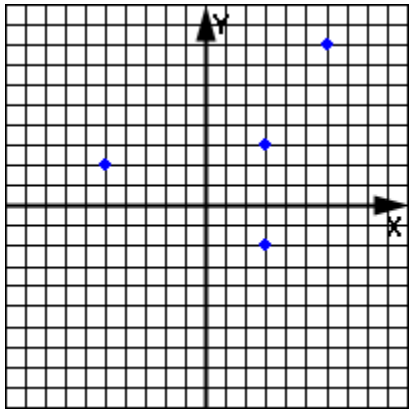
Unit 5: Lesson 02 — Relations: domain and range

Relation definition: A relation is a collection of points (officially called a **set** of points). There are **five ways** to show such a collection (set).

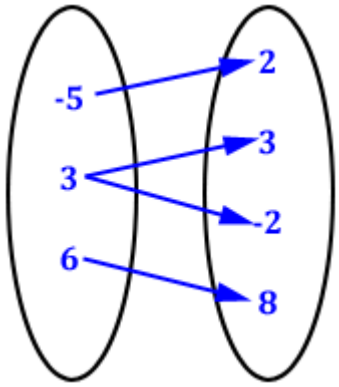
1st way: Let's begin with the most familiar, a list of **ordered pairs**:

{ (–5, 2), (3, 3), (3, –2), (6, 8) }

2nd way: Graph



3rd way: Mapping



4th way: Table

x	y
-5	2
3	3
3	-2
6	8

5th way: Formula rule (More on this later when we study functions)

Domain:

The domain of a relation consists of all the **first coordinates** (all the **x's that are used**).

Range:

The range of a relation consists of all the **second coordinates** (all the **y's that are used**).

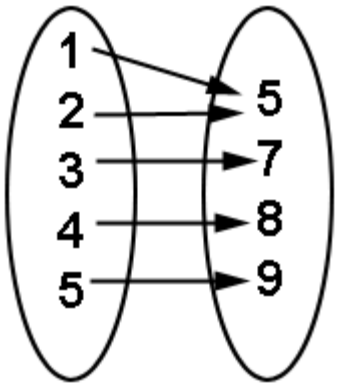
Example 1: State the domain and range of this relation:

{ (-9, 6), (7, 8), (6, -4), (7, 11), (0, 5) }

Domain: { -9, 7, 6, 0 }

Range: { 6, 8, -4, 5 , 11}

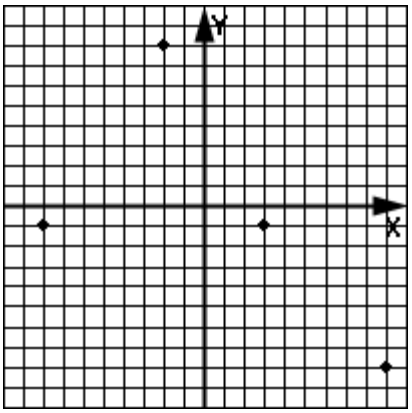
Example 2: State the domain and range of this relation:



Domain: { 1, 2, 3, 4, 5 }

Range: { 5, 7, 8, 9 }

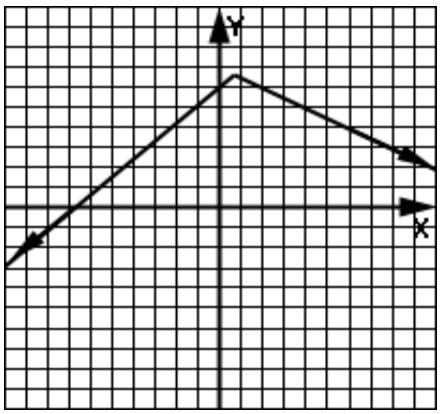
Example 3: State the domain and range of this relation:



Domain: { -8, -2, 3, 9 }

Range: { -1, 8, -8 }

Example 4: State the domain and range of this relation:



Domain: all real x

Range: y ≤ 6.5

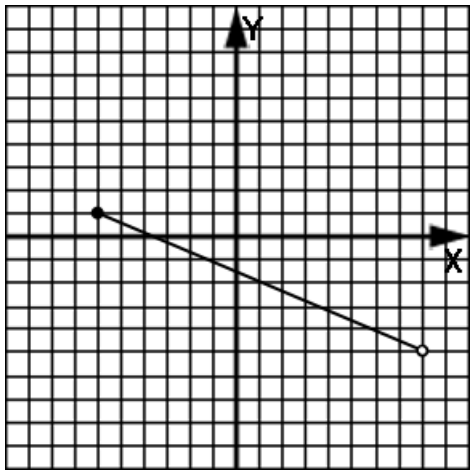
Example 5: State the domain and range of this relation:

Domain: { -5, 3, 6 }

Range: { 2, 3, -2, 8 }

x	y
-5	2
3	3
3	-2
6	8

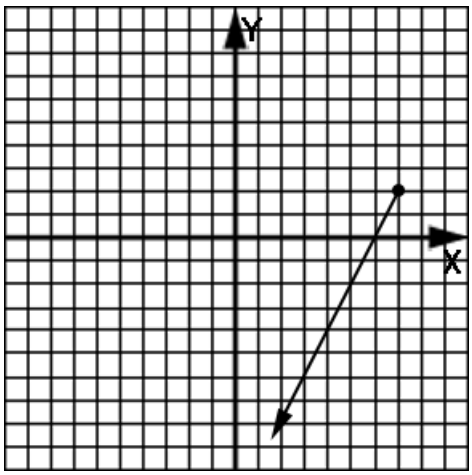
Example 6: State the domain and range of this relation:



Domain: $-6 \leq x < 8$

Range: $-5 < y \leq 1$

Example 7: State the domain and range of this relation:



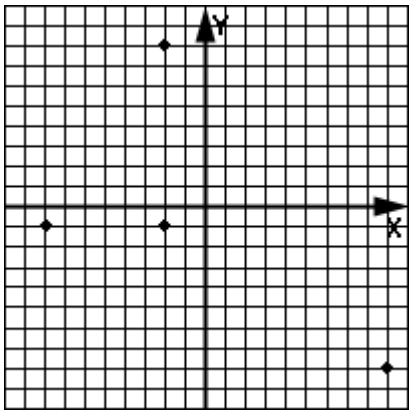
Domain: $x \leq 7$

Range: $y \leq 2$

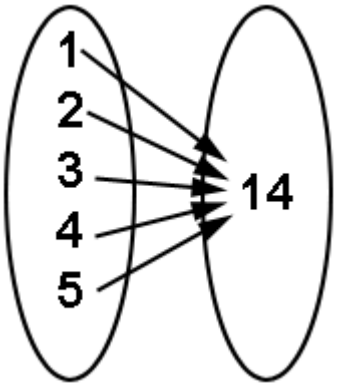
Assignment:

1. Express the relation represented by this list of ordered pairs as a mapping:
{ (4, 7), (-5, 11), (2, 9), (-1, 0) }

2. . Express the relation represented by this graph as a list of ordered pairs:



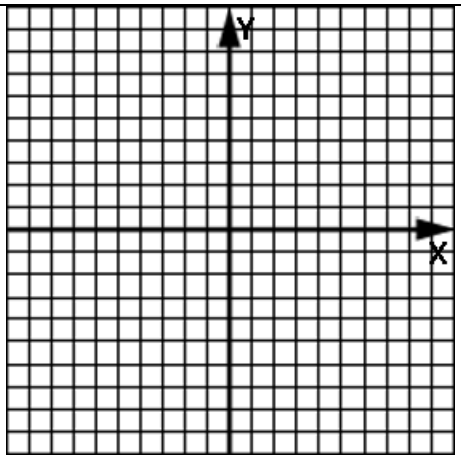
3. Express the relation represented by this mapping as a table:



x	y

4. Express the relation represented by this table as a graph:

x 0	y 1
5	7
8	2
-1	8
-3	4



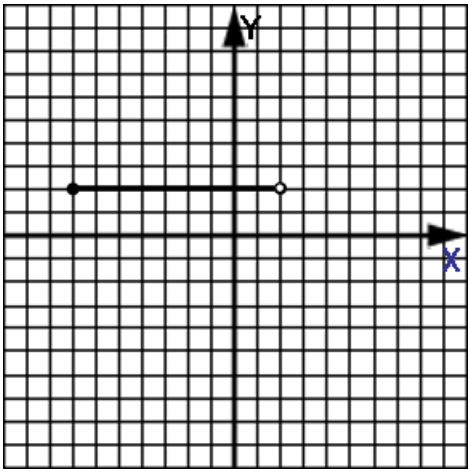
5. State the domain and range of the relation in problem 1.

6. State the domain and range of the relation in problem 2.

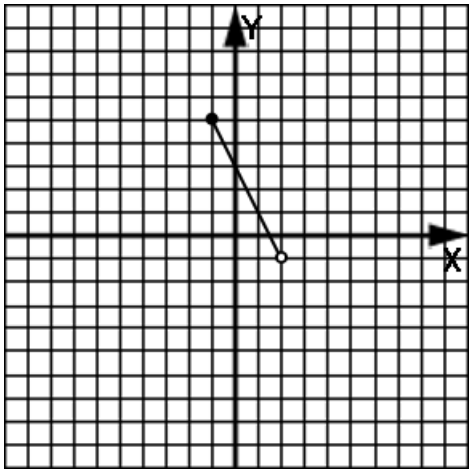
7. State the domain and range of the relation in problem 3.

8. State the domain and range of the relation in problem 4.

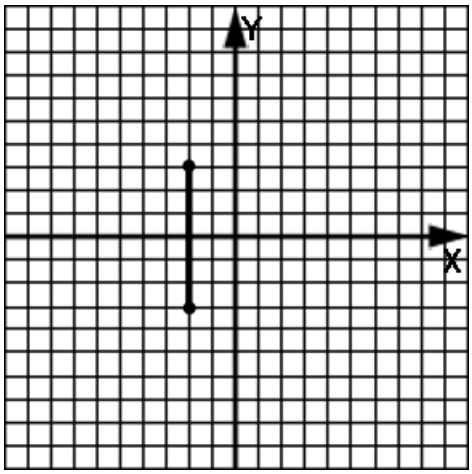
9. State the domain and range of the relation shown here.



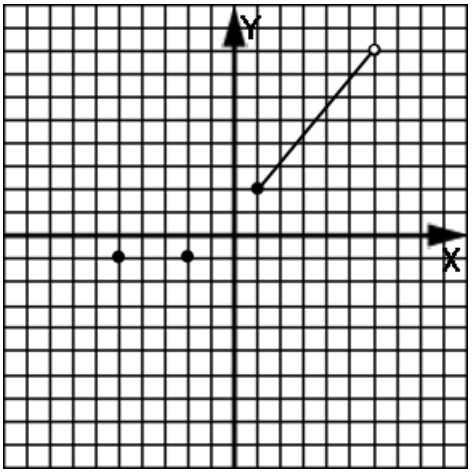
10. State the domain and range of the relation shown here.



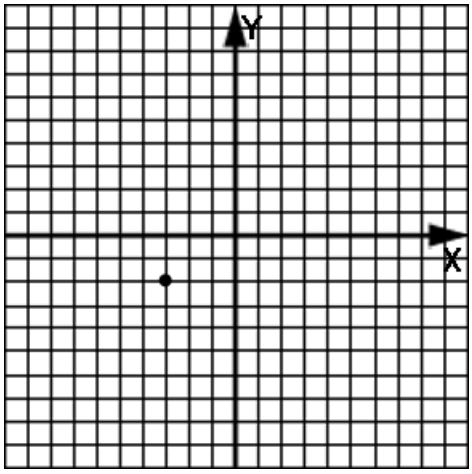
11. State the domain and range of the relation shown here.



12. State the domain and range of the relation shown here.



13. State the domain and range of the relation shown here.



14. State the domain and range of the relation shown here.