

RELATIONS

- A *relation* is a set of *ordered pairs*.

eg. $\{(7,3), (5,-4), (9,3), (-10,2), (12,-4), (9,6)\}$

- The *domain* of a relation is the set of the first numbers of the ordered pairs.

eg. the domain is $\{7,5,9,-10,12\}$

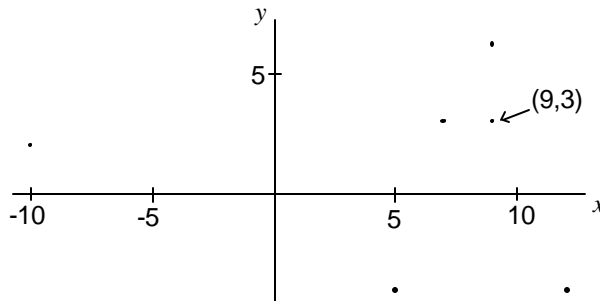
- The *range* of a relation is the set of the second numbers of the ordered pairs.

eg. the range is $\{3,-4,2,6\}$

- A relation can be represented by a *table of values*.

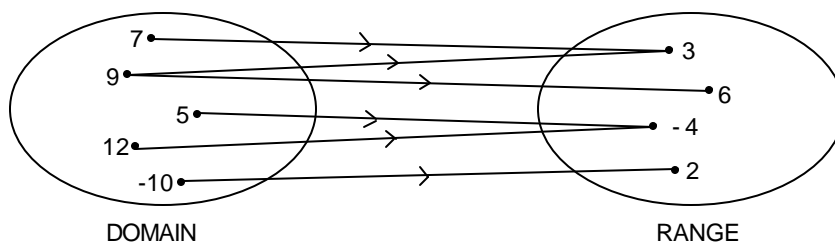
x	7	5	9	-10	12	9
y	3	-4	3	2	-4	6

- A relation can be represented by a *Cartesian plane graph*.



The x values form the domain and the y values form the range.

- A relation can be represented by a *mapping diagram*.



-10 is *mapped* to 2, etc.

- A relation may be represented by an *equation*.

eg. $x = 2$, $y = 2$, $y = 3x$, $y = x^2$, $y^2 = x$, $x^2 + y^2 = 25$.

- ☺ Draw accurate graphs of these relations. Assuming the maximum possible domain (*the usual practice when the domain is not known*), what is the domain and range of each relation?

- A relation may be represented by an *inequation* or *inequality*.

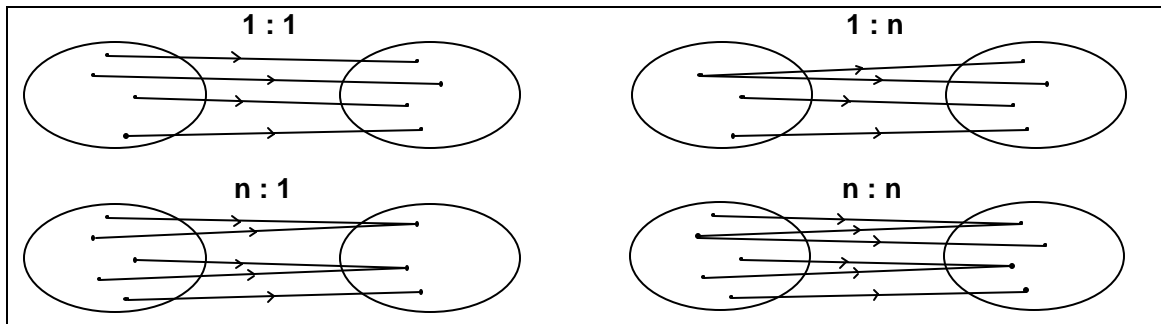
eg. $x < 2$, $y < 2$, $y \leq 3x$, $y > x^2$, $y^2 \leq x$, $x^2 + y^2 < 25$

- ☺ Sketch the graphs of these relations. What is the domain and range of each relation?

☺ Ex 4.3 p 142

■ Relations can be of four types:

1 : 1 or *one-to-one*, **1 : n** or *one-to-many*, **n : 1** or *many-to-one*, **n : n** or *many-to-many*



- If a relation is **1 : n**, then it is possible to draw a *vertical line which passes through two points on the graph* of the relation.
- If a relation is **n : 1**, then it is possible to draw a *horizontal line which passes through two points on the graph* of the relation.
- If a relation is **n : n**, then it is possible to draw a vertical line which passes through two points on the graph and a horizontal line which passes through two points.

☺ What type is each of the following relations?

$$x = 2, y = 2, y = 3x, y = x^2, y^2 = x, x^2 + y^2 = 25$$

$$x < 2, y < 2, y \leq 3x, y > x^2, y^2 \leq x, x^2 + y^2 < 25$$

☺ Ex 4.4 p144