

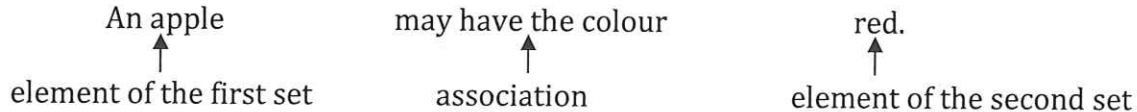
### 5.1 Representing Relations

A **set** is a collection of distinct objects.

An **element** of a set is one object in the set.

A **relation** associates the elements of one set with the elements of another set.

For example: Let's consider the set of fruits associated with the set of colours.



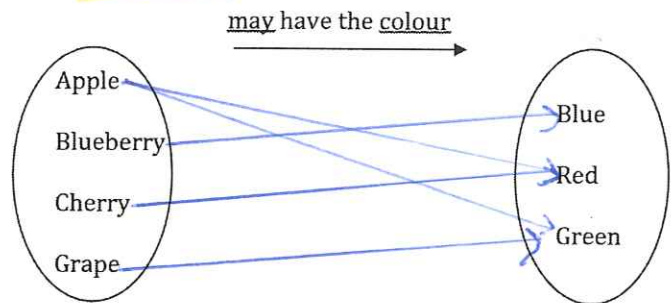
-We can show this relation as a **set of ordered pairs**:

{(apple, red), (apple, green), (blueberry, blue), (cherry, red), (grape, green)}

-We can also show this relation in a **table**:

Fruit	Colour
Apple	Red
Apple	Green
Blueberry	Blue
Cherry	Red
Grape	Green

-We can also show this relation in an **arrow diagram**:



A relation has direction from one set to the other set. The order of the words in the ordered pairs, the columns in the table, and the ovals in the arrow diagram is important. It does not make sense to say "red may have the colour apple". The elements in the sets are listed in some order, if possible.

**Ex. 1** For the table to the right:

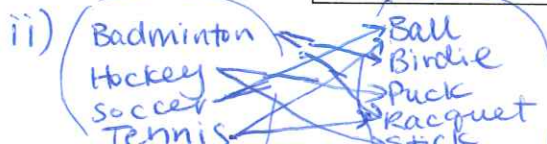
a) describe the relation in words

*Each sport uses the equipment.*

b) represent the relation:

- i) as a set of ordered pairs
- ii) as an arrow diagram

i) {(Bad, Bird), (Bad, Racq), (Hockey, Puck), (Hockey, Stick), (Soccer, Ball), (Tennis, Racq), (Tennis, Ball)}



Sport	Equipment
Badminton	Birdie
Badminton	Racquet
Hockey	Puck
Hockey	Stick
Soccer	Ball
Tennis	Racquet
Tennis	Ball

When the elements of one or both sets in a relation are numbers, the relationship can be represented as a bar graph.

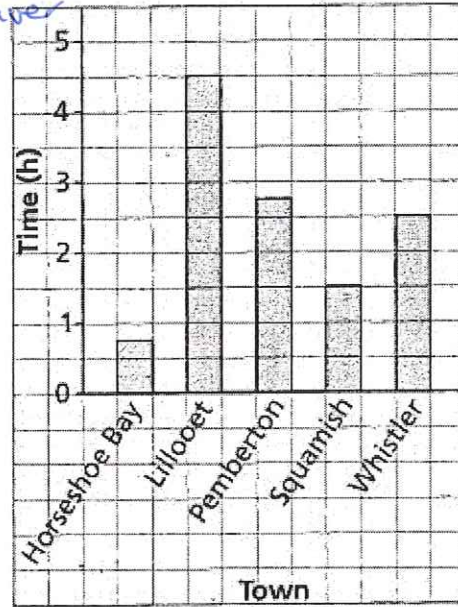
**Ex. 2** Consider the relation represented by this bar graph.

Represent the relation:

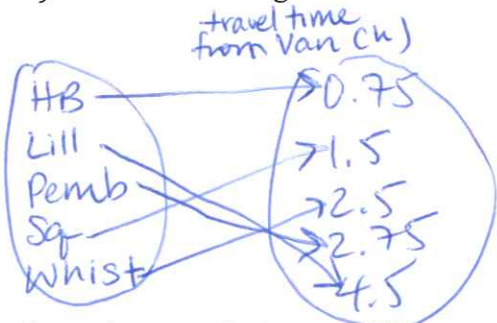
a) as a table

Town	Avg Travel time to Vancouver (h)
Horseshoe Bay	0.75
Lillooet	4.5
Pemberton	2.75
Squamish	1.5
Whistler	2.5

Average Travel Time to Vancouver



b) as an arrow diagram

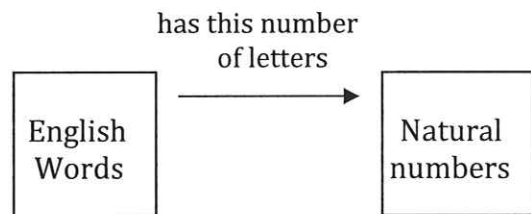


Sometimes a relation contains so many ordered pairs that it is impossible to list them all or to represent them in a table.

**Ex. 3** In the diagram:

a) Describe the relation in words.

Each English word contains this many letters



b) List 2 ordered pairs that belong to the relation.

{(mathematics, 11), (fun, 3)}