

Relation Vs Function Practice

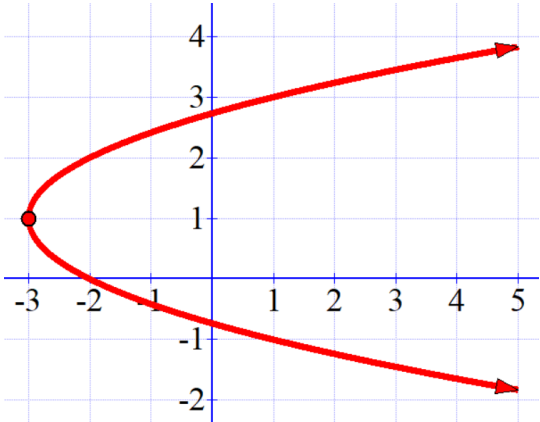
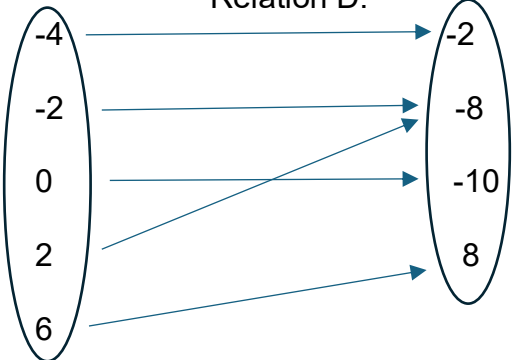
Use the following information to answer the first question.

Consider the following statements.	
Statement 1	All relations are functions.
Statement 2	A function is not a relation.
Statement 3	Something can be a relation or a function, but not both.
Statement 4	A function is a special type of relation.

1. The correct statement is

- A) 1 B) 2 C) 3 D) 4

Use the following information to answer the next question.

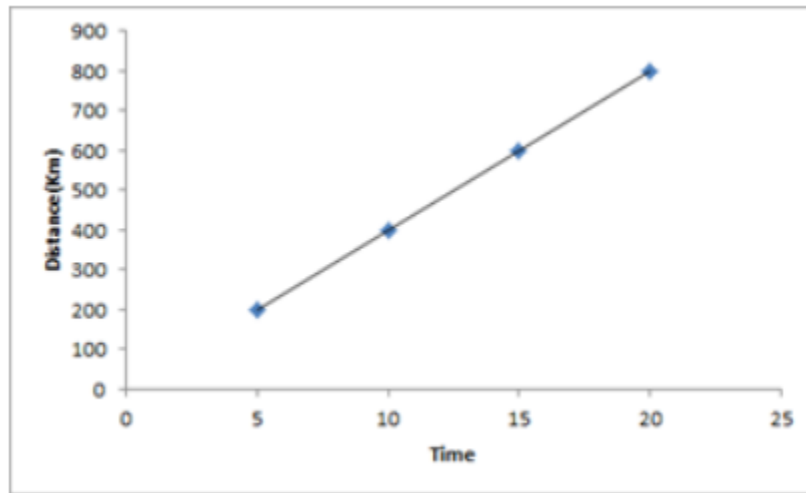
Consider the following 4 relations.													
<p style="text-align: center;">Relation A.</p> <p style="text-align: center;">(-2,-5) (-1,-1) (0,3) (1,7) (2,11)</p>	<p style="text-align: center;">Relation B.</p> <table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 50%;">x</th><th style="width: 50%;">y</th></tr></thead><tbody><tr><td>0</td><td>0</td></tr><tr><td>2</td><td>1</td></tr><tr><td>2</td><td>-1</td></tr><tr><td>8</td><td>-2</td></tr><tr><td>18</td><td>3</td></tr></tbody></table>	x	y	0	0	2	1	2	-1	8	-2	18	3
x	y												
0	0												
2	1												
2	-1												
8	-2												
18	3												
<p style="text-align: center;">Relation C.</p> 	<p style="text-align: center;">Relation D.</p> 												

2. The two relations that are not functions are

- A) A and C B) B and C C) A and D D) B and D

Use the following information to answer the next question.

The following statements were made with respect to the graph below.



Statement 1	The independent variable is time.
Statement 2	The independent variable is distance.
Statement 3	The smallest value for the domain is 5.
Statement 4	The largest value for the range is 200.

3. The two correct statements are

A) 1 and 3

B) 1 and 4

C) 2 and 3

D) 2 and 4

Use the following information to answer the next question.

Consider possible range values for the following 4 functions.

E. {-3,-1,0,1,5}	F. {8,5,2,-3,-5}	G. [-11,9]	H. {-5,-2,1,6,8}
I. {-27,-3,0,-12,-48}	J. [-1,4]	K. {-25,1,2,3,127}	L. {-9,-3,0,6,12}

Function 1	Function 2										
<table border="1"> <tr><td>-9</td><td>-27</td></tr> <tr><td>-3</td><td>-3</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>6</td><td>-12</td></tr> <tr><td>12</td><td>-48</td></tr> </table>	-9	-27	-3	-3	0	0	6	-12	12	-48	
-9	-27										
-3	-3										
0	0										
6	-12										
12	-48										
Function 3.	Function 4										
	<p>(-3,-25) (-1,1) (0,2) (1,3) (5,127)</p>										

4. Using the letters E – L, the correct range values that represent the 4 functions (1-4) in order, are _____, _____, _____, and _____.
5. One ordered pair in a relation is (Yellowknife, 11). The most probable association linking these two elements is
- A) A utensil and its length in metres
 - B) A colourful bird and its number of beaks
 - C) A city and its population
 - D) A city and its number of letters

6. The volume of gas remaining in a vehicle's tank is a function of the distance travelled. In function notation, the equation is, $V(d) = -0.08d + 50$, where V is the volume of gas remaining and d is the distance travelled. One ordered pair for this function is $(125, y)$. The value of y is _____.

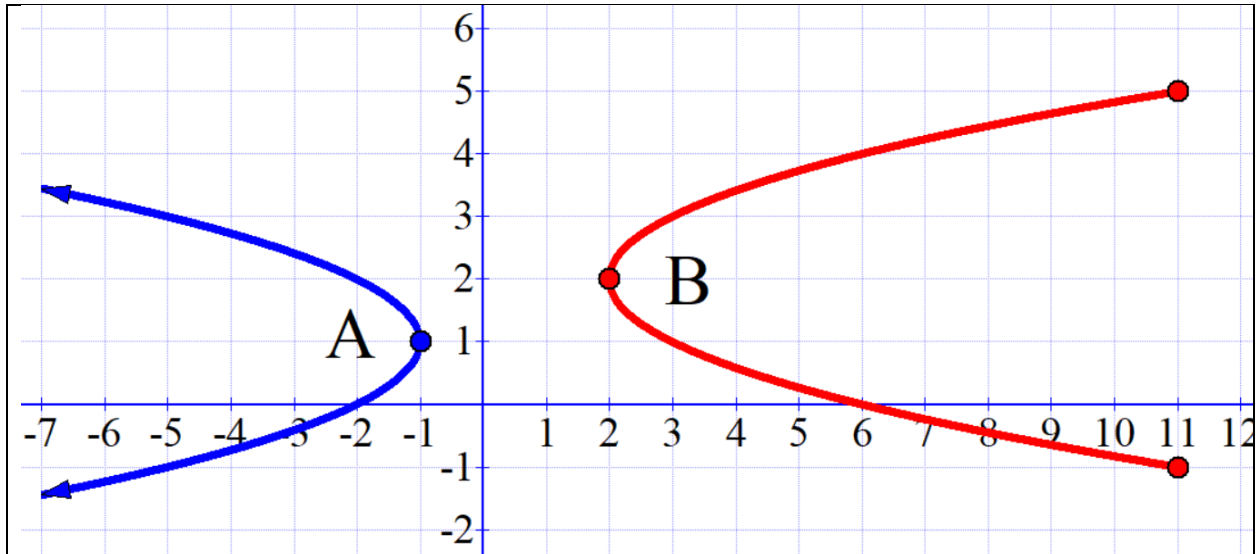
Use the following information to answer the next question.

The following 4 relations are represented by ordered pairs.

Relation 1	$\{(1,1), (-1,1), (2,4), (3,9)\}$
Relation 2	$\{(-1,-9), (1,-5), (4,1), (10,13)\}$
Relation 3	$\{(0,0), (-24,2), (-24,-2), (-6,1)\}$
Relation 4	$\{(-3,91), (0,1), (2,41), (5,251)\}$

7. Using the numbers 1-4, the relation that is not a function is _____, and the relation that has a value of 4 for its domain is _____.

Use the graphs below to answer the next question.



8. Compare and contrast the two graphs above. In your analysis, be sure to use the words relation, function, vertical line test, domain and range.

Relation Vs Function Practice **Solutions**

Use the following information to answer the first question.

Consider the following statements.	
Statement 1	All relations are functions.
Statement 2	A function is not a relation.
Statement 3	Something can be a relation or a function, but not both.
Statement 4	A function is a special type of relation.

1. The correct statement is

A) 1

B) 2

C) 3

D) 4

Solution

The overriding statement related to this question is that all functions are relations, but not all relations are functions.

Statement 1 is false. All relations are not functions.

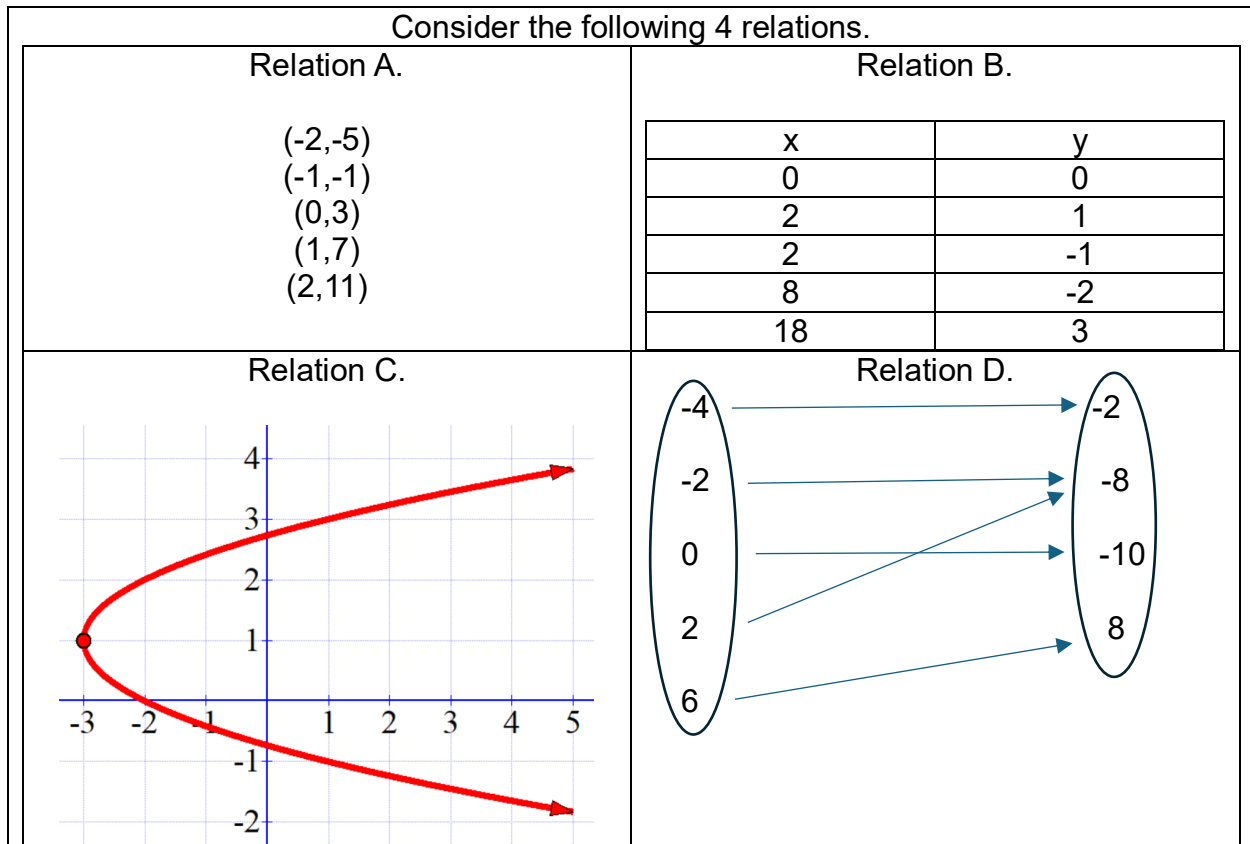
Statement 2 is false. A function is a relation.

Statement 3 is false. It is possible to have a relation and a function.

Statement 4 is true. A function is a special type of relation where for every first element, there is only 1 second element.

The correct answer is D.

Use the following information to answer the next question.



2. The two relations that are not functions are

A) A and C

B) B and C

C) A and D

D) B and D

Solution

Relation A is a function because for every first element there is only 1 second element.

Relation B is not a function because the first element of 2 had two second elements (1 and -1).

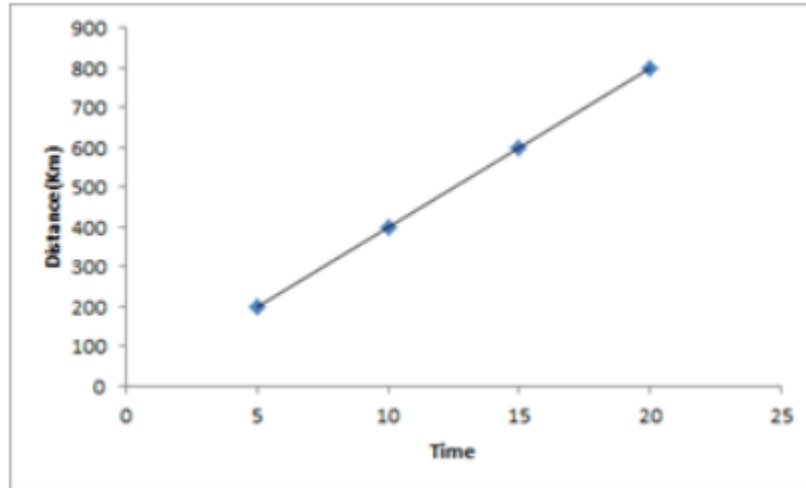
Relation C is not a function because it does not pass the vertical line test. It is possible to draw a vertical line that intersects the graph at more than 1 location. This means that for a given value of x , there are 2 values for y . This situation violates the definition of a function.

Relation D is a function because for every first element there is only 1 second element.

The correct answer is B.

Use the following information to answer the next question.

The following statements were made with respect to the graph below.



Statement 1	The independent variable is time.
Statement 2	The independent variable is distance.
Statement 3	The smallest value for the domain is 5.
Statement 4	The largest value for the range is 200.

3. The two correct statements are

A) 1 and 3

B) 1 and 4

C) 2 and 3

D) 2 and 4

Solution

Statement 1 is true. The horizontal axis is represented by time. The distance travelled depends on how much time has elapsed.

Statement 2 is false. The vertical axis or distance is dependent on time. Distance is the dependent variable.

Statement 3 is true. The domain, read off of the x-axis, is any value between 5 and 20. Thus, 5 is the smallest value in the domain.

Statement 4 is false. The range, read off of the y-axis, is any value between 200 and 800. The largest value for the range is 800.

The correct answer is A.

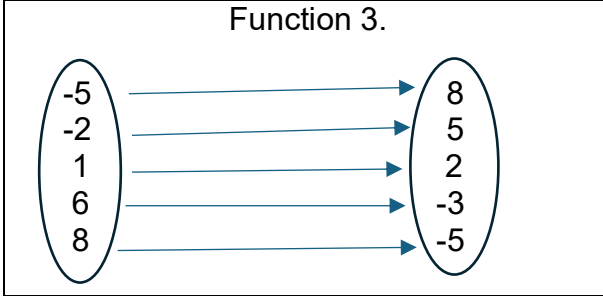
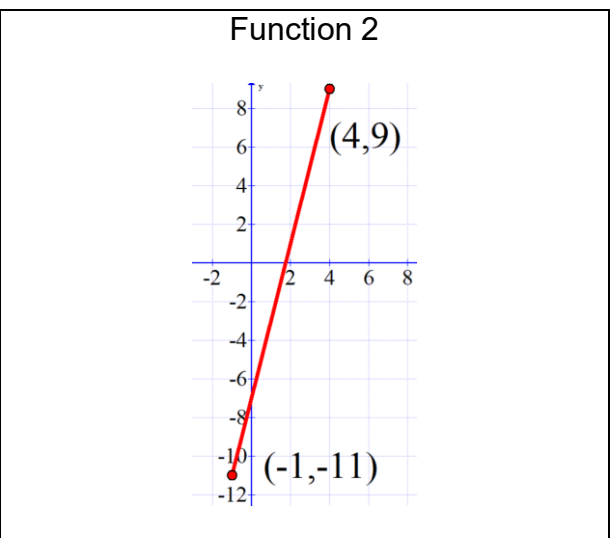
Use the following information to answer the next question.

Consider possible range values for the following 4 functions.

E. {-3,-1,0,1,5}	F. {8,5,2,-3,-5}	G. [-11,9]	H. {-5,-2,1,6,8}
I. {-27,-3,0,-12,-48}	J. [-1,4]	K. {-25,1,2,3,127}	L. {-9,-3,0,6,12}

Function 1

-9	-27
-3	-3
0	0
6	-12
12	-48



- Function 4
- (-3,-25)
 - (-1,1)
 - (0,2)
 - (1,3)
 - (5,127)

4. Using the letters E – L, the correct range values that represent the 4 functions (1-4) in order, are I, G, F, and K.

Solution

Function 1 shows the relation as a table, with the first column being values for x (the domain) and the second column being values for y (the range). The range for Function 1 is {-27,-3,0, -12, -48}. This range is represented by the letter I.

Function 2 shows the relation as a graph. Using the endpoints of the line, the lowest possible value for y is -11 and the highest possible value for y is 9. The range is any value between -11 and 9. Expressed in interval notation, the range is [-11,9]. This range is represented by the letter G.

Function 3 shows the relation as an arrow diagram (or a mapping). The elements in the oval on the right represent the range. The range is $\{8,5,2,-3,-5\}$. This range is represented by the letter F.

Function 4 shows the relation as a list of ordered pairs. The second element in each ordered pair is the range. The range is $\{-25,1,2,3,127\}$. This range is represented by the letter K.

Using the letters E – L, the correct range values that represent the 4 functions (1-4) in order are I, G, F, and K.

5. One ordered pair in a relation is (Yellowknife, 11). The most probable association linking these two elements is
- A) A utensil and its length in metres
 - B) A colourful bird and its number of beaks
 - C) A city and its population
 - D) **A city and its number of letters**

Solution

The first element, Yellowknife, is a city. Options A and B can be eliminated. It is not reasonable that the second element of 11 would represent its population. Since the word has 11 letters, the most probable association linking these two elements is a city and its number of letters.

The correct answer is D.

6. The volume of gas remaining in a vehicle's tank is a function of the distance travelled. In function notation, the equation is, $V(d) = -0.08d + 50$, where V is the volume of gas remaining a d is the distance travelled. One ordered pair for this function is (125, y). The value of y is 40.

Solution

In an ordered pair, the first value is the independent variable; in this case, it is the distance travelled. Substitute 125 for d into the equation.

$$V(125) = -0.08(125) + 50$$

$$V(125) = 40$$

This means that after travelling 125 km, there is 40 litres left in the tank.

The value of y is 40.

Use the following information to answer the next question.

The following 4 relations are represented by ordered pairs.	
Relation 1	$\{(1,1), (-1,1), (2,4), (3,9)\}$
Relation 2	$\{(-1,-9), (1,-5), (4,1), (10,13)\}$
Relation 3	$\{(0,0), (-24,2), (-24,-2), (-6,1)\}$
Relation 4	$\{(-3,91), (0,1), (2,41), (5,251)\}$

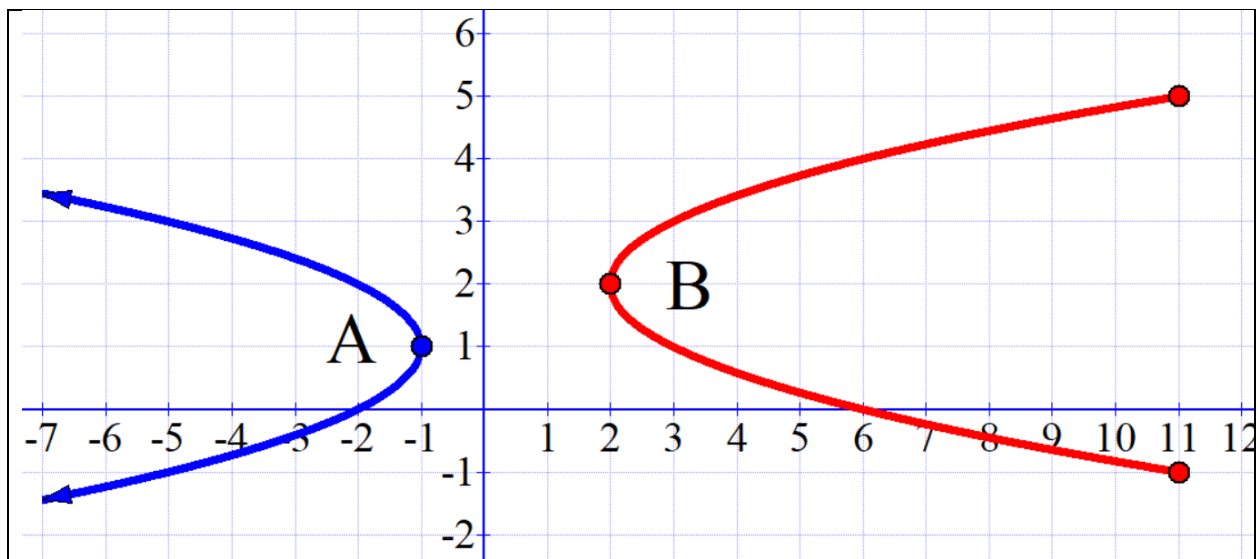
7. Using the numbers 1-4, the relation that is not a function is 3, and the relation that has a value of 4 for its domain is 2.

Solution

Relations 1, 2, and 4 are all functions because for every first element (x), there is only one second element (y). However, for relation 3, the first element of -24 has two second elements (2 and -2). Thus relation 3 is not a function.

Relation 2 has a value of 4 for its domain, as the point (4,1) is one of the listed ordered pairs.

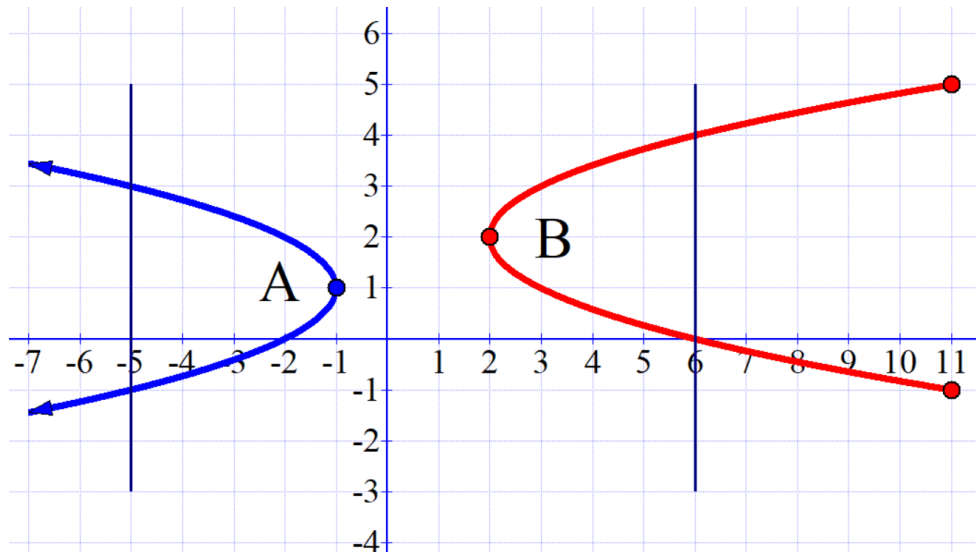
Use the graphs below to answer the next question.



8. Compare and contrast the two graphs above. In your analysis, be sure to use the words relation, function, vertical line test, domain and range.

Solution

The vertical line test is used to determine if a relation is a function or not. If a vertical line intersects a graph at more than one point, the graph is not a function.



For graph A, the vertical line is drawn at $x = -5$. Intersecting the graph at two locations means that the x value of -5 has two values for y . In this case, the two points are $(-5, -1)$ and $(-5, 3)$.

For graph B, the vertical line is drawn at $x = 6$. This line intersects the graph at $(6, 0)$ and $(6, 4)$. The first element of 6 is matched with two second elements, i.e. 0 and 4.

Both of these graphs are relations but neither one is a function.

The domain of graph A is $\{x \mid x \leq -1, x \in \mathbb{R}\}$. It can also be written as $(-\infty, -1]$.

The range of graph A is $\{y \mid y \in \mathbb{R}\}$. It can also be written as $(-\infty, \infty)$.

The domain of graph B is $\{x \mid 2 \leq x \leq 11, x \in \mathbb{R}\}$. It can also be written as $[2, 11]$.

The range of graph B is $\{y \mid -1 \leq y \leq 5, y \in \mathbb{R}\}$. It can also be written as $[-1, 5]$.