

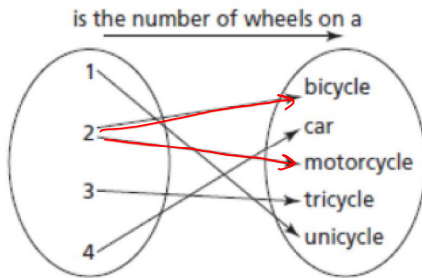
Lesson 3 What is a Function?

Recall:

A relation associates the elements of one set with the elements of another set. It is a set of ordered pairs. A relation can have two or more ordered pairs with the same first coordinate.

A **function** is a special type of relation in which each element in the domain corresponds with exactly one element in the range.

ie Every value of x has only one value of y .
 (all first coordinates must be different)

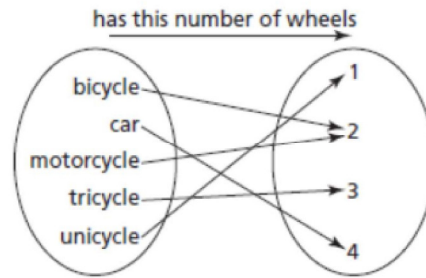


Not a function

The value 2 has more than one element

must all be different
 — (2, bicycle)
 — (2, motorcycle)

Still a relation, though



Is a function

Each element in the first set is associated with exactly one element in the second set

(bicycle, 2) — can be the same
 (motorcycle, 2) ✓

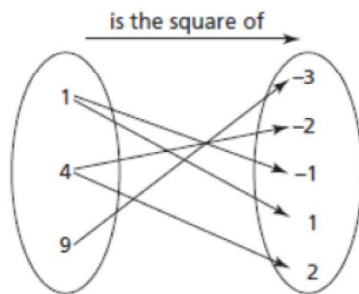
Example 1: For each relation below:

- Determine whether the relation is a function. Justify your answer.
- State the domain and range.

a) Relation associating the shape and number of sides.
 $\{(\text{triangle}, 3), (\text{square}, 4), (\text{rectangle}, 4), (\text{octagon}, 8)\}$

*Is a function. Each shape has exactly one value associated with it.
 ie No repetition of first elements
 $D: \{\text{triangle}, \text{square}, \text{rectangle}, \text{octagon}\}$
 $R: \{3, 4, 8\}$*

b)



*Not a function
 Some elements in the first set are associated with more than one element in the second set
 $D: \{1, 4, 9\}$
 $R: \{-3, -2, -1, 1, 2\}$*

c) The table shows the cost of a bus ticket, C dollars, for different number of tickets bought.

Number of Tickets, N	Cost, C (\$)
1	1.75
2	3.5
3	5.25
4	7
5	8.75

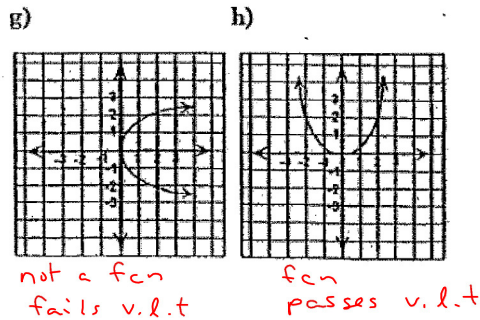
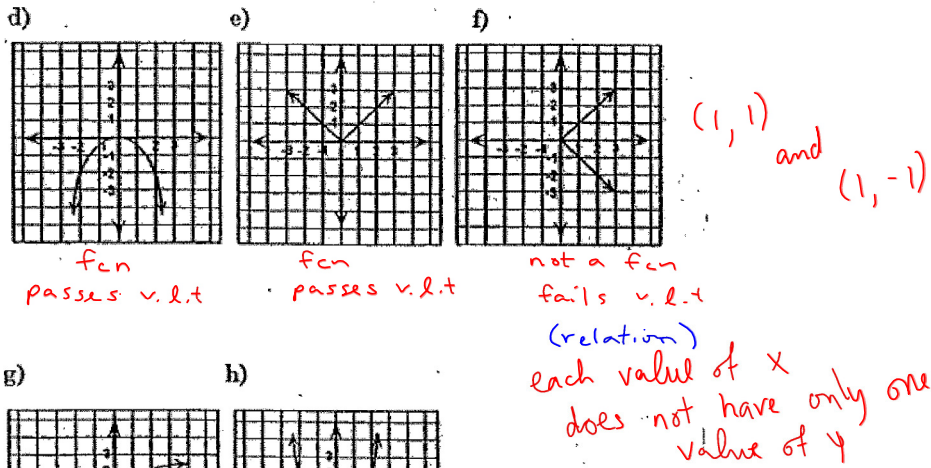
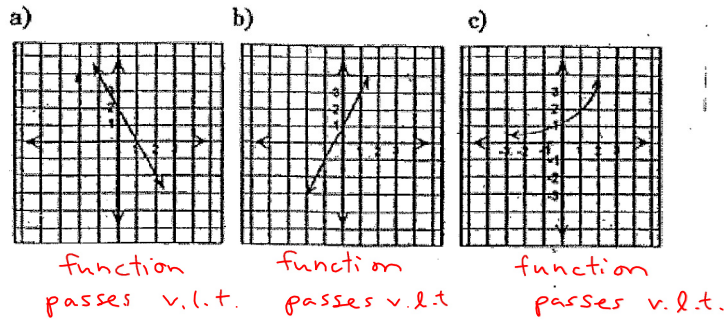
*Is a function. Each number of tickets is associated to exactly one cost.
 $D: \{1, 2, 3, 4, 5\}$
 $R: \{1.75, 3.5, 5.25, 7, 8.75\}$*

Vertical Line Test for a Function (v.l.t.)

A graph represents a function when no two points on the graph lie on the same vertical line.

If a graph is given we use the vertical line test to determine if it is a function. We pass an imaginary vertical line through the given graph from left to right. If the graph crosses the vertical line only once, it is function. If it crosses more than once, it is not a function.

Which of the following graphs are functions?



Assignment: Pg. 270; 4, 5, 9a, 12
 Pg. 294; 6, 8
 on pink sheet w/graphs, fcn or not a fcn