Choice** Which equation describes the relationship in the table?

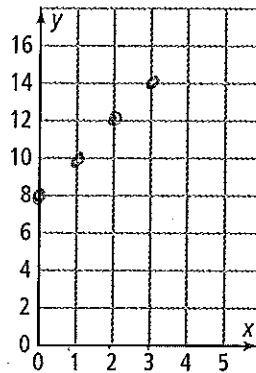
(A)  $y = 2x + 8$

(B)  $y = 2x - 8$

(C)  $y = x + 2 + 8$

(D)  $y = x + 2 - 8$

13. Plot the points from the table on the graph.



Linear: Line!  
~~\*A Function~~  
~~\*Constant pattern~~

Non-linear!  
~~\*Not a line!~~  
~~\*Not a function.~~  
~~None-constant pattern~~

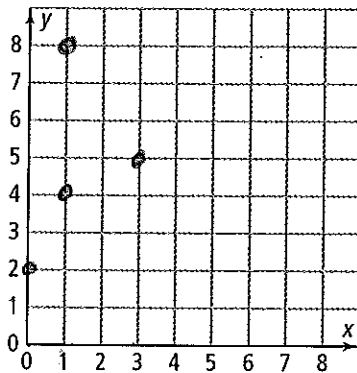
14. Underline the correct word or words to complete the sentence.

The points lie do not lie on a line; so, the relationship is is not a linear function.

**Got It? Reasoning** Does the set of ordered pairs (0, 2), (1, 4), (3, 5), and (1, 8) represent a linear function? Explain.

15. Plot the points on the graph.

~~1-4~~  
~~7-8~~



16. Do the ordered pairs represent a linear function? Explain.

No,

### Lesson Check • Do you UNDERSTAND?

**Vocabulary** The amount of toothpaste in a tube decreases each time you brush your teeth. Identify the independent and dependent variables in this relationship.

17. Complete each phrase to identify the variables.

Let  $A$  = the amount of toothpaste in a ?.

Let  $B$  = the number of times you ? your teeth.

tube

brush

18. Underline the correct word to complete each sentence.

$A$  is the independent / dependent variable.

$B$  is the independent / dependent variable.

### Lesson Check • Do you UNDERSTAND?

**Reasoning** Does the graph at the right represent a linear function? Explain.

19. Draw a line from each word in Column A to its definition in Column B.

Column A

Column B

relation

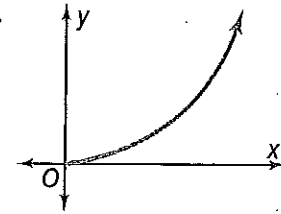
function whose graph is a line or part of a line

function

pairing of input and output values

linear function

relationship that pairs each input value with exactly one output value



20. Use the terms above to explain whether or not the graph represents a linear function.

No, the line curves.

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### Math Success

Check off the vocabulary words that you understand.

dependent variable

independent variable

linear function

Rate how well you can *describe linear functions*.

