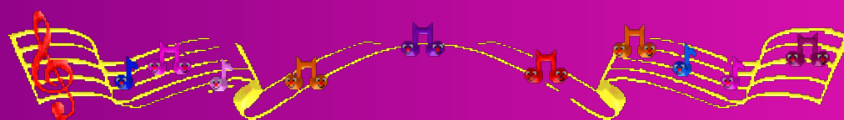


## Chapter 5

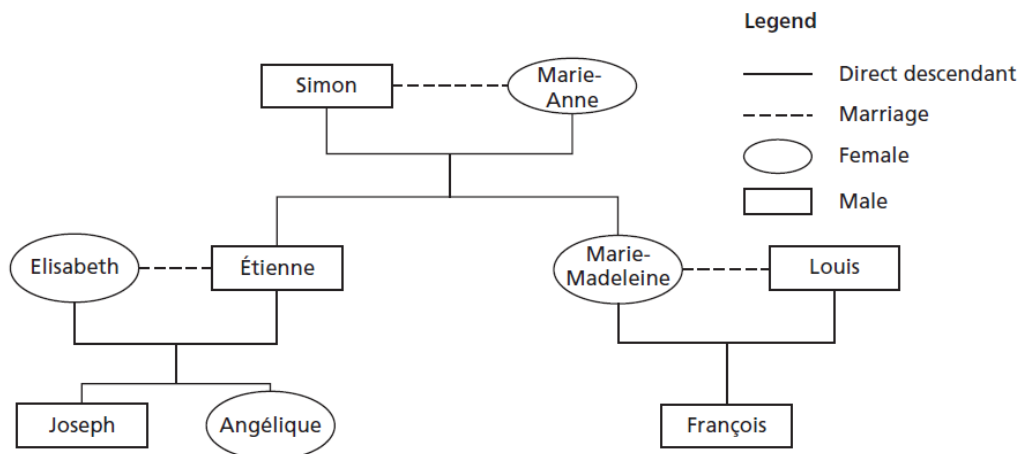
# Functions & Relations



## 5.1 Representing Relations



### How are we Related !!!!



- How is Joseph related to Simon?
- How are Angélique and François related?
- How does the family tree show these relations?



# Terminology

A set is a collection of distinct objects.

## Set of Fruit

Fruit

apple

blueberry

cherry

huckleberry

## Set of Colours

Colour

red

green

blue

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

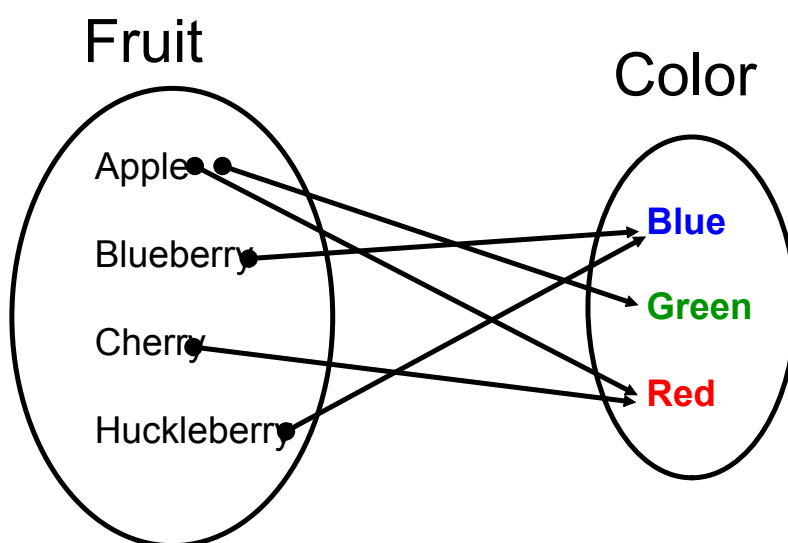


<u>Set of Fruit</u>
Fruit
apple
blueberry
cherry
huckleberry

*Apple* is an element of the set of Fruit

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

### Arrow Diagram



## Some other ways to display the relation :

### Use a table



Fruit	Colour
apple	red
apple	green
blueberry	blue
cherry	red
huckleberry	blue



## Table of Values

x	y
0	1
1	4
2	7
3	10

*+1* (green arrow pointing right from x=0 to x=1)  
*+3* (blue arrow pointing up from y=1 to y=4)

$$Y = 3x + 1$$

$$= \underbrace{3(0)}_0 + 1$$

$$y = 3x + 1$$

$$\underbrace{3(1)}_3 + 1$$

$$3 + 1$$

$$4$$

$$y = \underline{3}x + 1$$

*what y increases*

*what x should increase by*

Ordered Pairs (x,y)

$$(0, 1)$$

$$(1, 4)$$

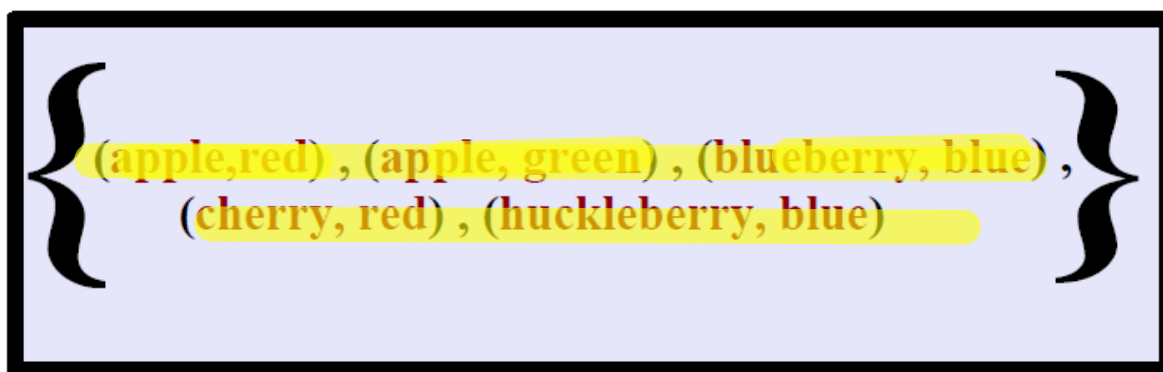
$$(2, 7)$$

$$(3, 10)$$

$$\{(0, 1), (1, 4), (2, 7), (3, 10)\}$$

Set of ordered pairs for  $y = 3x + 1$

\* Use a set of *ordered pairs* to display a relation.



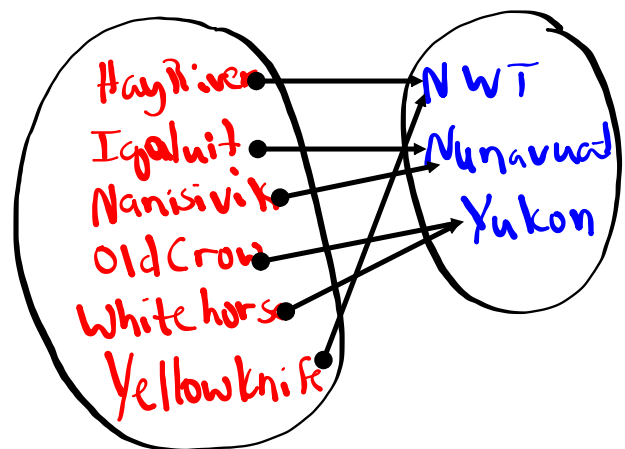
Fruit	Colour
apple	red
apple	green
blueberry	blue
cherry	red
huckleberry	blue



*Northern communities* can be associated with the *territories* they are in.

Try !!

Community	Territory
Hay River	NWT
Iqaluit	Nunavut
Nanisivik	Nunavut
Old Crow	Yukon
Whitehorse	Yukon
Yellowknife	NWT



a) ~~Describe this relation in words.~~

b) Represent this relation:

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

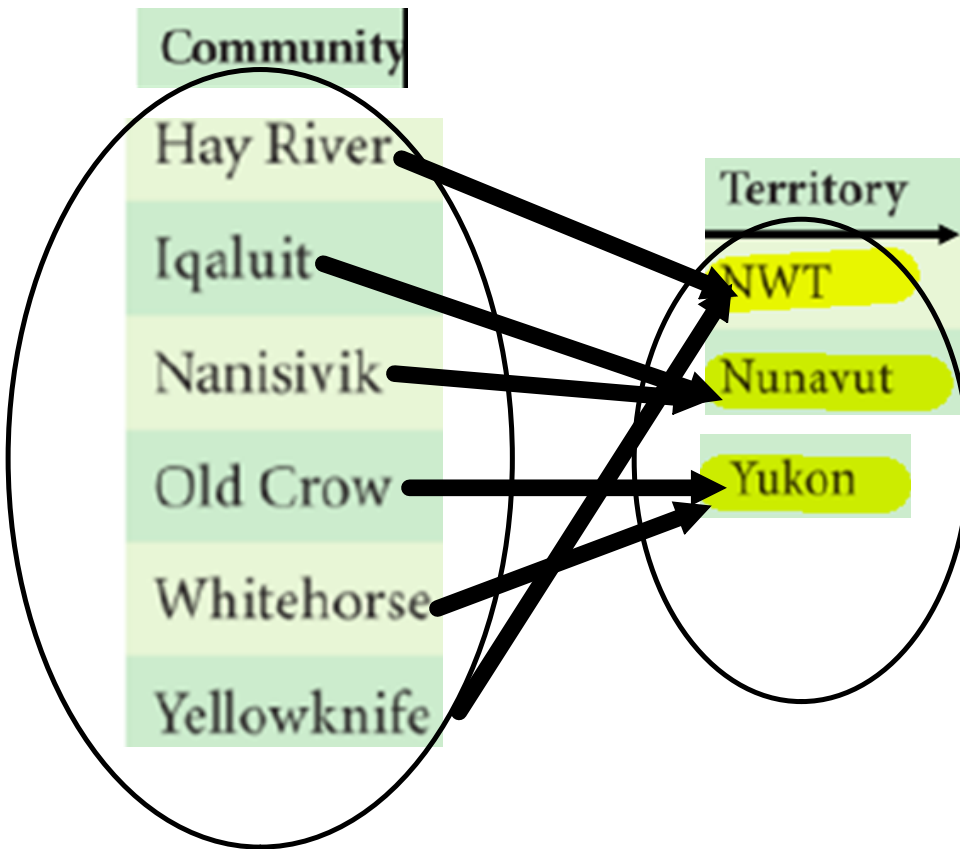
b i)  $\left\{ \begin{array}{l} (\text{Hay River, NWT}), (\text{Iqaluit, Nunavut}), \\ (\text{Nanisivik, Nunavut}), (\text{Old Crow, Yukon}), \\ (\text{Whitehorse, Yukon}), (\text{Yellowknife, NWT}) \end{array} \right\}$

**1)**

**The communities are the first ordered pairs.  
The territories are the second ordered pairs.**

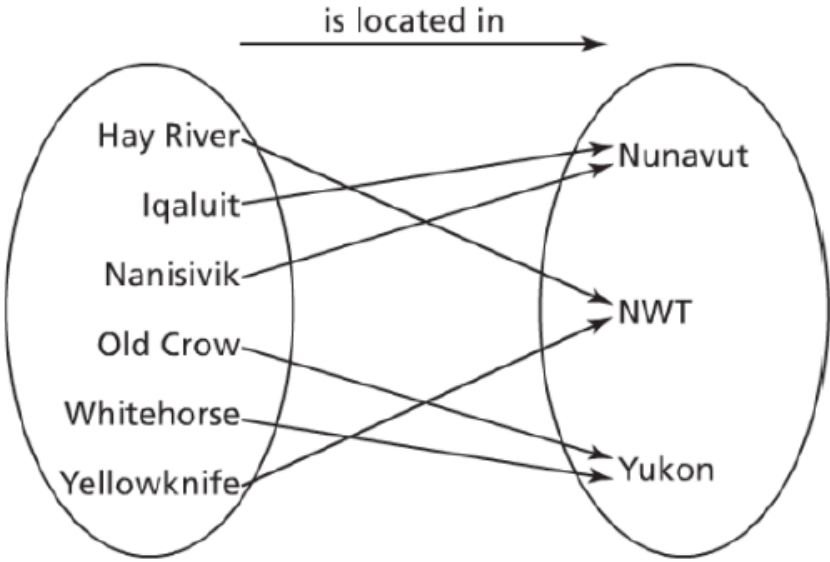
**(Hay River, NWT) , (Iqaluit, Nunavut) , (Nanisivik, Nunavut) ,  
(Old Crow, Yukon), (Whitehorse, Yukon) , (Yellowknife , NWT)**

Community	Territory
Hay River	NWT
Iqaluit	Nunavut
Nanisivik	Nunavut
Old Crow	Yukon
Whitehorse	Yukon
Yellowknife	NWT



Community	Territory
Hay River	NWT
Iqaluit	Nunavut
Nanisivik	Nunavut
Old Crow	Yukon
Whitehorse	Yukon
Yellowknife	NWT

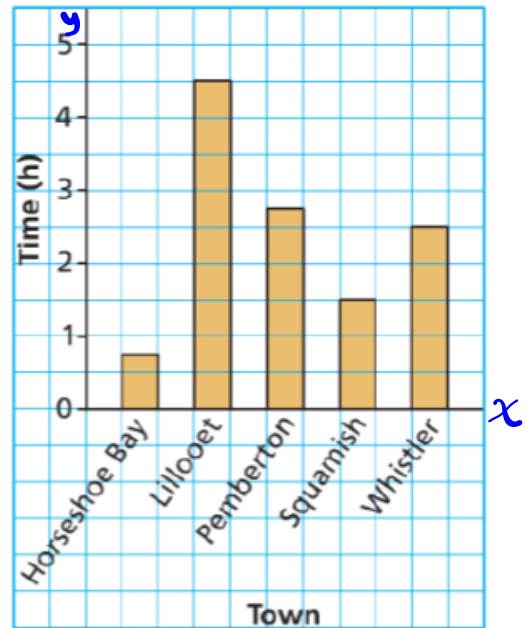
ii)



**You Try !!**

Different towns in British Columbia can be associated with the average time, in hours, that it takes to drive to Vancouver.

Town	Time
------	------



Represent the relation as a *table*.

Town	Time
Horseshoe Bay	$\frac{3}{4}$ hr or 45min
Lillooet	4.5h or 4hr 30min
Pemberton	$2\frac{3}{4}$ hr or 2hr 45min
Squamish	1.5 hr or 1hr 30min
Whistler	2.5 hr or 2hr 30min

**solution:**

<b>Town</b>	<b>Average Time (h)</b>
Horseshoe Bay	0.75
Lillooet	4.5
Pemberton	2.75
Squamish	1.5
Whistler	2.5

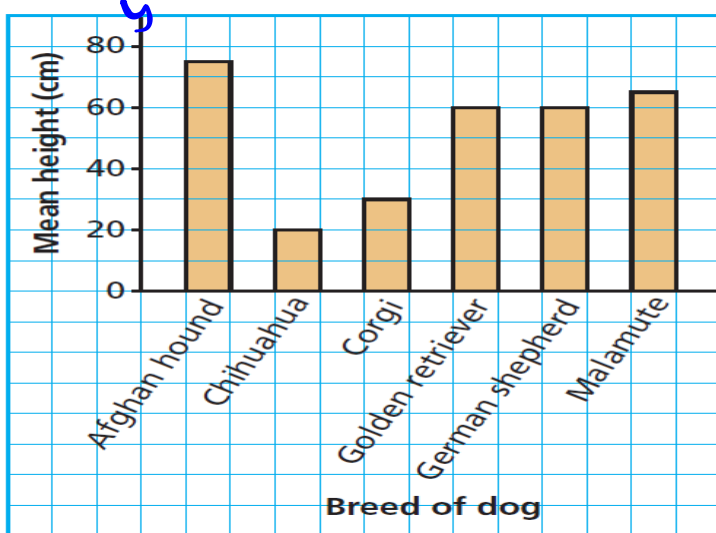
## Representing a Relation Given as a Bar Graph



Different breeds of dogs can be associated with their mean heights. Consider the relation represented by this graph.



Mean Heights of Different Breeds of Dogs



Represent the relation:

a) as a table

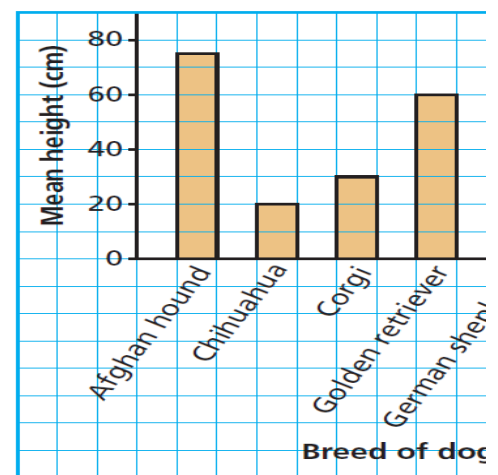
b) as an arrow diagram

Represent the relation:

a) as a table

In the table, write the breeds of dogs in the first column  
the mean heights in centimetres in the second column

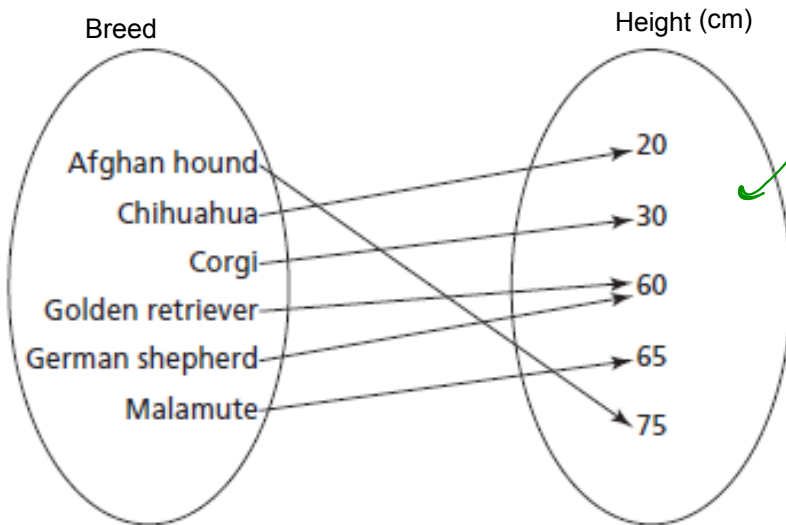
Breed of Dog	Mean Height (cm)
Afghan hound	75
Chihuahua	20
Corgi	30
Golden retriever	60
German shepherd	60
Malamute	65





b) as an arrow diagram

b) In the arrow diagram, write the breeds of dogs in the first set and the mean heights in centimetres in the second set.



*ordered from smallest to largest.*

Mean Heights of Different Breeds of Dogs

