

**EXERCISE 1.2****PAGE: 8****1. Which of the following are examples of the null set?**

- (i) Set of odd natural numbers divisible by 2
- (ii) Set of even prime numbers
- (iii)  $\{x: x \text{ is a natural numbers, } x < 5 \text{ and } x > 7\}$
- (iv)  $\{y: y \text{ is a point common to any two parallel lines}\}$

**Solution:**

- (i) Set of odd natural numbers divisible by 2 is a null set as odd numbers are not divisible by 2.
- (ii) Set of even prime numbers is not a null set as 2 is an even prime number.
- (iii)  $\{x: x \text{ is a natural number, } x < 5 \text{ and } x > 7\}$  is a null set as a number cannot be both less than 5 and greater than 7.
- (iv)  $\{y: y \text{ is a point common to any two parallel lines}\}$  is a null set as the parallel lines do not intersect. Therefore, they have no common point.

**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 numbers less than 99

**Solution:**

- (i) The set of months of a year is a finite set as it contains 12 elements.
- (ii)  $\{1, 2, 3 \dots\}$  is an infinite set because it has infinite number of natural numbers.
- (iii)  $\{1, 2, 3 \dots 99, 100\}$  is a finite set as the numbers from 1 to 100 are finite.
- (iv) The set of positive integers greater than 100 is an infinite set as the positive integers which are greater than 100 are infinite.
- (v) The set of prime numbers less than 99 is a finite set as the prime numbers which are less than 99 are finite.

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

- (i) The set of lines which are parallel to the  $x$ -axis

- (ii) The set of letters in the English alphabet
- (iii) The set of numbers which are multiple of 5
- (iv) The set of animals living on the earth
- (v) The set of circles passing through the origin (0, 0)

**Solution:**

- (i) The set of lines which are parallel to the  $x$ -axis is an infinite set as the lines which are parallel to the  $x$ -axis are infinite.
- (ii) The set of letters in the English alphabet is a finite set as it contains 26 elements.
- (iii) The set of numbers which are multiple of 5 is an infinite set as the multiples of 5 are infinite.
- (iv) The set of animals living on the earth is a finite set as the number of animals living on the earth is finite.
- (v) The set of circles passing through the origin (0, 0) is an infinite set as infinite number of circles can pass 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)  $A = \{x: x \text{ is a multiple of } 10\}$ ;  $B = \{10, 15, 20, 25, 30 \dots\}$

**Solution:**

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

Order in which the elements of a set are listed is not significant.

Therefore,  $A = B$ .

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

We know that  $12 \in A$  but  $12 \notin B$ .

Therefore,  $A \neq B$

(iii)  $A = \{2, 4, 6, 8, 10\}$ ;

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

Therefore,  $A = B$

(iv)  $A = \{x: x \text{ is a multiple of } 10\}$

$$B = \{10, 15, 20, 25, 30 \dots\}$$

We know that  $15 \in B$  but  $15 \notin A$ .

Therefore,  $A \neq B$

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

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

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

**Solution:**

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

$x^2 + 5x + 6 = 0$  can be written as

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

By further calculation

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

So we get

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

Here

$$A = \{2, 3\}; B = \{-2, -3\}$$

Therefore,  $A \neq B$

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

$$B = \{y: y \text{ is a letter in the word WOLF}\} = \{W, O, L, F\}$$

Order in which the elements of a set which are listed is not significant.

Therefore,  $A = B$ .

**6. From the sets given below, select equal sets:**

$$A = \{2, 4, 8, 12\}, B = \{1, 2, 3, 4\}, C = \{4, 8, 12, 14\}, D = \{3, 1, 4, 2\}$$

$$E = \{-1, 1\}, F = \{0, a\}, G = \{1, -1\}, H = \{0, 1\}$$

**Solution:**

$$A = \{2, 4, 8, 12\}; B = \{1, 2, 3, 4\}; C = \{4, 8, 12, 14\}$$

$$D = \{3, 1, 4, 2\}; E = \{-1, 1\}; F = \{0, a\}$$

$$G = \{1, -1\}; H = \{0, 1\}$$

We know that

$$8 \in A, 8 \notin B, 8 \notin D, 8 \notin E, 8 \notin F, 8 \notin G, 8 \notin H$$

$$A \neq B, A \neq D, A \neq E, A \neq F, A \neq G, A \neq H$$

It can be written as

$$2 \in A, 2 \notin C$$

Therefore,  $A \neq C$

$$3 \in B, 3 \notin C, 3 \notin E, 3 \notin F, 3 \notin G, 3 \notin H$$

$$B \neq C, B \neq E, B \neq F, B \neq G, B \neq H$$

It can be written as

$$12 \in C, 12 \notin D, 12 \notin E, 12 \notin F, 12 \notin G, 12 \notin H$$

Therefore,  $C \neq D, C \neq E, C \neq F, C \neq G, C \neq H$

$$4 \in D, 4 \notin E, 4 \notin F, 4 \notin G, 4 \notin H$$

Therefore,  $D \neq E, D \neq F, D \neq G, D \neq H$

Here,  $E \neq F, E \neq G, E \neq H$

$$F \neq G, F \neq H, G \neq H$$

Order in which the elements of a set are listed is not significant.

$$B = D \text{ and } E = G$$

Therefore, among the given sets,  $B = D$  and  $E = G$ .