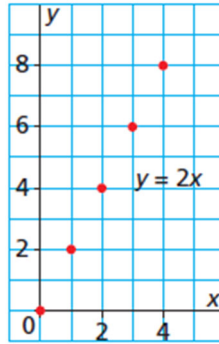


## Lesson 2: Domain and Range

We know a relation is a function if each  $x$ -value associates with exactly one value of  $y$ . A relation is NOT a function if it has two or more ordered pairs with the same  $x$ -value. We can determine if it is a function from its graph, as long as it passes the vertical line test (no two points on the graph lie on the same vertical line).

We can determine the domain ( $x$ -values) and range ( $y$ -values) from a graph.

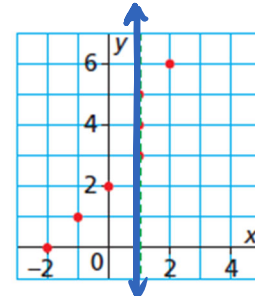


D:  $\{0, 1, 2, 3, 4\}$

R:  $\{0, 2, 4, 6, 8\}$

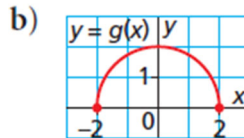
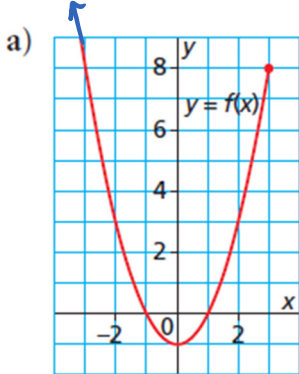
If there are discrete points, list a set of numbers for the domain and range:

The following graph has two or more ordered pairs with the same first coordinate. A vertical line passes through more than one point. The graph is not a function



$(1, 3), (1, 4), (1, 5)$

We can also use inequality signs if the points on the graph are connected by a line (curved or straight) or continue past the graph:



a) D:  $x \leq 3$

R:  $y \geq -1$

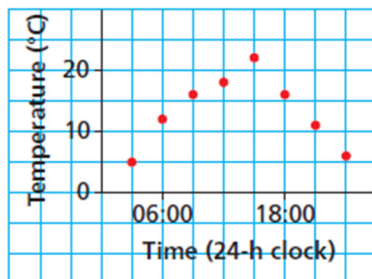
b) D:  $-2 \leq x \leq 2$

R:  $0 \leq y \leq 2$

### Examples:

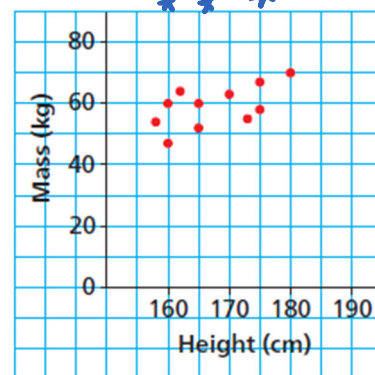
1) Which of the following graphs represent a function? (VLT)

a) Outside Temperature over a 24-h Period



yes passes VLT

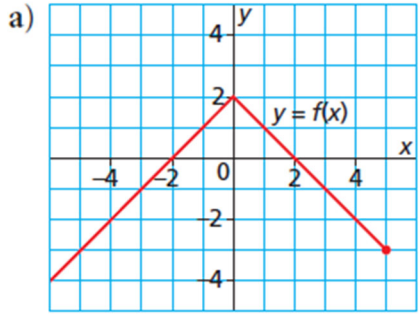
b) Masses of Students against Height



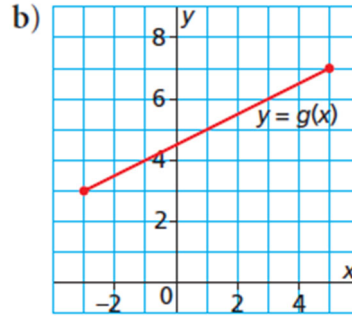
Not a function

$\{ \} \cup \cap \cap \cup$

2) Determine the domain and range of the graph of each function.



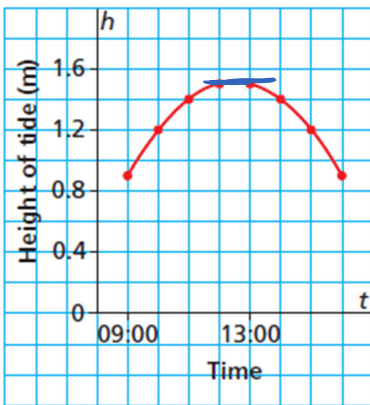
$D: x \leq 5$   
 $R: y \leq 2$



$D: -3 \leq x \leq 5$   
 $R: 3 \leq y \leq 7$

3) This graph shows the approximate height 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



↗ Height (m)

a) Identify the dependent variable and the independent variable.

↘ time

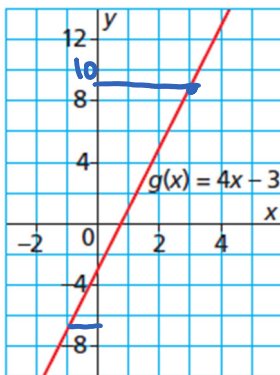
b) Why are the points in the graph connected?

measurements are only done every hour.

c) Determine the domain and range of the graph.

$D: 9:00 \leq t \leq 16:00$   
 $R: 0.9 \leq h \leq 1.5$

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



a) Determine the range value when the domain is 3.

9

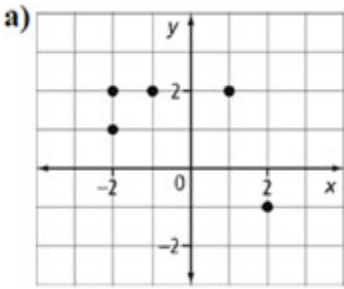
$g(3) = 4(3) - 3 = 9$

b) Determine the domain value when the range value is -7.

$y = -7$

$x = -1$

5) List the domain and range for each function:



D:  $\{-2, -1, 1, 2\}$   
 R:  $\{-1, 1, 2\}$

b)

x	y
7	3
5	2
3	1
1	0

D:  $\{1, 3, 5, 7\}$   
 R:  $\{0, 1, 2, 3\}$

c)  $(10, 5), (8, 4), (6, 3), (4, 2), (2, 1)$

D:  $\{2, 4, 6, 8, 10\}$   
 R:  $\{1, 2, 3, 4, 5\}$

6) State the domain and range for each graph and then tell if the graph is a function.

<p>Domain: <math>-4 \leq x &lt; 3</math></p> <p>Range: <math>-5 &lt; y &lt; 5</math></p> <p>Function? N</p>		<p>Domain: <math>x \leq 2</math></p> <p>Range: <math>y \geq -2</math></p> <p>Function? Y</p>	
<p>Domain: all real numbers <math>x \in \mathbb{R}</math></p> <p>Range: <math>y \geq -2</math></p> <p>Function? Y</p>		<p>Domain: <math>x \in \mathbb{R}</math></p> <p>Range: <math>y \in \mathbb{R}</math></p> <p>Function? Y</p>	
<p>Domain: <math>-2 \leq x \leq 2</math></p> <p>Range: <math>1 \leq y \leq 5</math></p> <p>Function? N</p>		<p>Domain: <math>-5 \leq x \leq 5</math></p> <p>Range: <math>-2 \leq y \leq 2</math></p> <p>Function? Y</p>	

