

CHAPTER



Functions

Lesson 6.1 Understanding Relations and Functions

Write an algebraic expression for each of the following.

- Philip made p number of banana muffins and 6 blueberry muffins. He gave each of 8 friends an equal number of muffins. Write an algebraic expression for the number of muffins that he gave to each friend.

Evaluate each expression for the given value of the variable.

- $\frac{5}{6}x - 11$ when $x = 30$
- $19x - 4$ when $x = 4$

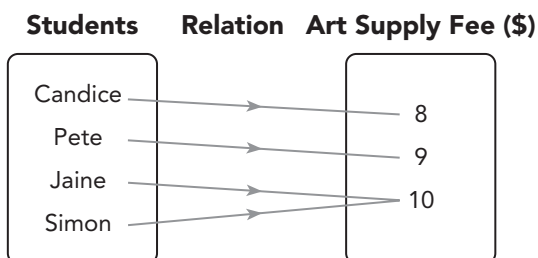
Use a mapping diagram to represent a relation.

Example

The table shows the art supply fee of four students.

Name of Student	Jaine	Pete	Simon	Candice
Art Supply Fee (\$)	10	9	10	8

Use a mapping diagram to show the relation between the students and their art supply fees. Then identify the relation between the students and their art supply fees.



The relation between the students and their art supply fees is a many-to-one relation.

Name: _____

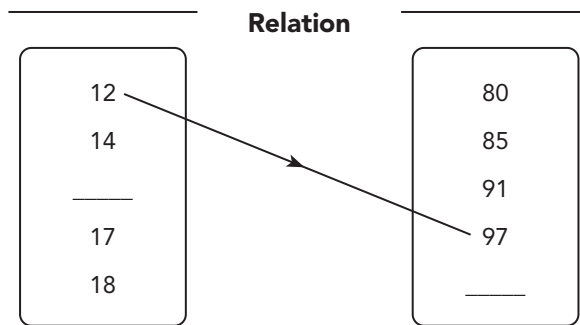
Date: _____

Complete.

4. The table shows the relation between the masses of five substances and their volumes.

Mass (g)	15	12	14	18	17
Volume (cm³)	100	97	85	91	80

Complete the mapping diagram to show the relation between the masses of the five substances and their volumes.



The relation between the masses of the five substances and their volumes is a _____-to-_____ relation.

Use a mapping diagram to represent a relation.

5. The table shows the relation between the diameters of four wires and their resistances.

Diameter (cm)	3	2	4	1
Resistance (Ω)	0.4	0.13	0.7	0.05

Draw a mapping diagram and identify the relation between the diameters of the wires and their resistances.

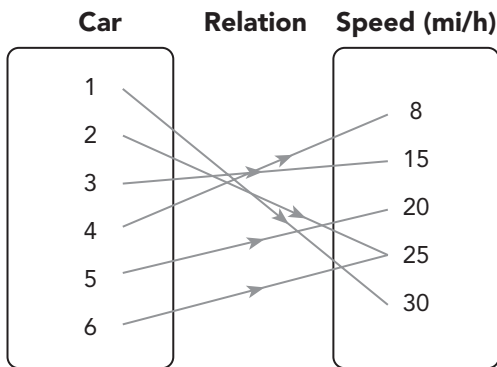
Tell whether a relation is a function from a mapping diagram.

Example

A speed camera detected the speed of the first six cars that passed through an intersection. The speed of each car is shown in the following table.

Car Number	1	2	3	4	5	6
Speed (mi/h)	30	25	15	8	20	25

- a) Draw a mapping diagram to represent the relation between the numbers of cars and their speeds. Identify the type of relation between the cars and their speeds.



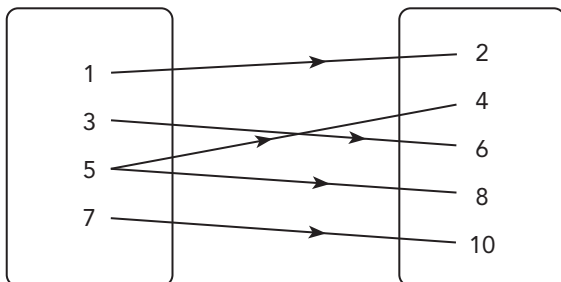
The relation between the numbers of the cars and their speeds is a many-to-one relation.

- b) Tell whether the relation represented by the mapping diagram is a function. Explain.

The relation between the numbers of the cars and their speeds is a function because from the mapping diagram, each input is mapped to exactly one output. It is impossible for each car to have two different recorded speeds when it drives pass the speed camera.

Complete. Tell whether the function is a relation. Explain.

6. **Input** **Relation** **Output**



(1, 2)	(3, 6)	(5, 4)
(5, 8)	(7, 10)	

Because the mapping diagram shows a _____-to-_____ relation, it _____ a function.

Name: _____

Date: _____

Tell whether each relation is a function. Explain.

7. The number of skips each of four students made skipping rope without stopping is shown in the table.

Student	Number of Skips
A	10
B	8
C	14
D	25

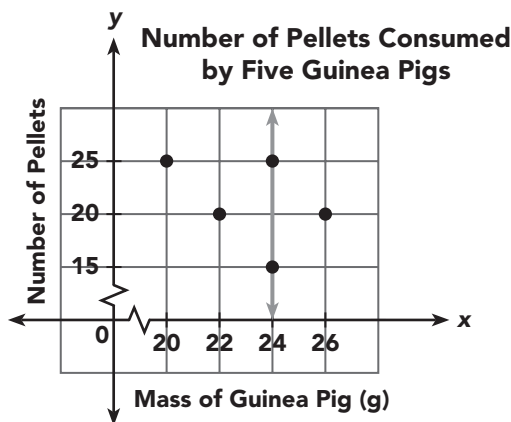
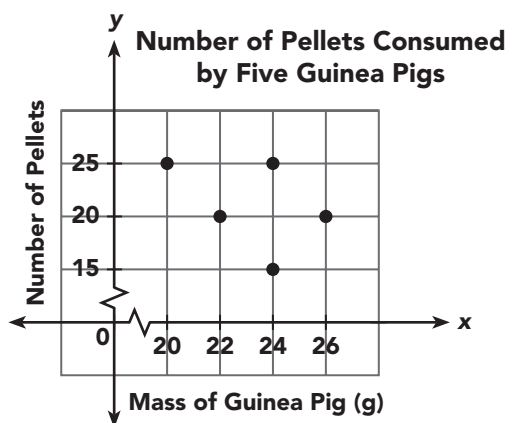
- a) Draw a mapping diagram to represent the relation between the students and the number of skips. Identify the type of relation between the students and the number of skips.

- b) Tell whether the relation represented by the mapping diagram is a function and explain why.

Tell whether a relation is a function from a graph.

Example

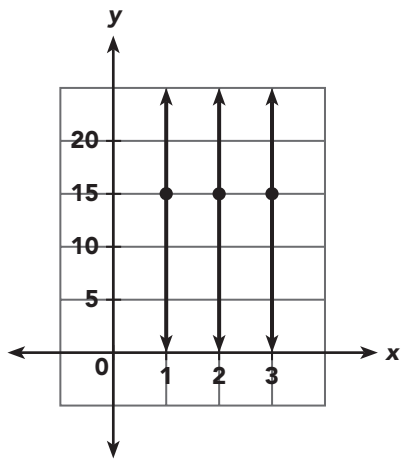
The graph shows the relation between the number of grass pellets that five guinea pigs consumed, y , and the guinea pig's mass, x grams. Tell whether the relation represented by the graph is a function.



From the graph, there is one vertical line that intersects the graph at more than one point. Based on the vertical line test, the relation represented by the graph is not a function.

Complete. Tell whether the relation represented by each graph is a function. Explain.

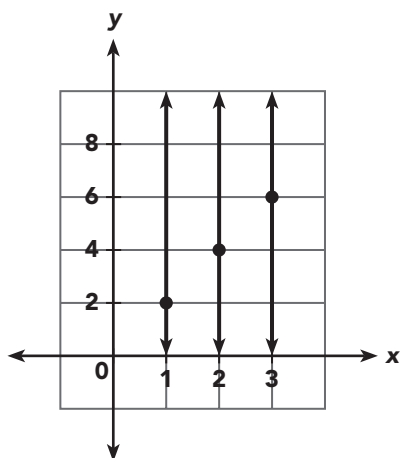
8.



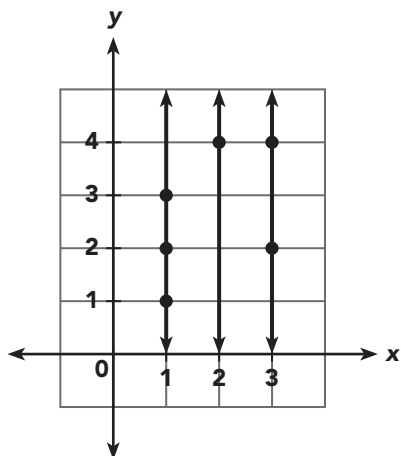
_____ ; Because _____ vertical line _____ the graph at _____ ,
the graph _____ a function.

Tell whether the relation represented by each graph is a function. Explain.

9.



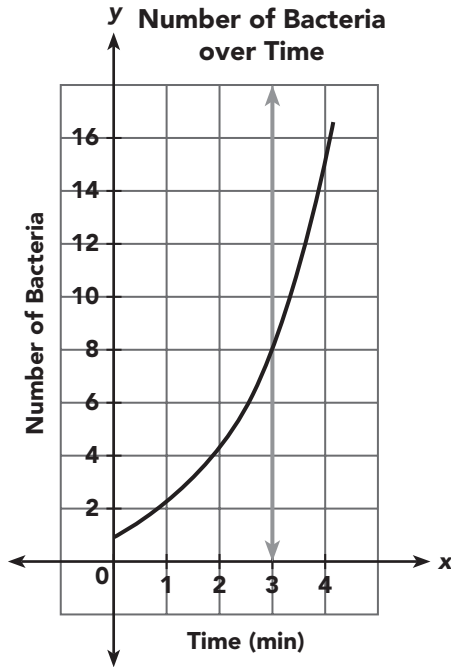
10.



Tell whether a curved graph is a function.

Example

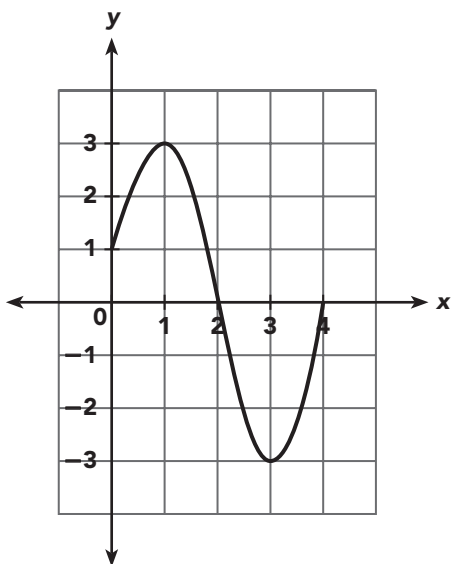
Bacteria grow fast in fermenters under optimum conditions. The graph shows the number of bacteria, y , present in a fermenter at t minutes.



From the graph, any vertical line only intersects the graph at exactly one point. Based on the vertical line test, the relation represented by the graph is a function.

Complete. Tell whether the relation represented by graph is a function. Explain.

11.



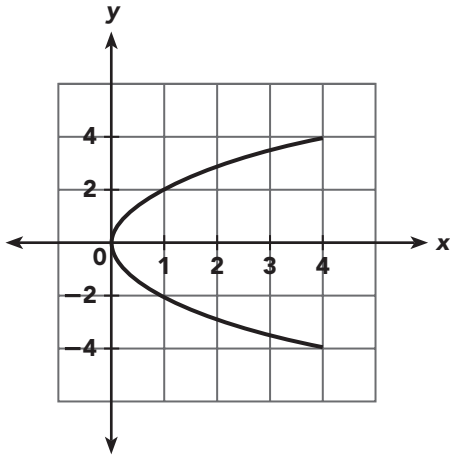
_____; Because _____ vertical line _____ the graph _____, the graph _____ a function.

Name: _____

Date: _____

Tell whether the relation represented by each graph is a function. Explain.

12.



13.

