



Octahedron institute, chandan nagar

office no 2, 1st floor chandan complex

Class 11 - Mathematics

SETS

Maximum Marks: 90

Time Allowed: 2 hours

General Instructions:

ANSWER ALL QUESTIONS

Section A

1. Let A, B and C be three sets, then prove that: $A - (B \cup C) = A \cap (B \cup C)'$ 3
2. 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 who had only physics. 3
3. In a survey of 400 students in a school, 100 were listed as taking apple juice, 150 as taking orange juice and 75 were listed as taking both apple as well as orange juice. Find how many students were taking neither apple juice nor orange juice. 3
4. If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$, verify that: $(A \cap B)' = A' \cup B'$ 3
5. In a class of 35 students, 24 like to play cricket and 16 like to play football. Also each student likes to play at least one of the two games. How many students like to play both cricket and football? 3
6. Assume that $P(A) = P(B)$ show that $A = B$. 3
7. 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 who had physics and chemistry but not mathematics. 3
8. Write the set in the set-builder form: $\{3, 6, 9, 12\}$ 3
9. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8\}$ and $C = \{3, 4, 5, 6\}$. 3

Find: A'

10. Draw appropriate Venn diagram for: $(A \cup B)'$ 3
11. Let A, B and C be the sets such that $A \cup B = A \cup C$ and $A \cap B = A \cap C$ Show that $B = C$. 3
12. 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. 3
Find: the number of people who read at least one of the newspaper.
13. State whether each of the following sets is finite or infinite: (i) The set of lines which are parallel to the x-axis. 3
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 who had at least one of the three subjects. 3
15. For any two sets A and B, prove that $A \cup B = A \cap B \Leftrightarrow A = B$ 3
16. For any two sets A and B prove that: $P(A \cap B) = P(A) \cap P(B)$. 3
17. The Given 'Set' is null or not? Set of odd natural numbers divisible by 2. 3
18. 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 who had none of the subjects. 3
19. Let A, B and C be three sets such that $A \cup B = C$ and $A \cap B = \phi$ then prove that $A = C - B$. 3
20. If $X = \{a, b, c, d\}$ and $Y = \{f, b, d, g\}$ find: $X - Y$ 3
21. Taking the set of natural numbers as the universal set, write down the complement of the set: $\{x : x \text{ is an even natural number}\}$ 6
22. Let A and B be two sets. If $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ for some set X, prove that $A = B$. 6
23. For any two sets A and B, prove that $A \cup B = A \cap B \Leftrightarrow A = B$. 6
24. In a survey it was found that 21 people liked product A, 26 liked product B and 29 6

liked product C. If 14 people liked products A and B, 12 people liked products C and A, 14 people liked products B and C and 8 liked all the three products. Find how many liked product C only?

25. In a group of 400 people in USA, 250 can speak Spanish and 200 can speak English. **6**
How many people can speak both Spanish and English?