

# Chapter 5: Relations and Functions

## BUILDING ON

Writing equations to represent patterns in tables  
Graphing and analyzing linear relations

## BIG IDEAS

A relations associates the elements of one set with the elements of another set  
A function is a special type of relation for which each element of the first set is associated with a unique element of the second set  
A linear function has a constant rate of change and its graph is a non-vertical straight line

# New Vocabulary

Relation

Arrow diagram

Function

Domain

Range

Function notation

Rate of change

Linear function

Vertical intercept

Horizontal intercept

# 5.1 Representing Relations

## **Lesson Focus**

Represent relations in different ways

# New Terms

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

Ex. The set of natural numbers from 1 to 5      $\{1, 2, 3, 4, 5\}$

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

Ex. The number 3 is an element from the set of natural numbers 1 to 5

The order of elements in a set does not matter!

## Explore

List the set of natural numbers from 10 to 15

$\{10, 11, 12, 13, 14, 15\}$

List the set of integers between -3 and 3

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

List the set of whole numbers less than 5

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

List the set rational numbers from 1 to 3

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

Consider the set of fruits and the set of colours.

We can associate fruits with their colours.

For example:

An apple



element of first set

may have the colour



association

red.



element of second set

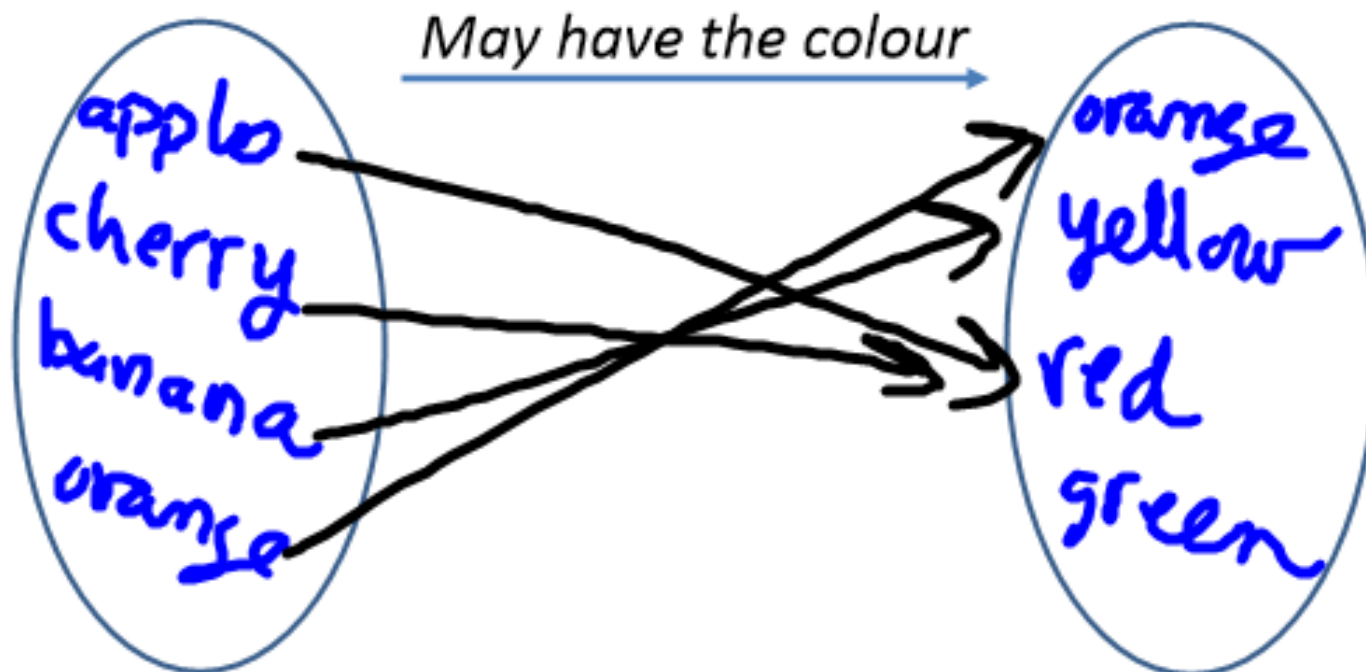
What are more fruits? What are their colours?

Banana may have the colour yellow

# Arrow Diagram

An **arrow diagram** can be used to show association

Each arrow associates an element of the first set with an element of the second set



# Example

## Table

Northern communities can be associated with the territories they are in. Consider the relation represented by this table.

- a) Describe this relation in words.
- b) Represent this relation:
  - i) as a set of ordered pairs
  - ii) as an arrow diagram

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

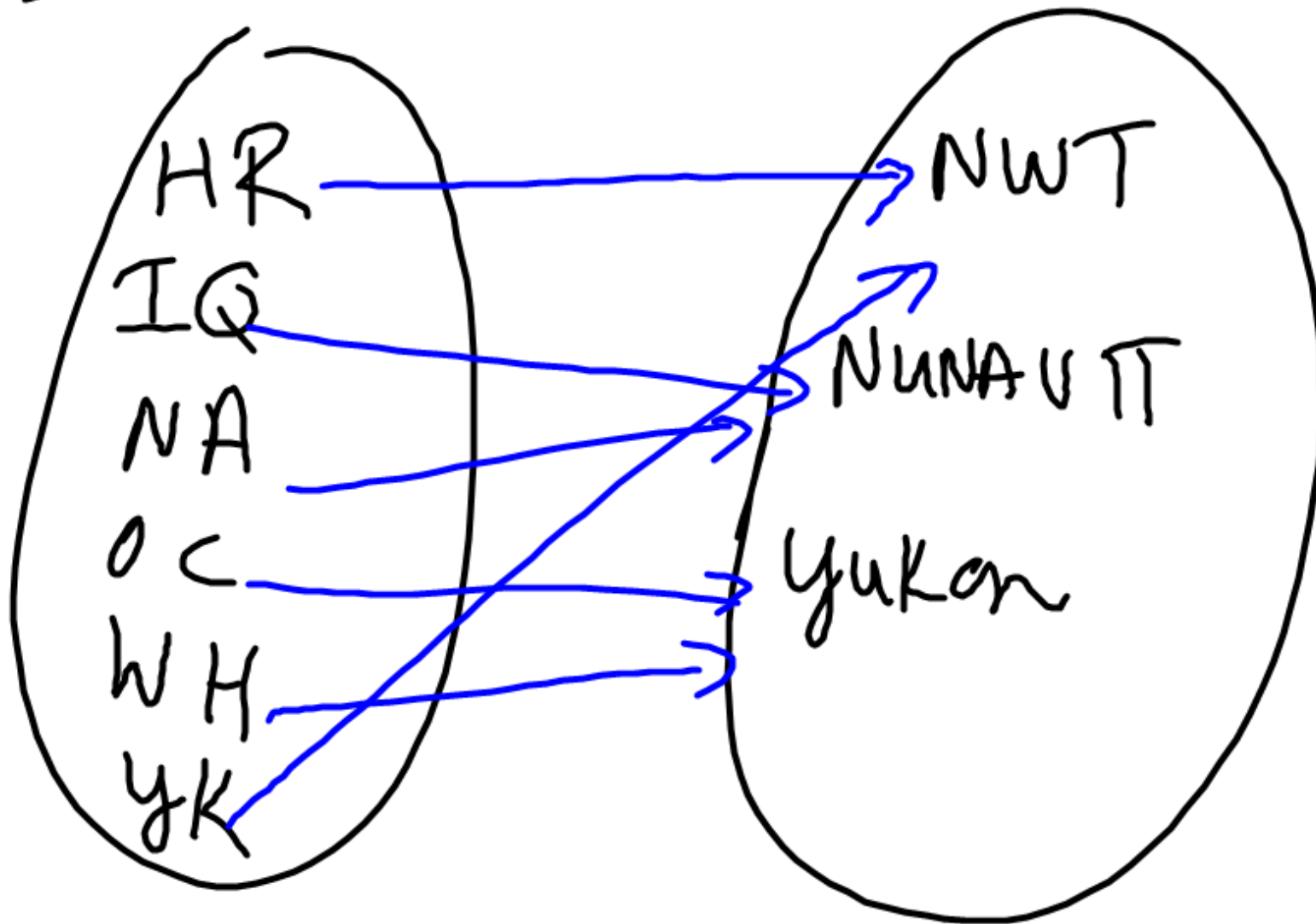
a) Hay River is located in NWT.



## b) ORDERED PAIRS

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

# ARROW DIAGRAM



## Example – Your Turn

Animals can be associated with the classes they are in.

Animal	Class
ant	Insecta
eagle	Aves
snake	Reptilia
turtle	Reptilia
whale	Mammalia

a) Describe this relation in words.

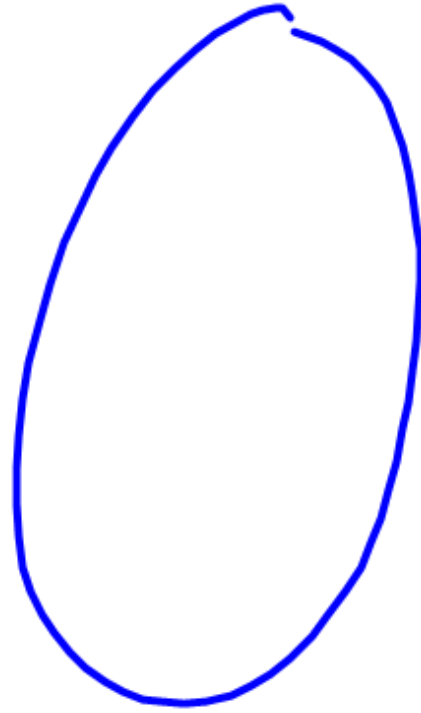
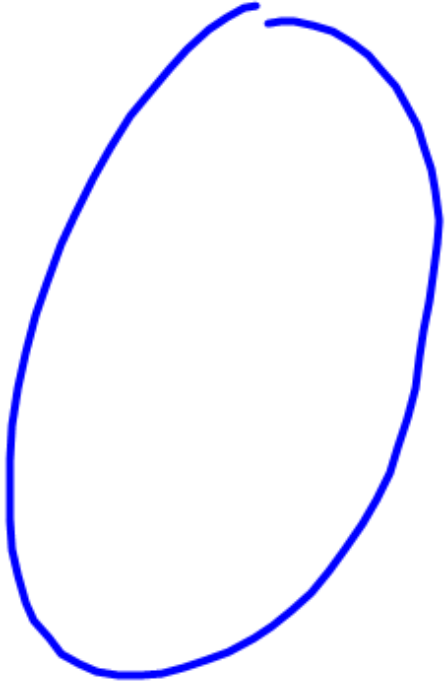
b) Represent this relation:

i) as a set of ordered pairs

ii) as an arrow diagram

a) Ant belongs to  
the class of insecta

belongs to  
class  $\phi$



# Homework

**P. 261-263**

**# 3, 5, 7**

# Graphs

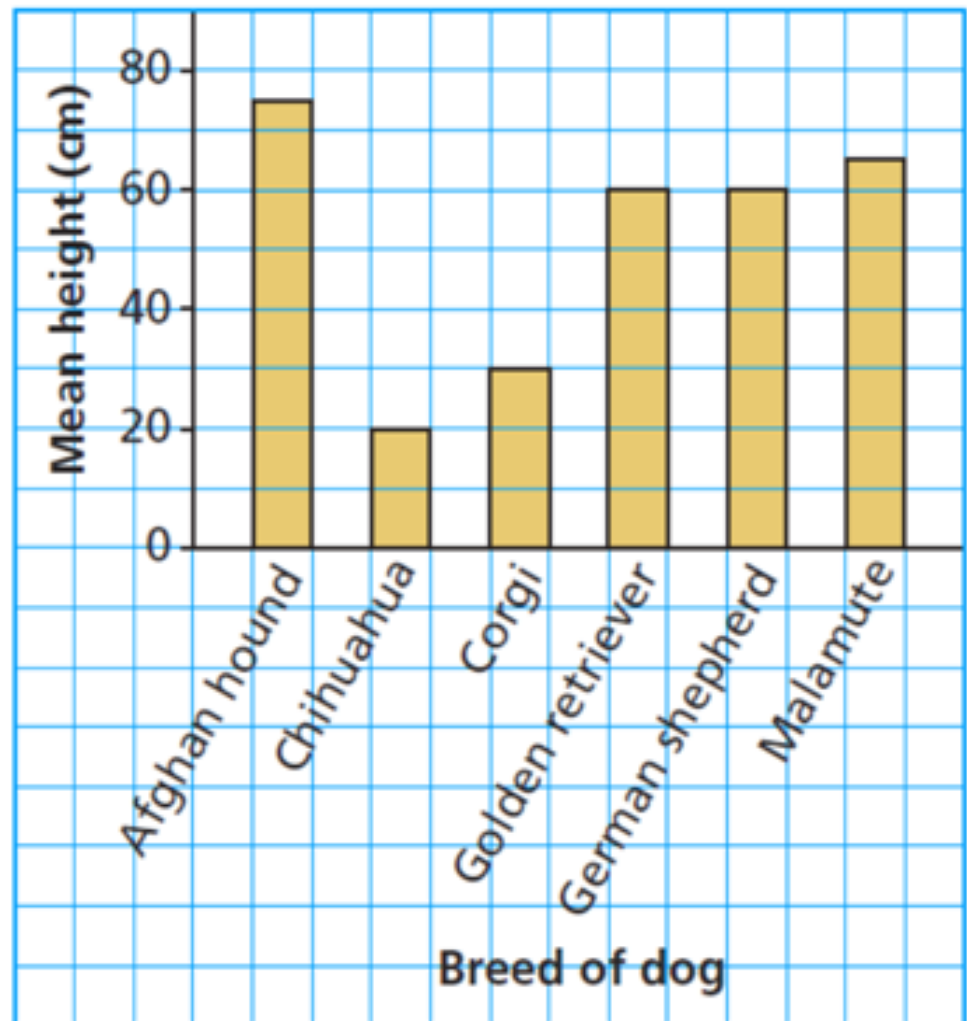
When elements of one or both sets in a relation are numbers, the relation can be represented as a bar graph

# Example

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

- as a table
- as an arrow diagram

Mean Heights of Different Breeds of Dogs

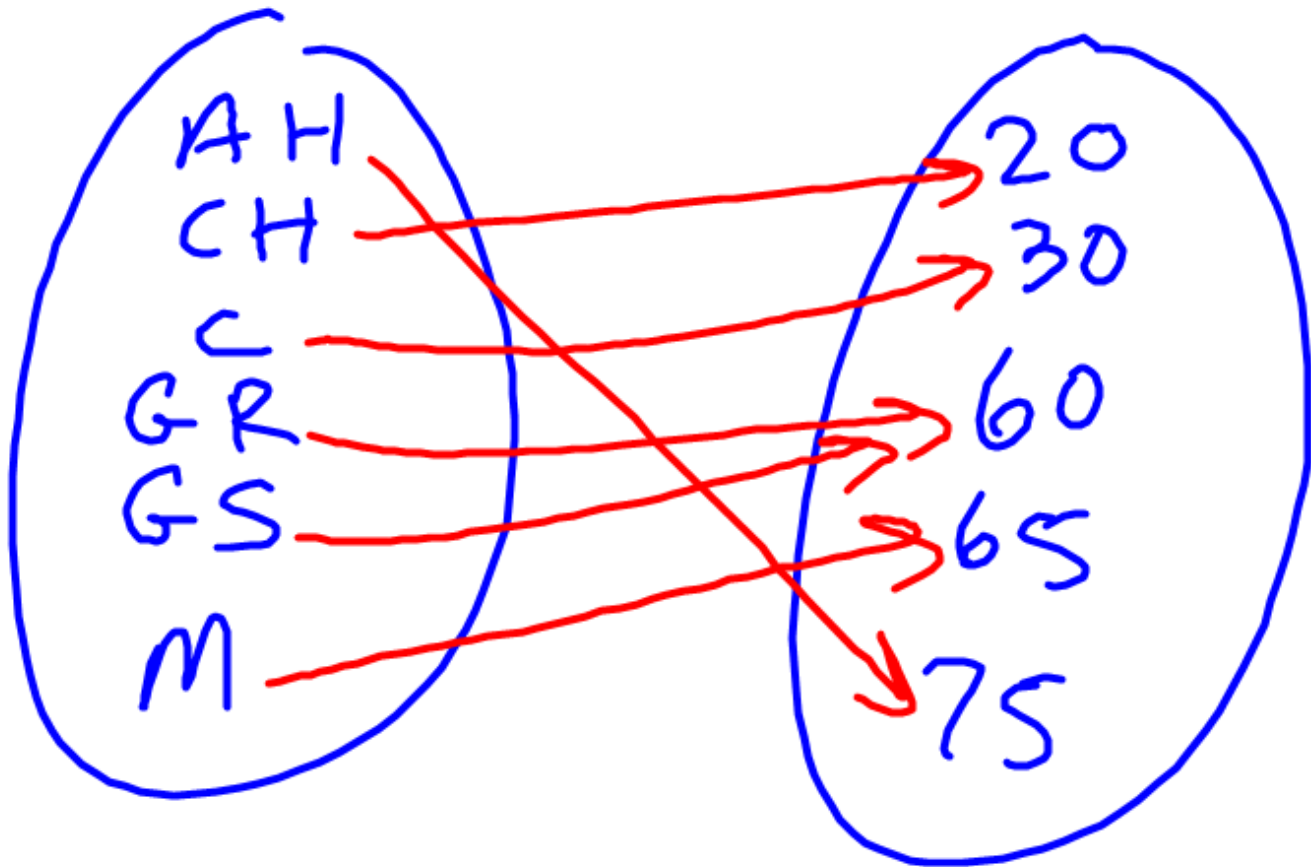


a)

Breed of Dog	Mean Height (cm)
AH	75
CH	20
C	30
GR	60
GS	60
M	65



has a mean height (cm)



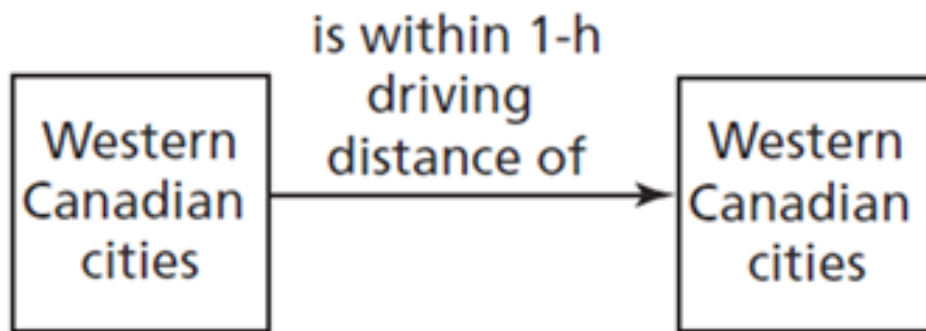






# Expand your thinking

In this diagram:



Both sets in a relation can be the same.

- Describe the relation in words.
- List 2 ordered pairs that belong to the relation.

• *~~X~~ Sometimes a relation contains so many ordered pairs it's impossible to list them all*

a)

① Moose Jaw is within 1 hour  
driving distance of Regina.

② Nanaimo is within 1 hour  
of Victoria

b) { (Moose Jaw, Regina) (Nanaimo, Victoria) }

# Homework

**P. 261-263**

# 3, 5, 7

• # 4, 6, 8, 9, 10, 13