

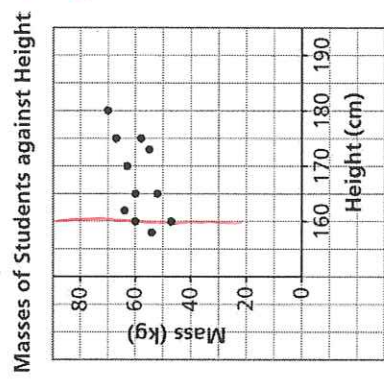
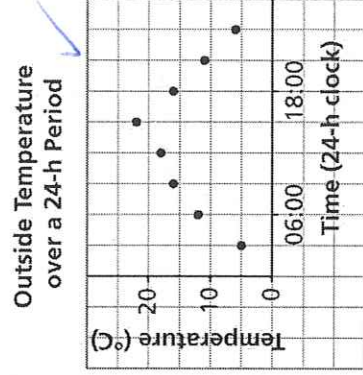
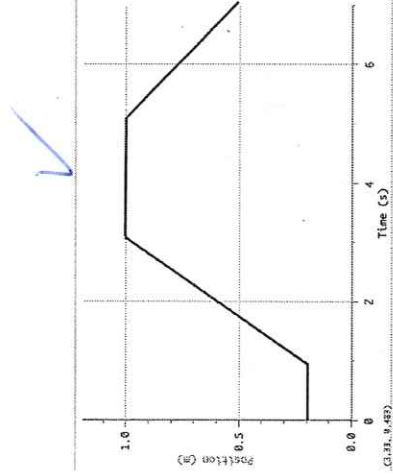
5.5 Graphs of Relations and Functions

Function: A relation where each element in the domain is associated with exactly one element of the range. To determine whether a relation is a function from its graph, we use the vertical line test: If you can draw a vertical line that crosses more than one point on the graph, then the graph does not represent a function.

Domain: The set of first elements of a relation. On a graph, the first elements are the horizontal coordinates (usually the x-values).

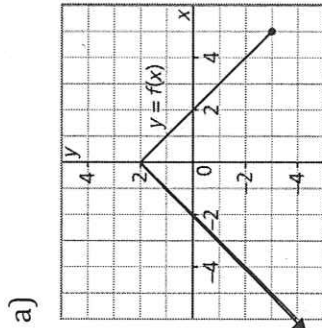
Range: The set of second elements of a relation. On a graph, the second elements are the vertical coordinates (usually the y-values).

Example: Which of these graphs represents a function? Justify your answer.

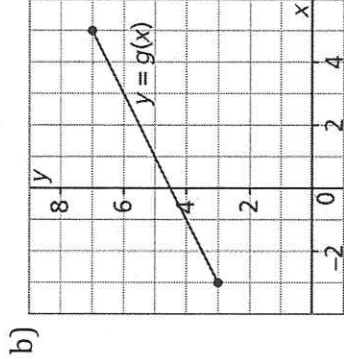


The first 2 pass the vertical line test

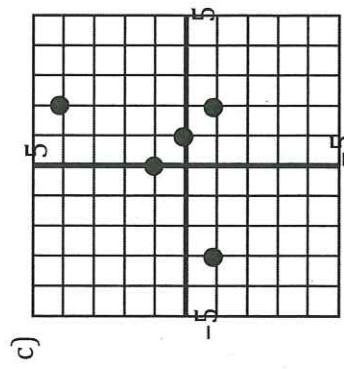
Example: Determine the domain and range of the graph of each relation.



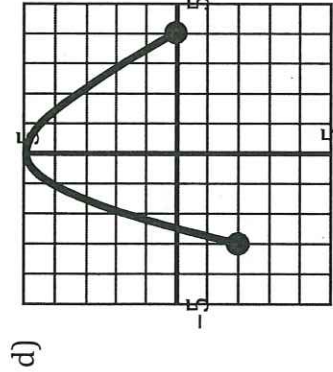
D: $\{x \mid x \leq 5, x \in \mathbb{R}\}$
 R: $\{y \mid y \geq 2, y \in \mathbb{R}\}$



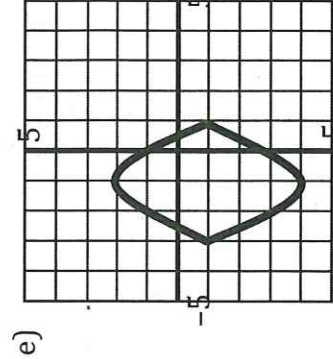
D: $\{x \mid -3 \leq x \leq 5, x \in \mathbb{R}\}$
 R: $\{y \mid 3 \leq y \leq 7, y \in \mathbb{R}\}$



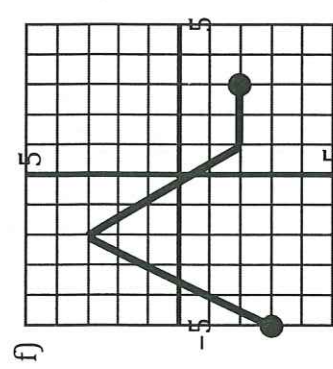
D: $\{-3, 0, 1, 2, 3\}$
 R: $\{-1, 0, 1, 4\}$



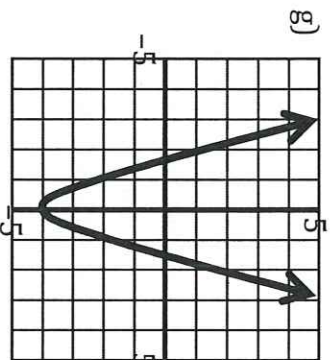
D: $\{x \mid -3 \leq x \leq 4, x \in \mathbb{R}\}$
 R: $\{y \mid 0 - 2 \leq y \leq 5, y \in \mathbb{R}\}$



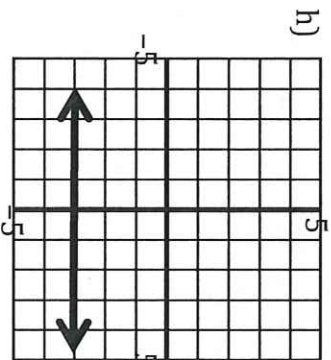
D: $\{x \mid -3 \leq x \leq 1, x \in \mathbb{R}\}$
 R: $\{y \mid -4 \leq y \leq 2, y \in \mathbb{R}\}$



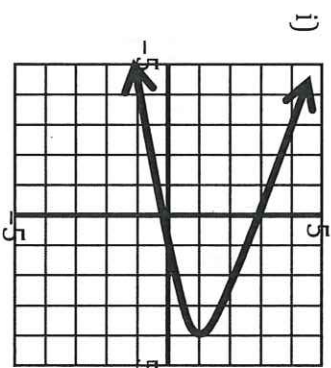
D: $\{x \mid -5 \leq x \leq 3, x \in \mathbb{R}\}$
 R: $\{y \mid -3 \leq y \leq 3, y \in \mathbb{R}\}$



D: $\{x | x \in \mathbb{R}\}$
 R: $\{y | y \geq -4, y \in \mathbb{R}\}$



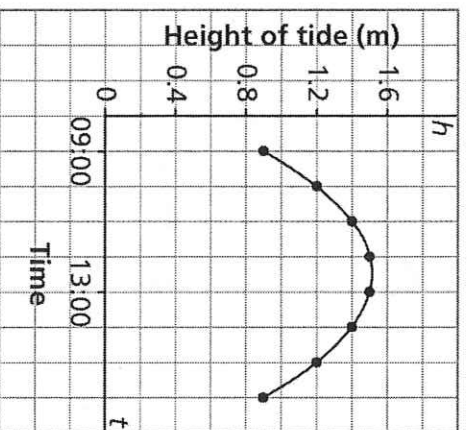
D: $\{x | x \in \mathbb{R}\}$
 R: $\{y | y = -3\}$



D: $\{x | x \leq 4, x \in \mathbb{R}\}$
 R: $\{y | y \in \mathbb{R}\}$

Example: This graph shows the approximate height of the tide, h metres, as a function of time, t , at Port Clements, Haida Gwaii on June 17, 2009.

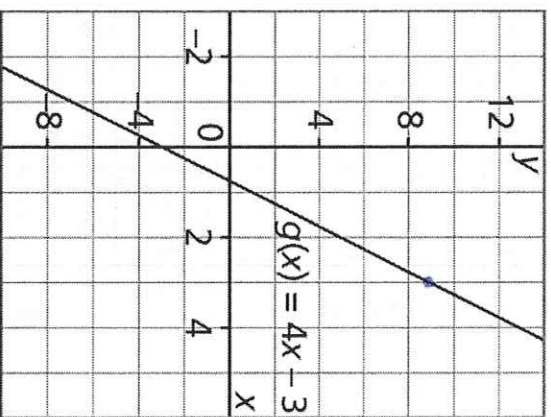
Height of Tide at Port Clements,
 June 17, 2009



- a) Identify the dependent variable and the independent variable. Justify your choices.
 dependent: height of tide
 independent: time
 height of tide depends on time.
- b) Why are the points on the graph connected? Explain.
 tide height can be measured at any time.

- c) Determine the domain and range of the graph.
 D: $\{t | 09:00 \leq t \leq 16:00\}$
 R: $\{h | 0.9 \leq h \leq 1.5\}$

Example: Here is a graph of the function $g(x) = 4x - 3$.



- a) Determine the range value when the domain value is 3.
 $g(3) = 9$ OR $g(3) = 4(3) - 3 = 9$
- b) Determine the domain value when the range value is -7.
 $g(x) = -7$ OR $-7 = 4x - 3$
 $x = -1$ OR $-4 = 4x$
 $x = -1$