

- (iii) $\{x : x \text{ is a natural number, } x < 5 \text{ and } x > 7\}$
 (iv) $\{y : y \text{ is point common to any parallel lines}\}$.

Sol. The following are the examples of the null set.

- (i) There is no odd natural number divisible by 2.
 (iii) There is no natural number such that $x < 5$ and as well as $x > 7$.
 (iv) Parallel lines never meet at a point.

[Note : in (ii), there is one even prime number, namely 2.

So, it is not the empty set.]

2. Which of the following sets are finite or infinite ?

- (i) The set of months of a year.
 (ii) $\{1, 2, 3, \dots\}$
 (iii) $\{1, 2, 3, \dots, 99, 100\}$
 (iv) The set of positive integers greater than 100.
 (v) The set of prime members less than 99.

Sol. (i) The set of months of a year :

It is a **finite set**, as there are 12 members of the set, which are the months of the year.

- (ii) $\{1, 2, 3, \dots\}$

It is an **infinite set**, since there are infinite number of natural numbers.

- (iii) $\{1, 2, 3, \dots, 99, 100\}$

• It is a **finite set** as it contains first 100 natural numbers.

- (iv) The set of positive integers greater than 100.

It is an **infinite set** since there are infinite number of positive integers *viz.* 101, 102, 103, ... greater than 100.

- (v) The set of prime numbers less than 99.

This is a **finite sets**, because the set is $\{2, 3, 5, 7, \dots, 97\}$

3. State whether each of the following sets is finite or infinite :

- (i) The set of lines which are parallel to the x-axis.
 (ii) The set of letters in English alphabet.
 (iii) The set of numbers which are multiples of 5.
 (iv) The set of animals living on earth.
 (v) The set of circles through origin $[0, 0]$.

Sol. (i) **Infinite**. Infinite lines can be drawn parallel to x-axis.

- (ii) **Finite**. It is set of 26 letters.

- (iii) **Infinite**. $\{5, 10, 15 \dots\}$

- (iv) **Finite**. There are finite number of animals living on earth.

(v) **Infinite.** Infinite number of circles can be drawn passing through the origin.

4. In the following, state whether $A = B$ or not :

(i) $A = \{a, b, c, d\}$ $B = \{d, c, b, a\}$

(ii) $A = \{4, 8, 12, 16\}$ $B = \{8, 4, 16, 18\}$

(iii) $A = \{2, 4, 6, 8, 10\}$ $B = \{x : x \text{ is positive even integer and } x \leq 10\}$

(iv) $A = \{x : x \text{ is multiple of } 10\}$ $B = \{10, 15, 20, 25, 30, \dots\}$

Sol. (i) $A = B$ (ii) $A \neq B$ (iii) $A = B$ (iv) $A \neq B$

5. Are the following pair of sets equal? Give reasons.

(i) $A = \{2, 3\}$ $B = \{x : x \text{ is a solution of } x^2 + 5x + 6 = 0\}$.

(ii) $A = \{x : x \text{ is a letter in the word FOLLOW}\}$
 $B = \{y : y \text{ is a letter in the word WOLF}\}$.

Sol. (i) No. Since $x^2 + 5x + 6 = 0$

$\Rightarrow (x + 2)(x + 3) = 0$

$\Rightarrow x = -2 \text{ or } x = -3$

Solution set = $\{-2, -3\}$.

Clearly, $A \neq B$.

(ii) $A = \{x : x \text{ is a letter in the word FOLLOW}\} = \{F, O, L, W\}$
 and $B = \{y : y \text{ is a letter in the word WOLF}\} = \{W, O, L, F\}$.

Since every element of A is in B and every element of B is in A,
 therefore

$A = B$.

\therefore Yes, equal.

6. From the sets, given below, select examples of equal sets :

$A = \{2, 4, 8, 12\}$

$B = \{1, 2, 3, 4\}$

$C = \{4, 8, 12, 14\}$

$D = \{3, 1, 4, 2\}$

$E = \{-1, 1\}$

$F = \{0, 0\}$

$G = \{1, -1\}$

$H = \{0, 1\}$

Sol. Equal sets are B and D; E and G.