

Relations and Functions

Relation: associates 2 set of item  
 - in a table, how the first column is related to the second column.

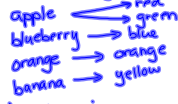
Set: a collection of distinct objects  
 element: one object in a set

\* Examples of how to represent relations

① Table

Fruit	Colour
apple	red
apple	green
blueberry	blue
orange	orange
banana	yellow

② Arrow Diagram



③ Ordered pair

- (apple, red)
- (apple, green)
- (blueberry, blue)
- (orange, orange)
- (banana, yellow)

Function: A special relation  
 - for every x-value there is only 1 y-value

Domain: set of first elements (x-values)

Range: set of second elements (y-values)

Diagram illustrating the vertical line test for functions.

**Not A Function:** A table with # wheels (x) and transportation (y). Arrows show 1 wheel mapping to bike, 2 wheels to car and motorcycle, 3 wheels to bicycle, and 4 wheels to tricycle. A vertical line at x=2 intersects two points.

**Function:** A table with transportation (x) and # wheels (y). Arrows show bike to 2, car to 4, bicycle to 3, tricycle to 4, and motorcycle to 2. A vertical line at x=2 intersects only one point.

**Function:** A table with x (1-5) and y (2, 4, 6, 8, 10). A vertical line at any x intersects only one y.

**Not a Function:** A table with x (1-4) and y (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12). A vertical line at x=2 intersects two y-values.

Red annotations: "look at x-values" and "look at y-values".

Describing a Function

x-value: first column  
 independent variable  
 \* domain

y-value: second column  
 dependent variable  
 \* range

\* Vertical Line Test

- take a vertical line & move it along the x-axis, if it intersects the graph only once as it moves, then the graph is a function.

Graphs illustrating the vertical line test:

- A line passing through (-2,1) and (2,4) is labeled "Function".
- A circle passing through (-2,1) and (-2,-3) is labeled "Not a function".
- A parabola opening downwards is labeled "Function".
- A sideways parabola opening to the right is labeled "Not a function".