

**ASSIGNMENT**  
**CLASS XI SETS**

1. Describe each of the following sets in roster form:

(i)  $\{x : x \text{ is a positive integer and a divisor of } 9\}$

(ii)  $\{x : x \in \mathbb{Z} \text{ and } |x| \leq 2\}$

(iii)  $\{x : x \text{ is a letter of the word 'PROPORTION'}\}$

(iv)  $\left\{x : x = \frac{n}{n^2 + 1} \text{ and } 1 \leq n \leq 3, \text{ where } n \in \mathbb{N}\right\}$

2. Describe the following sets in set-builder form:

(i)  $A = \{1, 2, 3, 6, 9, 18\}$

(ii)  $B = \left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots\right\}$

(iii)  $C = \left\{\frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \frac{5}{26}, \frac{6}{37}, \frac{7}{50}\right\}$

3. Which of the following are the empty sets?

(i)  $A = \{x : x^2 - 3 = 0 \text{ and } x \text{ is rational}\}$

(ii)  $B = \{x : x \text{ is an even prime number}\}$

(iii)  $C = \{x : 4 < x < 5, x \in \mathbb{N}\}$

(iv)  $D = \{x : x^2 = 25 \text{ and } x \text{ is an odd integer}\}$

4. Find the pairs of equal sets, from the following sets, if any, giving reasons:

$A = \{0\}$ ,  $B = \{x : x > 15 \text{ and } x < 5\}$ ,  $C = \{x : x - 5 = 0\}$ ,  $D = \{x : x^2 = 25\}$

$E = \{x : x \text{ is an integral positive root of the equation } x^2 - 2x - 15 = 0\}$

5. State which of the following sets are finite and which are infinite:

(i)  $A = \{x : x \in \mathbb{Z} \text{ and } x^2 - 5x + 6 = 0\}$

(ii)  $B = \{x : x \in \mathbb{Z} \text{ and } x^2 \text{ is even}\}$

(iii)  $C = \{x : x \in \mathbb{Z} \text{ and } x^2 = 36\}$

(iv)  $D = \{x \in \mathbb{Z} \text{ and } x > -10\}$

6. Let  $A = \{\emptyset, \{\emptyset\}, 1, \{1, \emptyset\}, 2\}$ . Which of the following are true?

(i)  $\emptyset \in A$  (ii)  $\{\emptyset\} \in A$  (iii)  $\{1\} \in A$  (iv)  $\{2, \emptyset\} \subset A$  (v)  $2 \subset A$

(vi)  $\{2, \{1\}\} \not\subset A$  (vii)  $\{\{2\}, \{1\}\} \not\subset A$  (viii)  $\{\emptyset, \{\emptyset\}, \{1, \emptyset\}\} \subset A$  (ix)  $\{\{\emptyset\}\} \subset A$

7. Two finite sets have m and n elements. The number of subsets of the first set is 112 more than that of the second set. Find the value of m and n.

8. Find the smallest set A such that  $A \cup \{1, 2\} = \{1, 2, 3, 5, 9\}$ .

9. Express the following using Venn diagram:

(i)  $(A - B)^c$

(ii)  $A \cup B^c$

(iii)  $A^c \cap B$

(iv)  $A - (B \cup C)$

10. If  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ ,  $A = \{1, 2, 4, 5, 6, 9\}$ ,  $B = \{3, 4, 5, 7, 9\}$  and  $C = \{3, 4, 6, 8, 10\}$ , verify:

(i)  $A \cap (B \cap C) = (A \cap B) \cap C$

(ii)  $(A \cup B) \cap (A \cap B^c) = A$

(iii)  $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$

(iv)  $A - (B \cap C) = (A - B) \cup (A - C)$

(v)  $A \cap (B - C) = (A \cap B) - (A \cap C)$

(vi)  $U - (U - A) = A$

11. If  $A$  and  $B$  be two sets containing 3 and 6 elements respectively. Find the maximum and minimum number of elements in  $A \cup B$ .

12. In a survey of 100 students, the number of students studying the various languages is found as: English only 18; English but not Hindi 23; English and Sanskrit 8; Sanskrit and Hindi 8; English 26; Sanskrit 48 and no language 24. Find:

- (i) How many students are studying Hindi?  
 (ii) How many students are studying Hindi and English both?

13. The students of a certain school have a choice of three games: Tennis, Badminton and Cricket. The following table gives the percentage of students who play some or all the games:

Games	Tennis	Badminton	Tennis and Badminton	Badminton and Cricket	Cricket and Tennis	Cricket only	All Games
% of students	35	30	10	10	8	30	3

Draw a Venn diagram and use it to determine the percentage of students who:

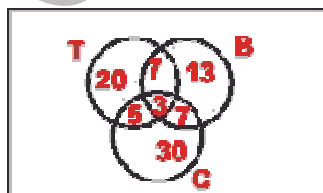
- (i) play Tennis only                      (ii) play Badminton only  
 (iii) play Cricket                          (iv) do not play any of the games.

14. In a survey of 25 students, it was found that 15 had taken mathematics, 12 had taken physics and 11 had taken chemistry, 5 had taken mathematics and chemistry, 9 had taken mathematics and physics, 4 had taken physics and chemistry and 3 had taken all the three subjects. Find the number of students that had taken:

- (i) only chemistry                      (ii) only mathematics                      (iii) only physics  
 (iv) physics and chemistry but not mathematics      (v) mathematics and physics but not chemistry  
 (vi) only one of the subjects      (vii) at least one of the three subjects      (viii) none of the subjects

## ANSWERS

1. (i)  $\{1, 3, 9\}$       (ii)  $\{-2, -1, 0, 1, 2\}$       (iii)  $\{ 'P', 'R', 'O', 'T', 'I', 'N' \}$       (iv)  $\left\{ \frac{1}{2}, \frac{2}{5}, \frac{3}{10} \right\}$
2. (i)  $\{x : x \text{ is a positive integer and a divisor of } 18\}$       (ii)  $\left\{ x : x = \frac{1}{n} \text{ and } n \in \mathbb{N} \right\}$       (iii)  $\left\{ x : x = \frac{n}{n^2 + 1} \text{ and } n \leq 7, \text{ where } n \in \mathbb{N} \right\}$
3.  $A$  and  $C$       4.  $C = E$       5.  $A$  and  $C$  are finite sets      6. (i), (ii), (iv), (vi), (vii), (viii) and (ix)
7.  $m = 7, n = 4$       8.  $A = \{3, 5, 9\}$       11. maximum = 9 and minimum = 6      12. (i) 18      (ii) 3
13. (i) 20%      (ii) 13%      (iii) 45%      (iv) 15%.



14. (i) 5      (ii) 4      (iii) 2      (iv) 1      (v) 6      (vi) 11  
 (vii) 23      (viii) 2