**5.1 – Representing Relations**

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

For example, we can write the set of natural numbers from 1 to 5 as follows: {1, 2, 3, 4, 5}

The order of the elements in a set *does not* matter!

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 may have the colour red.

element of first set association element of second set

We can write the set of ordered pairs as follows: {apple, red}

The relations may also be represented as:

a) a table

|  |  |
| --- | --- |
| **Fruit** | **Colour** |
| Apple | Red |
| Apple | Green |
| Blueberry | Blue |
| Cherry | Red |
| Huckleberry | Blue |

The heading of each column describes each set.

b) an arrow diagram

may have the colour

apple blue

blueberry

green

cherry

huckleberry red

The two ovals represent the sets. Each arrow associates an element of the first set with an element of the second set. Each relation only makes sense in one direction. For example, it doesn’t make sense to say “red may have the colour apple”.

**Example 1: Representing a Relation Given as a Table**

Athletes can be associated with their sports.

|  |  |
| --- | --- |
| **Athlete** | **Sport** |
| Jennifer Botterill | Ice hockey |
| Jennifer Jones | Curling |
| Jeremy Wotherspoon | Speed skating |
| Jonathan Cheechoo | Ice hockey |

a) Describe this relation in words.

The relation shows the association “takes part in” from a set of athletes to a set of sports. For example, Jennifer Botterill takes part in ice hockey.

b) Represent this relation as a set of ordered pairs.

{(Jennifer Botterill, ice hockey), (Jennifer Jones, curling), (Jeremy Wotherspoon, speed skating), (Jonathan Cheechoo, ice hockey)}

c) Represent this relation as an arrow diagram.

takes part in

Botterill Curling

Jones

Ice Hockey

Wotherspoon

Cheechoo Speed

Skating

**Example 2: Representing a Relation Given as a Bar Graph**

See page 260 of the textbook for a good example.