

XI Mathematics SETS

- 1 Write the set $\left\{\frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \frac{5}{26}, \frac{6}{37}, \frac{7}{50}\right\}$ in the set builder form.
- 2 Represent the set $G = \left\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}\right\}$ in set – builder form.
- 3 If $U = \{x : x \leq 10, x \in \mathbb{N}\}$, $A = \{x : x \text{ is a prime, } x \in \mathbb{N}\}$ and $B = \{x : x \text{ is even, } x \in \mathbb{N}\}$ then write $A \cap B'$ in Roster form.
- 4 Write the set $\{x : x \text{ is a prime natural number which divides 5151 in tabular form}\}$
- 5 Write the following sets in Roster form:
 - a) $A = \{x : x \text{ is a prime divisor of } 60\}$
 - b) $B = \{x : x \text{ is an odd natural number}\}$
 - c) $C = \{x : x = \frac{n}{n+1}, \text{ where } n \text{ is a natural number and } 1 \leq n \leq 6\}$
- 6 Write the following sets in set - builder form:
 - a) $D = \{2, 4, 8, 16, 32\}$
 - b) $E = \{3, 6, 9, 12\}$
 - c) $F = \{1, 4, 9, 16, 25, \dots\}$
- 7 If $A = \{1, 2, 3, 4, 5, 6\}$ and $B = \{3, 4, 5, 6, 7, 8\}$, find $A - B$
- 8 If $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$, $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, verify whether:
 - i) $(A \cup B)^c = A^c \cap B^c$
 - ii) $(A \cap B)^c = A^c \cup B^c$
 - iii) $A \times B = B \times A$.
- 9 If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$. Verify that
 - i) $(A \cap B)' = A' \cup B'$
 - ii) $(A \cup B)' = A' \cap B'$
- 10 If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{1, 2, 5, 7\}$ Verify that
 - i) $(A \cup B)' = A' \cap B'$
 - ii) $(A \cap B)' = A' \cup B'$
- 11 If $A = \{1, 2, 3, 4\}$ and $B = \{2, 4, 6, 8\}$ Prove that $(A - B) \cup (B - A) = (A \cup B) - (A \cap B)$
- 12 If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$; $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$, verify that $(A \cup B)' = A' \cap B'$
- 13 Verify the De- Morgan's laws for the sets $U = \{-2, -1, 0, 1, 2, 3, 4, 5, 6\}$, $A = \{1, 3, 4, 6\}$ and $B = \{-1, 2, 3, 4, 6\}$ where U is the universal set.
- 14 If $U = \{1, 2, \dots, 9\}$; $A = \{3, 4, 7, 8\}$; $B = \{1, 3, 5, 7\}$ and $C = \{2, 3, 5\}$ Prove that
 - i) $(A \cup B)' = A' \cap B'$
 - ii) $C - (B \cap A) = (C - B) \cup (C - A)$
- 15 If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$; $A = \{2, 4, 6, 8\}$; $B = \{1, 2, 5, 8\}$ and $C = \{2, 3, 4, 5\}$ then verify that:
 - i) $(A \cup B)' = A' \cap B'$
 - ii) $A - (B \cap C) = (A - B) \cup (A - C)$
- 16 If $A = \{1, 2, 3, 4, 5\}$, $B = \{3, 4, 5, 6\}$ and $C = \{6, 7, 8, 9\}$ and $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ Verify that
 - i) $(A \cup B)' = A' \cap B'$
 - ii) $(A \cap B)' = A' \cup B'$
 - iii) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
- 17 Write all possible subsets of $A = \{a, b, c\}$. How many subsets are there if A has 4 elements.
- 18 What is a power set? Write the power set of $A = \{2, 3, 1\}$.
- 19 If $A = \{1, 2, \emptyset\}$, find $P(A)$.
- 20 If $A = \{1\}$, how many elements $P[P\{P(A)\}]$ contains?
- 21 Find the number of elements in the power set of A , if $A = \{3, 8, 9, 11\}$.
- 22 If A, B, C are any three sets, such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$. Show that $B = C$.
- 23 Using properties of sets, show that $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$
- 24 Show by means of Venn diagram that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- 25 Show that for any two sets A & B , $A \cap B = A \cup B$ implies $A = B$.
- 26 If P and Q are two sets such that $P \subset Q$, then find $P \cup Q$.
- 27 For any three sets A, B and C , is it true that $A \cap B = A \cap C$ implies $B = C$?
- 28 In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only and not cricket? How many like tennis?
- 29 In a survey of 600 students in a school, 150 students were found to be taking tea and 225 taking coffee, 100 were taking both tea and coffee. Find how many students were taking:
 - (i) neither tea nor coffee. (ii) Only Tea (iii) Only Coffee.
- 30 If X and Y are two sets such that $n(X) = 17$, $n(Y) = 23$ and $n(X \cup Y) = 38$ find $n(X \cap Y)$.

- 31 A and B are two sets such that $n(A - B) = 20 + x$, $n(B - A) = 3x$ and $n(A \cap B) = x + 1$. Draw a Venn diagram to illustrate this information. Find (i) the value of x (ii) $n(A \cup B)$.
- 32 X and Y are two sets such that $X \cup Y$ has 50 elements X has 22 elements Y has 38 elements, how many elements X and Y have in common?
- 33 In a survey of 100 students, the number of students studying the various languages were found to be: English only 18, English but not Hindi 23, English and Sanskrit 8, English 26, Sanskrit 48, Sanskrit and Hindi 8, no language 24. Find
 a. How many students were studying Hindi?
 b. How many students were studying English and Hindi?
- 34 In a class, 18 students took physics, 23 students took chemistry and 24 students took mathematics. Of these 13 took both chemistry and mathematics, 12 took both physics and chemistry and 11 took both physics and mathematics. If 6 students offered all the three subjects, find:
 i) total number of students in the class;
 ii) how many took mathematics but not chemistry;
 iii) how many took exactly one of the three subjects?
- 35 In a survey of 100 persons it was found that 28 read magazine A, 30 read magazine B, 42 read magazine C, 8 read magazine A and B, 10 read magazine A and C, 5 read magazine B and C, and 3 read all the three magazines.
 i) How many persons read at least one of the magazines?
 ii) How many persons read none of three magazines?
 iii) How many persons read exactly one of the magazine?
 iv) How many read magazine C only?
- 36 In a survey of 500 persons it was found that 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. How many watch all the three games? How many watch exactly one of the three games? How many watch at least one of these games?
- 37 In an university, out of 100 students 15 offered Mathematics only; 12 offered statistics only; 8 offered only Physics; 40 offered Physics and Mathematics; 20 offered Physics and Statistics; 10 offered Mathematics and Statistics, 65 offered Physics. Find the number of students who
 (i) offered Mathematics (ii) offered Statistics
 (iii) did not offer any of the above three subjects.
- 38 In a town of 2000 families it was found that 40% of the inhabitants like food A, 25% like food B and 15% like food C. If 10% of families like food A and B, 6% like food B and C, 8% like food A and C and 3% like all the three foods A, B and C. Find the number of families who like:
 i) Food A only ii) Food B only iii) Food C only iv) none of the foods A, B or C.
- 39 In a class, 36 students opted for Physics, 46 opted for Chemistry, and 48 students opted for Mathematics. Of these 26 opted both Chemistry and Mathematics, 24 opted both Physics and Chemistry 22 opted for both Mathematics and Physics, 12 have opted for all the three subjects.
 Find i) The number of students in the class.
 ii) The number of students who have opted Mathematics but not Chemistry
 iii) The number of students who have opted exactly one subject.
- 40 In a survey of 30 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 and 4 had taken Physics and Chemistry and 2 had taken all the three subjects. Find the number of students that had taken
 a) Only Chemistry b) Only one of the subject
- 41 In a survey it was found that 21 people liked product A, 26 liked product B and 29 liked C. If 14 people liked product A and B, 12 people liked product C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked (i) product C only (ii) products A and C but not product B (iii) at least one of three products.
- 42 In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Find :
 a) the number of people who read at least one of the newspapers.
 b) the number of people who read exactly one newspaper.
 c) How many read newspaper C only
 d) Number of people who read none of the newspapers
 Draw the venn diagram to represent the above information.
- 43 There are 200 individuals with a skin disorder, 120 had been exposed to the chemical C1 50 to chemical C2 and 30 to both the chemicals C1 and C2. Find the number of individuals exposed to
 i) Chemical C1 but not chemical to C2
 (ii) Chemical C2 but not chemical to C1 iii) Chemical C1 or chemical C2.