

ASSIGNMENT
CLASS XI SETS

Q1. 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) $\left\{x : x = \frac{n}{n^2 + 1} \text{ and } 1 \leq n \leq 3, \text{ where } n \in \mathbb{N}\right\}$
- (v) $A = \{x : x \text{ is a multiple of } -3 \text{ and } |x| \leq 18\}$ (vi) $B = \{x : x^2 = x, x \in \mathbb{R}\}$
- (vii) $C = \{x : x \text{ is a positive factor of a prime } p\}$ (viii) $D = \{x : x^4 - 5x^2 + 6 = 0, x \in \mathbb{R}\}$

Q2. 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) $C = \left\{\frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \frac{5}{26}, \frac{6}{37}, \frac{7}{50}\right\}$

Q3. 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) $D = \{x : x^2 = 25 \text{ and } x \text{ is an odd integer}\}$

Q4. Find the pairs of equal sets, from the following sets, if any, giving reasons:

- $A = \{0\}$, $B = \{x : x > 15 \text{ and } x < 5\}$, $C = \{x : x - 5 = 0\}$, $D = \{x : x^2 = 25\}$
 $E = \{x : x \text{ is an integral positive root of the equation } x^2 - 2x - 15 = 0\}$

Q5. 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) $D = \{x \in \mathbb{Z} \text{ and } x > -10\}$

Q6. 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) $\{2, \{1\}\} \subset A$ (vii) $\{\{2\}, \{1\}\} \subset A$ (viii) $\{\emptyset, \{\emptyset\}, \{1, \emptyset\}\} \subset A$ (ix) $\{\{\emptyset\}\} \subset A$

Q7. 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.

Q8. Find the smallest set A such that $A \cup \{1, 2\} = \{1, 2, 3, 5, 9\}$.

Q9. Express the following using Venn diagram:

- (i) $(A - B)^c$ (ii) $A \cup B^c$ (iii) $A^c \cap B$ (iv) $A - (B \cup C)$

Q10. 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) $U - (U - A) = A$

Q11. If A and B be two sets containing 3 and 6 elements respectively. Find the maximum and minimum number of elements in $A \cup B$.

Q12. 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?

Q13. 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.

Q14. 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

Q15. In a survey of 100 persons it was found that 28 read magazine A, 30 read magazine B, 42 read magazine C, 8 read magazines A and B, 10 read magazines A and C, 5 read magazines B and C and 3 read all the three magazines. Find:

- (a) How many read none of the three magazines?
(b) How many read magazine C only?

Q16. Out of 100 students, 15 passed in English, 12 passed in Mathematics, 8 in science, 6 in English and Mathematics, 7 in Mathematics and Science, 4 in English and Science; 4 in all the three. Find how many passed:

- (a) in English and Mathematics but not in Science
(b) In Mathematics and Science but not in English
(c) In Mathematics only
(d) In more than one subject only

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Q17. In a group of 50 students studying French, English, Sanskrit were found to be as follows:

French = 17, English = 13, Sanskrit = 15, French and English = 9, English and Sanskrit = 4, French and Sanskrit = 5, English, French and Sanskrit = 3. Find the number of students who study:

- (a) French only
(b) English only
(c) Sanskrit only
(d) English and Sanskrit but not French
(e) French and Sanskrit but not English
(f) at least one of three languages
(g) none of three languages

Q18. A survey of 500 TV viewers produced the following information: 285 watch football, 195 watch hockey, 115 watch basketball, 45 watch football and basketball, 70 watch football and hockey, 50 watch hockey and basketball, 50 do not watch any of the three games.

- (a) how many watch all the three games?
(b) how many watch exactly one of the three games?

ANSWERS

1. (i) $\{1, 3, 9\}$ (ii) $\{-2, -1, 0, 1, 2\}$ (iii) $\{ 'P', 'R', 'O', 'T', 'I', 'N' \}$ (iv) $\left\{ \frac{1}{2}, \frac{2}{5}, \frac{3}{10} \right\}$

(v) $A = \{-18, -15, -12, -9, -6, -3, 0, 3, 6, 9, 12, 15, 18\}$ (vi) $B = \{0, 1\}$

(vii) $C = \{1, p\}$ (viii) $D = \{-\sqrt{3}, -\sqrt{2}, \sqrt{2}, \sqrt{3}\}$

2. (i) $\{x : x \text{ is a positive integer and a divisor of } 18\}$ (ii) $\left\{ x : x = \frac{1}{n} \text{ and } n \in \mathbb{N} \right\}$

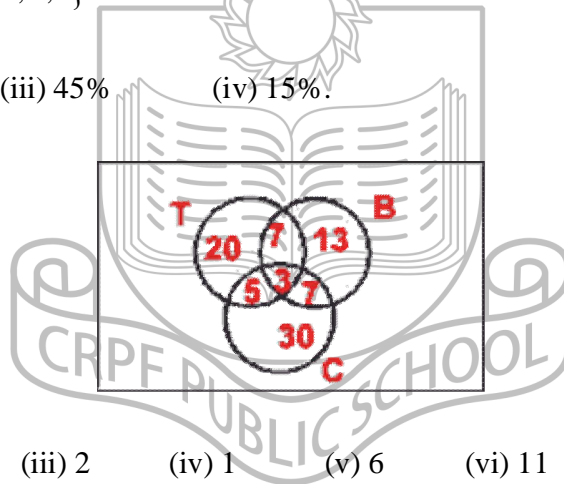
(iii) $\left\{ x : x = \frac{n}{n^2 + 1} \text{ and } n \leq 7, \text{ where } n \in \mathbb{N} \right\}$

3. A and C 4. $C = E$ 5. A and C are finite sets 6. (i), (ii), (iv), (vi), (vii), (viii) and (ix)

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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

15. (a) 20 (b) 30

16. (a) 2 (b) 3 (c) 3 (d) 9

17. (a) 6 (b) 3 (c) 9 (d) 1 (e) 2 (f) 30 (g) 20

18. (a) 20 (b) 325