

Notes 1.6:

Relations

A **Relation** is a set of ordered, (x, y) pairs. It's called a relation because the x/input values are somehow related to the y/output values.

ex: $\{(-1, -2), (0, -1), (1, 0), (2, 5), (3, 2), (4, 3)\}$

Relations can be represented in several ways:

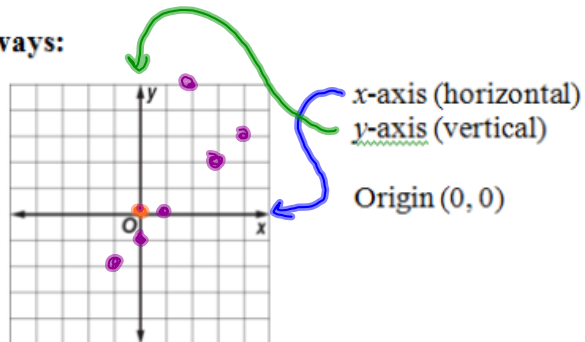
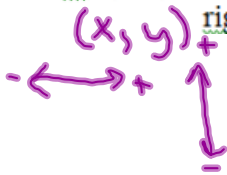
- By a points on a **Coordinate Graph**:

x-coordinate = horizontal location

y-coordinate = vertical location

ex: $(3, 2)$ = start at the origin

right 3 & up 2



- With a **Table**:

The input always comes first in a table. The output comes second.

Tables can be oriented vertically or horizontally.

The ordered pairs are listed in order of the x-values, least to greatest.

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

x	-1	0	1	etc
y	-2	-1	0	

- With **Mapping**:

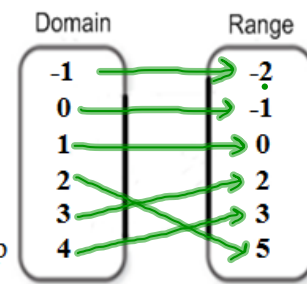
The input or x -values are known as the **Domain**:

$$\{-1, 0, 1, 2, 3, 4\}$$

The output or y -values are known as the **Range**:

$$\{-2, -1, 0, 2, 3, 5\}$$

A mapping shows how each input (*domain member*) is matched up with an output (*range member*). Both number sets should be in order from least to greatest. Arrows are drawn to show how the members of the *domain* and *range* are paired up.



- Sometimes a relation can be represented with an **Equation**:

$y = 3x - 2$ produces the ordered pairs: $\{(0, -2), (1, 1), (2, 4), (3, 7), (4, 10)\}$
with the domain: $\{0, 1, 2, 3, 4\}$

$$y = 3(0) - 2$$

$$-2 = 0 - 2$$

$$y = 3(1) - 2$$

$$+1 = 3 - 2$$

Here is an example of a relation represented several ways:

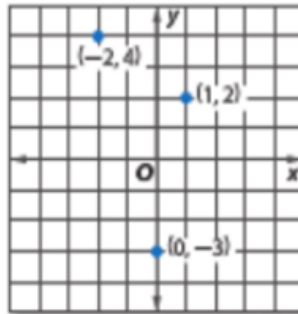
Ordered Pairs

(1, 2)
(-2, 4)
(0, -3)

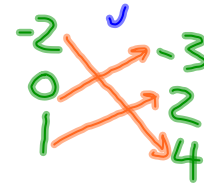
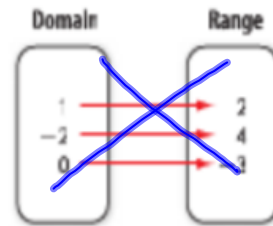
Table

x	y
1	2
-2	4
0	-3

Graph



Mapping



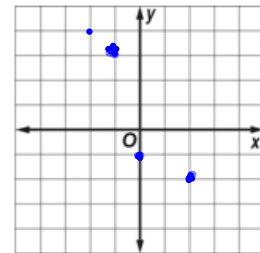
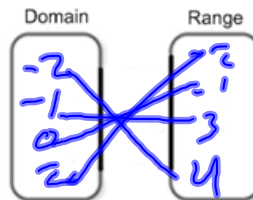
1. Express the relation as a table, a mapping, a graph and determine the domain & range.

(-2, 4), (-1, 3), (0, -1), (2, -2)

Domain: $\{-2, -1, 0, 2\}$

Range: $\{-2, -1, 3, 4\}$

x	y
-2	4
-1	3
0	-1
2	-2



In a relation the input values (x) are called the Independent Variables. The values that depend on the on the input (the output or y 's) are called the Dependent Variables. The dependent variables produced depend upon the independent variable selected. The independent variables are always graphed on the x -axis of a graph.

you choose

depends on choice

for example: The number of detentions increases with the number of tardies.

since the number of detentions depends on the number of tardies, tardies are the independent variable and detentions are the dependent variable.

2. Identify the independent and dependent variables for the following relations.

a. The air pressure inside a tire increases as the temperature increases.

dependent

independent

b. As the rain increases so does the level of the river.

independent

Dependent

c. The more money the students give a teacher, the fewer homework assignments are given.

Independent

Depends