PENANG SANGAM HIGH SCHOOL

DEPARTMENT OF MATHEMATICS/PHYSICS
YEAR 11 MATHEMATICS WEEK 9

STRAND 3 **RELATIONS**

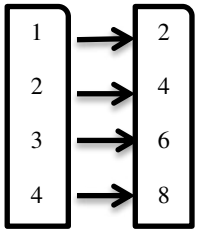
3.1 FUNCTIONS

Learning Objective
At the end of this lesson, students should be able to:
- Determine inverse

- **Relations** - link one element to the other.

Ways of writing relations

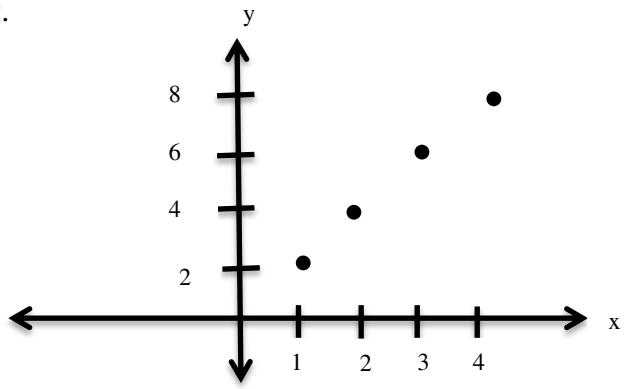
1. **A relation given as a rule –** relations can be given using simple formulae called rules e.g. $y = 2x$
2. **Arrow diagrams –** arrow diagrams can be drawn to show the link between x and y values e.g.



3. **Ordered pairs –** sometimes a set of ordered pairs is listed to represent a relation. An ordered pair is a composition having two values written in a fixed order within round brackets e.g. {(x,y):(1,2),(2,4),(3,6),(4,8)}.
4. **A table of values –** the values for x and y can be given in a tabular form e.g.

x	1	2	3	4
y	2	4	6	8

5. **A Cartesian graph –** the ordered pairs can easily be shown on a Cartesian plane where the y values are plotted against the x values e.g.



6. **A phrase or sentence –** sometimes a phrase or a sentence is written to describe a relation e.g. "y is two times x".

- **Function –** a function relates an input to an output.
- **Inverse – t**he inverse of a relation, R is written R^{-1}. It is obtained by reversing the order of the elements in each pair of the relations (i.e. by interchanging the x and y values). In an arrow diagram, the arrows go in the opposite direction for the inverse.

Inverse Of Relations Given As Rules Or Graphs

- If the relation is given as a formula, to get the inverse:-
  i) Interchange positions of x and y.
  ii) Make y the subject of the formula.

Examples: Find the inverse of

a) $y = 2x + 3$

Interchanging x and y we get

$$x = 2y + 3$$

Making y the subject of the formula we get

$$x - 3 = 2y + 3 - 3$$

$$\frac{x-3}{2} = \frac{2y}{2}$$

Therefore, the inverse is $y = \frac{x-3}{2}$

b) $y = \frac{x+4}{2}$

Interchanging x and y we get

$$x = \frac{y+4}{2}$$

Making y the subject of the formula we get

$$2x x = \frac{y+4}{2} \text{ x2}$$

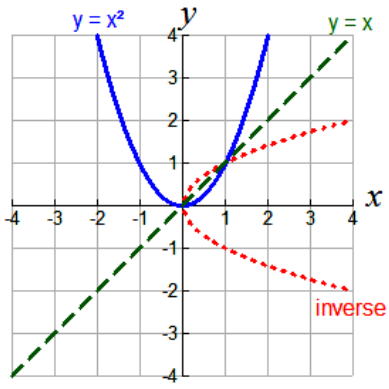
$$2x = y + 4$$

$$2x - 4 = y + 4 - 4$$

Therefore, the inverse is $y = 2x - 4$

- If a graph is drawn, the inverse is obtained by reflecting the graph in the line $y = x$

Example: For the following graph, sketch the graph of the inverse relation.



Exercise

1. Find the inverse of
   a) $y = 2x + 4$ b) $y = \frac{x-1}{2}$

2. For the following graph, sketch the graph of the inverse relation.