

Chapter Seven

Set:

- A set is the name given to a collection of items.
- For example, the number of students within a class forms the set of students in the class.

Set notation:

- A set can be represented by the symbol $\{ \}$ or $()$.
- Therefore $\{\text{farmers}\}$ = the set of farmers.

The elements of a set:

- These are the items which are found within a given set.
- For example, if $Y = \{1, 2, 3, 4\}$, then the elements of Y are 1, 2, 3, and 4.
- Also if $X = \{a, b\}$, then the elements of X are a and b.

The symbol \in :

- Consider now the set $Y = \{1, 2, 3\}$. Since 2 is a member of Y, we write $2 \in Y$, which means that 2 is a member of Y.
- Also since 3 is a member of Y, we can also write $3 \in Y$.
- But since 7 is not a member of Y, we write $7 \notin Y$, which means that 7 is not a member of Y.

The set of numbers:

- Our number system which refers to the numbers that we use, can be divided into the following groups of sets:

- (1) The set of integers i.e. $\{\dots\dots 3, -2, -1, 0, 1, 2, 3, 4 \dots\dots\}$
- Integers are whole numbers which are either negative or positive, as well as 0.
- (2) The set of whole numbers i.e. $\{0, 1, 2, 3, 4 \dots\dots\}$
- Whole numbers are numbers from zero upwards.
- (3) The set of natural numbers or counting numbers i.e. $\{1, 2, 3, 4 \dots\dots\}$.
- Natural numbers are numbers from 1 upwards.
- (4) The set of odd numbers i.e. $\{1, 3, 5, 7, 9 \dots\dots\}$
- These are numbers which when divided by 2, always give us a remainder.

- But the number 1 is an odd number.
- (5) The set of prime numbers i.e. {2, 3, 5, 7, 11, 13, 17}.
- These are numbers which have only two factors.
- For example $7 = 1 \times 7$ i.e 7 has only two factors which are 1 and 7.
- Also since $3 = 1 \times 3$, then 3 also has only two factors which are 1 and 3.
- But 9 is not a prime number since it has four factors, which are 1 and 9, as well as 3 and 3, as well as 1 and 9, i.e. $9 = 1 \times 9$ and $9 = 3 \times 3$.
- (6) The set of composite numbers i.e. {4, 6, 8, 9, 10}.
- These are numbers which have more than two factors.
- For example, the factors of 4 are 1 and 4, as well as 2 and 2, since $4 = 1 \times 4$ and $4 = 2 \times 2$.
- (7) The set of even numbers i.e. {2, 4, 6, 8, 10, 12}.
- There are numbers which can be divided by 2 without a remainder

Factors of a given number:

- These are whole numbers which can divide that given number without any remainder.
- The given number becomes the highest factor.
- Examples are:

(1) The factors of 6 = 1, 2, 3, 6.

(2) The factors of 8 = 1, 2, 4, 8.

(3) The factors of 30 = 1, 2, 3, 5, 6, 15, 30.

Multiples of a given number:

- If y is our number, then multiples of $y = 1 \times y, 2 \times y, 3 \times y, 4 \times y, \dots = y, 2y, 3y, 4y, \dots$
- For example, the multiples of 5 = $1 \times 5, 2 \times 5, 3 \times 5, 4 \times 5, \dots = 5, 10, 15, 20, \dots$
- Also, the multiples of 2 = $1 \times 2, 2 \times 2, 3 \times 2, 4 \times 2, \dots = 2, 4, 6, 8, \dots$

Types of sets:

- There are various types of sets and these are:

(1) A finite set:

- This is a set whose members or elements can be counted.
- An example is the set of people within a family.

(2) An infinite set:

- This is a set which contains an uncountable number of elements, and examples are:
 - (a) {sand particles within a sack of sand}.
 - (b) {number of buckets of water that can be fetched from the sea}.