



## MATHS

### BOOKS - MODERN PUBLISHERS MATHS (HINGLISH)

## SETS

#### Illustrative Examples

1. What is the difference between a collection and a set? Give reasons to support your answer?

 [Watch Video Solution](#)

2. Write the set of all vowels in the English alphabet, which precede r.

 [Watch Video Solution](#)

3. Write the set of all positive integers whose cube is odd.

 [Watch Video Solution](#)

4. Write the set of all real numbers which cannot be written as the quotient of two integers in the set-builder form.

 [Watch Video Solution](#)

5. Write the set  $\left\{ \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7} \right\}$  in the set-builder form.

 [Watch Video Solution](#)

6. Write the set  $\{X: X \text{ is a positive integer and } x^2 < 40\}$  in the Roster Form.

 [Watch Video Solution](#)

7. Write the set  $A = \{1, 4, 9, 16, 25, \dots\}$  in setbuilder form.

 [Watch Video Solution](#)

8. Write the solution set of the equation  $x^2 + x - 2 = 0$  in roster form.

 [Watch Video Solution](#)

9. Match each of the set on the left described in the roster form with the same set on the right described in the setbuilder form : (i)  $\{P, R, I, N, C, A, L\}$  (a)  $\{x : x \text{ is a positive integer and is a divisor of } 18\}$   
(ii)  $\{0\}$

 [Watch Video Solution](#)

10. State which of the following sets are finite and which are infinite

(i) The set of prime numbers less than 50.

(ii) The set of positive integers greater than 50.

(iii) The set concentric circles in a plane. Solution.

 [Watch Video Solution](#)

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

(i)  $A = \{X : X \in N \text{ and } x^2 - 3x + 2 = 0\}$

(ii)  $B = \{x : x \in N \text{ and } x^2 = 9\}$

(iii)  $C = \{x : x \in N \text{ and } x \text{ is even } \}$

(iv)  $D = \{x : x \in N \text{ and } 2x - 3 = 0\}$ .

 [Watch Video Solution](#)

**12.** Which of the following are empty (null) sets ?

(i)  $\{x : x < 5 \text{ and } x > 7, x \in N\}$

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

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

 [Watch Video Solution](#)

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

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



Watch Video Solution

14. Consider the following sets :

$$\phi, A = \{1, 3\}, B = \{1, 5, 9\}, C = \{1, 3, 5, 7, 9\}.$$

Insert the correct symbol  $\subset$  or  $\notin$  between each pair of sets : (i)

$$\phi \dots B$$

(ii) A.....B

(iii) A..... C

(iv) B.....C.



Watch Video Solution

15. List all the subsets of the set  $\{-1,0,1\}$ .



Watch Video Solution

16. Let  $A = \{p,q,r,s\}$ ,  $B = \{p,q,r\}$  and  $C = \{q,s\}$ . Find all sets  $X$  such that :

(i)  $X \subset B$  and  $X \subset C$

(ii)  $X \subset A$  and  $X \not\subset B$ .



Watch Video Solution

17. Let  $A$ ,  $B$  and  $C$  be three sets. If  $A \in B$  and  $B \subset C$ . is it true that  $A \subset C$

? If not give an example.



Watch Video Solution

18. Let  $A = \{1, 2, 3, 4\}$ ,  $B = \{1, 2, 3\}$  and  $C = \{2, 4\}$  Find all sets  $X$  satisfying the following pair of conditions (i)  $X \subseteq B$ ,  $X \neq B$  and  $X \subseteq C$

(ii)  $X \subseteq B$ ,  $X \subset C$ .



[Watch Video Solution](#)

19. Prove that  $A \subset B, B \subset C \Rightarrow A \subset C$ .



[Watch Video Solution](#)

20. Let  $A = \{\{1,2,3\},\{4,5\},\{6,7,8\}\}$ . Determine which of the following is true or false :

(i)  $1 \in A$

$\{1, 2, 3\} \subset A$

(iii)  $\{6, 7, 8\} \in A$

(iv)  $\{\{4, 5\}\} \subset A$

(v)  $\phi \in A$

(vi)  $\phi \subset A$ .



[Watch Video Solution](#)

21. Let  $A=\{1,2,3,4\}$   $B= \{3,4,5,6\}$ ,  $C=\{5,6,7,8\}$  and  $D=\{7,8,9,10\}$ .

(i)  $A \cup B$

(ii)  $A \cup C$

(iii)  $B \cup C$

(iv)  $B \cup D$

(v)  $A \cup B \cup C$

(vi)  $A \cup B \cup D$

(vii)  $B \cup C \cup D$ .



Watch Video Solution

22. If  $A_1 = \{2, 3, 4, 5\}$ ,  $A_2 = \{3, 4, 5, 6\}$ ,  $A_3 = \{4, 5, 6, 7\}$ , find

$\cup A_i$  and  $\cap A_i$ , where  $i=\{1,2,3\}$ .



Watch Video Solution

23.

Let

$A = \{3, 6, 12, 15, 18, 21\}$ ,  $B = \{4, 8, 12, 16, 20\}$ ,  $C = \{2, 4, 6, 10, 12, 14, 16\}$



. Obtain :

(i) A-B

(ii) B-C

(iii) C-D

(iv) D-C.



Watch Video Solution

24. Let A = Set of all rational numbers and  $B = \{x : x^2 - 4x + 2 = 0\}$ .

Then find A-B, B -A and  $A \cap B$ .



Watch Video Solution

25. If  $U = \{1,2,3,4,5,6\}$ ,  $A = \{1,2\}$ ,  $B = \{3,4,5\}$ , find  $A^c$ ,  $B^c$ ,  $A^c \cap B^c$  and  $A \cap B$ .



Watch Video Solution

26. Let  $U=\{1,2,3,4,5,6,7,8,9\}$ ,  $A= \{1,2,3,4\}$ ,  $B=\{2,4,6,8\}$  . Find: (i)  $A'$  (ii)  $B'$  (iii)  $(A \cup B)'$  (iv)  $(A \cap B)'$  (v)  $(A')$ ' (vi)  $(B - A)'$  .



[Watch Video Solution](#)

27. If  $U= \{x:x \text{ is a letter in English alphabet}\}$

$A=\{x:x \text{ is a vowel in English alphabet}\}$ .

Find  $A^c$  and  $(A^c)^c$  .



[Watch Video Solution](#)

28. Let  $U=\{1,2,3,4,5,6,7,8,9,10\}$ ,

$A=\{1,3,5\}$ ,  $B=\{2,4,6\}$ ,  $C=\{4,5,6\}$ .

Find (i)  $A^c \cap B^c$

(ii)  $(A \cup B)^c \cap C^c$ .



[Watch Video Solution](#)

29. If  $X$  and  $Y$  are subsets of the universal set  $U$ , then show that :

(i)  $Y \subset X \cup Y$

(ii)  $X \cap Y \subset X$

(iii)  $X \subset Y \Rightarrow X \cap Y = X$ .



Watch Video Solution

30. Given that  $E = \{2,4,6,8,10\}$ . If  $n$  represents any members of  $E$ , then write the following sets containing all numbers represented by:

(i)  $n+1$

(ii)  $n^2$ .



Watch Video Solution

31. Let  $X = \{1,2,3,4,5,6\}$ . If  $n$  represents any members of  $X$ , express the following sets :

(i)  $n \in X$  but  $2n \notin X$

(ii)  $n+5=8$

(iii)  $n$  is greater than 4.

 [Watch Video Solution](#)

**32.** Use the properties of sets to prove that for all the sets  $A$  and  $B$ ,  $A -$

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

 [Watch Video Solution](#)

**33.** For all sets  $A, B$  and  $C$  : Is  $(A-B) \cap (C - B) = (A \cap C) - B$ ?

Justify your answer :

 [Watch Video Solution](#)

**34.** Let  $P$  be the set of prime numbers and let  $S = \{t \mid 2^t - 1 \text{ is a prime}$

$\}$ . Prove that  $S \subset P$ .

 [Watch Video Solution](#)

**35.** Draw the Venn diagrams to illustrate the following relationship among the sets  $E, M$  and  $U$ , where  $E$  is the set of students studying English in a school,  $M$  is the set of students studying Mathematics in the same school,  $U$  is the set of all students in that school.

(i) All the students who study Mathematics study English, but some students who study English do not study Mathematics.

(ii) There is not students who studies both Mathematics and English.

(iii) Some of the students study Mathematics but do not study English, some study English but do not study Mathematics, and some study both.

(iv) Not all students study Mathematics, but every student studying English studies Mathematics.



[Watch Video Solution](#)

**36.** From 50 students taking examinations in mathematics, physics and chemistry, 37 passed mathematics, 24 physics and 43 chemistry. At most 19

passed mathematics and physics, at most 29 mathematics and chemistry and at most 20 physics and chemistry. Find the largest possible number that could have passed all three exams.



[Watch Video Solution](#)

## Frequently Asked Questions

1. If  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ ,

$A = \{1, 2, 3, 4\}$ ,

$B = \{2, 4, 6, 8\}$  and

$C = \{3, 4, 5, 6\}$ . Find :

(i)  $A^c$

(ii)  $B^c$

(iii)  $A \cup C$

(iv)  $(A \cup B)^c$

(v)  $(A^c)^c$

(vi)  $(B - C)^c$ .



[View Text Solution](#)

2. If  $A=\{1,2,3\}$ ,  $B=\{4,5,6\}$  and

$C=\{7,8,9\}$ , verify that :

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C).$$

 [Watch Video Solution](#)

3. Let  $U=\{1,2,3,4,5,6,7,8,9\}$ ,  $A = \{2,4,6,8\}$  and  $B=\{2,3,5,7\}$ . Verify that :

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

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

 [Watch Video Solution](#)

4. Prove  $(A \cap B)^c = A^c \cup B^c$ .

 [Watch Video Solution](#)

5. If  $A \cap B' = \phi$  then prove that  $A = A \cap B$  and hence show that  $A \subseteq B$ .

 [Watch Video Solution](#)

6. If  $A \cup B = A \cap B$ , prove that  $A=B$ .

 [Watch Video Solution](#)

7. If  $A$  and  $B$  are any two sets ,prove that :

(i)  $A - B = A \cap B^c$

(ii)  $(A - B) \cup B = A \cup B$ .

 [Watch Video Solution](#)

8. Show that :

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





[Watch Video Solution](#)

9. If  $A$ ,  $B$  and  $C$  are any three sets, then prove that :

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

(ii)  $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$ .



[Watch Video Solution](#)

10. Prove the following :

(i)  $A \subset B \Leftrightarrow B^c \subset A^c$

(ii)  $B \subset A \Rightarrow A \cup B = A$ .



[Watch Video Solution](#)

11. Prove the following :

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

(ii)  $U - (U - A) = (A^c)^c = A$ , where  $U$  is the universal set.

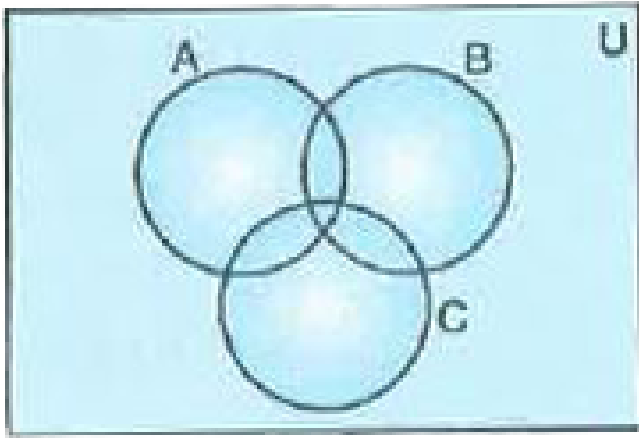


[Watch Video Solution](#)

12. Shade the following :

(i)  $A^c \cap (B \cup C)$

(ii)  $A^c \cap (C - B)$  in given Venn diagram .



[▶ Watch Video Solution](#)

13. If X and Y are two sets such that has 18 elements, X has 8 elements and Y has 15 elements; how many elements does  $X \cap Y$  have?

[▶ Watch Video Solution](#)

14. A and B are two sets containing respectively  $m_1$  and  $m_2$  elements.

If  $x \leq n(A \cup B) \leq y$ , find x and y.



Watch Video Solution

15. If set A and B has 3 and 6 elements respectively. Find the maximum and minimum number of elements in  $A \cup B$ .



Watch Video Solution

16. Two finite sets have m and n elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. The value of m and n is



Watch Video Solution

17. Suppose  $A_1, A_2, \dots, A_{30}$  are thirty sets each having 5 elements and  $B_1, B_2, \dots, B_n$  are n sets each having 3 elements, Let

$$\bigcup_{i=1}^{30} A_i = \bigcup_{j=1}^n B_j = S$$

and each element of  $S$  belongs to exactly 10 of the  $A_i$  and exactly 9 of the  $B_j$ . Find the value of  $n$ .



Watch Video Solution

18. If  $A$ ,  $B$  and  $C$  are three non - empty finite sets such that  $n(A) = 19$ ,  $n(B) = 15$ ,  $n(C) = 17$ ,  $n(A \cap B) = 11$ ,  $n(B \cap C) = 6$ ,  $n(C \cap A) = 7$  and  $n(A \cap B \cap C) = 5$ .

Also  $n(U) = 50$ .

(i)  $n(A \cap B^c \cap C^c)$

(ii)  $n(B \cap C^c \cap A^c)$

(iii)  $n(C \cap A^c \cap B^c)$

(iv)  $n(C \cap B \cap C^c)$

(v)  $n(B \cap C \cap A^c)$

(vi)  $n(C \cap A \cap B^c)$

(vii)  $n(A \cup B \cup C)$

(viii)  $n((A \cup B \cup C)^c)$ .



Watch Video Solution

 [Watch Video Solution](#)

**19.** Out of 20 members in a family , 11 like to take tea and 14 like coffee .

Assume that each one likes atleast one of the two drinks . How many like :

(i) both tea and coffee

(ii) only tea and not coffee

(iii) only coffee and not tea ?



[Watch Video Solution](#)

**20.** There are 20 students in a Chemistry class and 30 students in a Physics class . Find the number of students which are either in Physics class or Chemistry class in the following cases :

(i) the classes meet at the same hour

(ii) the two classes meet at rolled in both the subjects.



[View Text Solution](#)

**21.** 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.

 [Watch Video Solution](#)

**22.** A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product A and 450 consumers like product B. what is the least number that must have liked both products?

 [Watch Video Solution](#)

**23.** Out of 500 car owners investigated, 400 owned car A and 200 owned car B, 50 owned both A and B cars. Is this data correct?

 [Watch Video Solution](#)

**24.** There are 2000 individuals with a skin disorder . 120 had been exposed to the chemical  $C_1$ , 50 to chemical  $C_2$  and 30 to both the chemicals  $C_1$  and  $C_2$  . Find the numbers of individuals exposed to :

- (i) Chemical  $C_1$  but not Chemical  $C_2$
- (ii) Chemical  $C_2$  but not Chemicals  $C_1$
- (iii) Chemical  $C_1$  or Chemical  $C_2$ .



[Watch Video Solution](#)

**25.** In a survey of 25 students, it was found that 12 have taken physics, 11 have taken chemistry and 15 have taken mathematics; 4 have taken physics and chemistry; 9 have taken physics and mathematics; 5 have taken chemistry and mathematics while 3 have taken all the three subjects Find the number of students who have taken (i) physics only (ii) chemistry only; (iii) mathematics only (iv) physics and chemistry but not mathematics; (v) physics and mathematics but not chemistry; (vi) only one of the subjects; (vii) at least one of the three subjects; (viii) none of the three subjects.



[Watch Video Solution](#)

26. In an office, out of 3000 employees the manager classifies his employees on the basis of sincerity, experience and productive. Out of these 550 employees are sincere only, 320 employees are experienced and 350 employees are productive. 420 employees are both sincere and experienced 450 employees are both experienced and productive and 600 employees are both sincere and productive. Also, 400 employees are sincere, experienced and productive. Find the numbers of employees who are either sincere or experienced or productive.

[View Text Solution](#)

### Exercise 1 A Short Answer Type Questions

1. Write the following sets in Roster form :

(i)  $A = \{x : x \text{ is an integer and } -3 \leq x \leq 7\}$

(ii)  $B = \{x : x \text{ is natural number less than } 6\}$

(iii)  $C = \{x : x \text{ is a two-digit natural number such that the sum of its digits}$



is 8}

(iv)  $D = \{x : x \text{ is a prime number which is divisor of } 60\}$

(v)  $E =$  The set of all letters in the word TRIGONOMETRY

(vi)  $F =$  The set of all letters in the word BETTER.



[Watch Video Solution](#)

2. Write the following sets in Set - Builder Form :

(a) (i)  $A = \{0\}$

(ii)  $B = \{-1, 1\}$

(iii)  $C = \{1, 3, 5, 7, 9\}$

(iv)  $D = \{2, 4, 6, 8\}$

(v)  $E = \{1, 5, 10, 15, \dots\}$

(vi)  $F = \{12, 18, 24, \dots, 96\}$ .

(b) (i)  $\{6, 9, 12\}$

(iii)  $\{2, 4, 8, 16, 32\}$

(iii)  $\{5, 25, 125, 625\}$

(iv)  $\{2, 4, 6, \dots\}$

(v)  $\{1, 4, 9, \dots, 100\}$



[Watch Video Solution](#)

3. List all the elements of the following sets :

(i)  $A = \{x : x \text{ is an odd natural number}\}$

(ii)  $B = \left\{x : x \text{ is an integer , } -\frac{1}{2} < x < \frac{9}{2}\right\}$

(iii)  $C = \{x : x^2 \leq 4, x \in \mathbb{Z}\}$

(iv)  $D = \{x : x \text{ is a letter in the word LOYAL}\}$

(v)  $E = \{x : x \text{ is a month of a year not having 31 days}\}$

(vi)  $F = \{x : x \text{ is a consonant in the English alphabet , which precedes k}\}$ .



[Watch Video Solution](#)

4. Write the set of all vowels in the English alphabet , which precede q .



[Watch Video Solution](#)

5. Write the set of all integers whose cube is a even integer.



[Watch Video Solution](#)

6. Write the set  $\left\{ \frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{4}{17}, \frac{5}{26}, \frac{6}{37}, \frac{7}{50}, \frac{8}{65} \right\}$  in the Set - builder Form .

[Watch Video Solution](#)

7. Write the set  $\{x: x \text{ is a positive integer and } x^2 < 40\}$  in the Roster Form.

[Watch Video Solution](#)

## Exercise 1 B Short Answer Type Questions

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

(i)  $A = \{x: x \in N \text{ and } (x - 1)(x - 2) = 0\}$

(ii)  $B = \{x: x \in N \text{ and } x^2 = 4\}$

(iii)  $C = \{x: x \in N \text{ and } 2x - 1 = 0\}$

(iv)  $E = \{x : x \in N \text{ and } x \text{ is prime}\}$

(v)  $D = \{x : x \in N \text{ and } x \text{ is odd}\}$ .



[Watch Video Solution](#)

2. Which of the following are empty (null) sets ?

(i) Set of even prime numbers

(ii) Set of all even natural numbers divisible by 5

(iii)  $\{x : 5 < x < 6, x \in N\}$

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

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



[Watch Video Solution](#)

3. Are the following sets equal ? Give reasons :

(i)

$A = \{n : n \in Z \text{ and } n^2 \leq 4\}$ ,  $B = \{x : x \in R \text{ and } x^2 - 3x + 2 = 0\}$

(ii)  $A = \{x : x \text{ is a letter in the word LOYAL}\}$

$B = \{x : x \text{ is a letter in the word ALLOY}\}$ .



[Watch Video Solution](#)

4. Show that the set of letters needed to spell CATARACT and the set of letters needed to spell TRACT are equal.



[Watch Video Solution](#)

5. From the sets given below , select equal sets and equivalent sets:

$$A=\{0,a\},$$

$$B= \{1,2,3,4\},$$

$$C=\{4,8,12\},$$

$$D=\{3,1,2,4\},$$

$$E= \{1,0\},$$

$$F=\{8,4,12\},$$

$$G=\{1,5,7,11\} , H= \{a,b\} .$$



[Watch Video Solution](#)

6. Which of the following sets are equal ?

$$A = \{x : x \in N, x < 4\}, B = \{1, 2, 3\}, C = \{1, 3\},$$

$$D = \{x : x \in N, x \text{ is odd } x < 5\}, E = \{1, 2, 3\},$$

$$F = \{3, 1\}.$$



[Watch Video Solution](#)

7. Which of the following sets are equal ?

$$A = \{x : x \in N, x < 3\}, B = \{1, 2\}, C = \{3, 1\},$$

$$D = \{x : x \in N, x \text{ is odd } x < 5\},$$

$$E = \{1, 2\}, F = \{1, 3\}.$$



[Watch Video Solution](#)

## Exercise 1 C Short Answer Type Questions

1. Which of the following statements are true ? Justify your answer .

(i) The set of dogs is contained in the set of animals.

- (ii) The set of all isosceles triangles is contained in the set of all equilateral triangles .
- (iii) The set of all rectangles is contained in the set of squares .
- (iv) The sets  $A = \{x: x \text{ is letters in the word LITTLE}\}$  and  $B = \{x: x \text{ is a letter in the word TITLE}\}$  are equal.
- (v) Every set has a proper subset.



[Watch Video Solution](#)

2. (i) If  $x \in A$  and  $A \in B$ , then  $x \in B$ .
- (ii) If  $A \subset B$  and  $B \in C$ , then  $A \in C$ .
- (iii) If  $A \subset B$  and  $B \subset C$ , then  $A \subset C$ .
- (iv) If  $A \notin B$  and  $B \notin C$ , then  $A \notin C$ .
- (v) If  $x \notin A$  and  $A \notin B$ , then  $x \in B$ .
- (vi) If  $A \subset B$  and  $x \notin B$ , then  $x \notin A$ . Find true and false.



[Watch Video Solution](#)

3. Let  $A = \{\{1,2,3\}, \{4,5\}, \{6,7,8\}\}$  . Determine which of the following is true or false . Justify your answer.

(i)  $\phi \in A$

(ii)  $\phi \subset A$

(iii)  $1 \in A$

(iv)  $\{1, 2, 3\} \subset A$

(v)  $\{6, 7, 8\} \in A$

(vi)  $\{\{4, 5\}\} \subset A$ .



[Watch Video Solution](#)

4. Let  $A = \{\phi, \{\phi\}, 2, \{2, \phi, 5\}\}$ . Which of the following are true or false

Justify your answer.

(i)  $\phi \in A$

(ii)  $\{\phi\} \in A$

(iii)  $\{2\} \in A$

(iv)  $\{5, \phi\} \subset A$

(v)  $5 \subset A$



(vi)  $\{5, \{2\}\} \notin A$

(vii)  $\{\{5\}, \{2\}\} \notin A$

(viii)  $\{\phi, (\phi), (2, \phi)\} \subset A$

(ix)  $\{\{\phi\}\} \subset A.$



[Watch Video Solution](#)

5. Write down the subsets of the sets :

(i)  $\{1\}$



[Watch Video Solution](#)

6. Write down the subsets of the set

$\{a,b\}$



[Watch Video Solution](#)

7. Write down the subsets of the set

$\{1,2\}$



Watch Video Solution

8. Write down the subsets of the set

$\{1,\{1\}\}$ .



Watch Video Solution

9. Given the sets  $A = \{1, 3, 5\}$ ,  $B = \{2, 4, 6\}$  and  $C = \{0, 2, 4, 6, 8\}$ ,

which of the following may be considered as universal set (s) for all the

three sets A, B and C (i)  $\{0, 1, 2, 3, 4, 5, 6\}$  (ii)  $\varnothing$



Watch Video Solution

10. For any set A, prove that  $A \subseteq \phi \Leftrightarrow A = \phi$ .



Watch Video Solution

11. Let  $A, B$  and  $C$  be three sets . If  $A \subset B$  and  $B \in C$ , is it true that  $A \subset C$ ? If not , given an example.



Watch Video Solution

12. Prove that  $A \subset B, B \subset C \Rightarrow A \subset C$ .



Watch Video Solution

13. Prove that  $A \subseteq B, B \subseteq C$  and  $C \subseteq A \Rightarrow A = C = B$ .



Watch Video Solution

Exercise 1 D Short Answer Type Questions

1. Find the (a) union (b) intersection of each of the following pairs of sets:

(i)  $A = \{x : x \in \mathbb{Z}^+ \text{ and } x^2 > 7\}$ ,  $B = \{1, 2, 3\}$

(ii)  $A = \{x : x \in \mathbb{Z}^+\}$ ,  $B = \{x \in \mathbb{Z} \text{ and } x < 0\}$

(iii)  $A = \{x : x \in \mathbb{N} \text{ and } 4 < x < 9\}$ .

 [Watch Video Solution](#)

2. Let  $A = \{a, e, l, o, u\}$  and  $B = \{a, u\}$ . Show that  $A \cup B = A$ .

 [Watch Video Solution](#)

3. Let  $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$  and

$B = \{2, 3, 5, 7\}$ . Find  $A \cap B$  and prove that  $A \cap B = B$ .

 [Watch Video Solution](#)

4. Let  $X = \{\text{Ram}, \text{Geeta}, \text{Aakbar}\}$  be the set of students of XI class who are in School Hockey team.

Let  $Y = \{\text{Geeta}, \text{David}, \text{Ashok}\}$  be the set of students of XI class who are in School Football team.

Find  $X \cup Y$  and  $X \cap Y$  and interpret the set.



[Watch Video Solution](#)

5. Let  $A = \{3, 5, 7, 9, 11\}$ ,  $B = \{7, 9, 11, 13\}$ ,

$C = \{11, 13, 15\}$  and  $D = \{15, 17\}$ .

Find : (i)  $A \cap B$

(ii)  $B \cap C$

(iii)  $A \cap C$

(iv)  $B \cap D$

(v)  $A \cap D$

(vi)  $A \cap (B \cap C)$

(vii)  $A \cap C \cap D$

(viii)  $A \cap (B \cup D)$

$$(ix) (A \cap B) \cap (B \cup C)$$

$$(x) (A \cup D) \cap (B \cup C).$$



[Watch Video Solution](#)

6. Let  $A = \{x : x \in \mathbb{Z}^+\}$ ,

$$B = \{x : x \text{ is a multiple of } 3, \in \mathbb{Z}\},$$

$$C = \{x : x \text{ is a negative integer}\},$$

$$D = \{x : x \text{ is an odd integer}\}.$$

Find : (i)  $A \cap B$

(ii)  $B \cap C$

(iii)  $C \cap D$

(iv)  $A \cap C$

(v)  $A \cap D$

(vi)  $B \cap D$ .



[View Text Solution](#)

7. (a) If  $N_k = \{kn : n \in N\}$ , find  $N_3 \cap N_5$  and  $N_4 \cap N_6$ .

(b) If  $N_a = \{an : n \in N\}$ , describe  $N_4 \cap N_6$  and  $N_3 \cap N_5$ .



**Watch Video Solution**

8. Let  $A = \{3,6,9,12,15,18,21\}$ ,

$B = \{4,8,12,16,20\}$ ,

$C = \{2,4,6,8,10,12,14,16\}$  and

$D = \{5,10,15,20\}$ .

Find : (i)  $A-B$

(ii)  $A-C$

(iii)  $A-D$

(iv)  $B-A$

(v)  $C-A$

(vi)  $D-A$

(vii)  $B-C$

(viii)  $B-D$

(ix)  $C-B$

(x) D-8

(xi) C-D

(xii) D-C.



Watch Video Solution

9. If  $R$  is the set of real numbers and  $Q$  is the set of rational numbers, then what is  $RQ$ ?



Watch Video Solution

10. Let  $V = \{a, e, i, o, u\}$  and  $B = \{a, i, k, u\}$ . Find  $V \cap B$  and  $B \cap V$ .



Watch Video Solution

11. Let  $A = \{1, 2, 3, 4, 5, 6\}$  and  $B = \{2, 4, 6, 8\}$ . Find :  $A - B$  and  $B - A$ .

Show that  $A - B \neq B - A$ .





Watch Video Solution

12. If  $U = \{a, b, c, d, e, f, g, h\}$ , find the complements of the following sets : (i)  $A = \{a, b, c\}$  (ii)  $B = \{d, e, f, g\}$  (iii)  $C = \{a, c, e, g\}$  (iv)  $D = \{f, g, h, a\}$



Watch Video Solution

13. Let  $N$  be the universal set . Write the complements of the following sets :

(i)  $\{x : x \in N \text{ and } x \text{ is an odd}\}$

(ii)  $\{x : x \in N \text{ and } x \text{ is even}\}$

(iii)  $\{x : x \text{ is a prime number}\}$

(iv)  $\{x : x \in N \text{ and } x = 3n \text{ for some } n \in N\}$

(v)  $\{x : x \in N \text{ and } x \text{ is a perfect square}\}$

(vi)  $\{x : x \in N \text{ and } x \text{ is a perfect cube}\}$

(vii)  $\{x : x \in N \text{ and } x + 5 = 7\}$

(viii)  $\{x : x \in N \text{ and } 2x + 5 = 111\}$

(ix)  $\{x : x \in N \text{ and } x \geq 6\}$

(x)  $\{x : x \in N \text{ and } x \text{ is divisible by 3 and 5}\}$ .

 [Watch Video Solution](#)

## Exercise 1 E Short Answer Type Questions

1. (a) Let  $A = \{1,2,3,4\}$ ,  $B = \{4,6,7,8,9\}$  and  $C = \{2,3,4,6,8\}$ . Verify the following identities :

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

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

 [Watch Video Solution](#)

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

$B = \{2,4,6,8,10\}$  and  $C = \{1,2,3,4\}$ , then :

(i) What is  $U^c$  ?

(ii) What is  $A^C$ ?

(iii) What is  $A \cup A^c$ ?

(iv) What is  $A \cap (B - C)$ ?

(v) What is  $A \cap (B - C)$ ?

(vi) What is  $A - (B \cup C)$ ?

(vii) What is  $A - (B \cap C)$ ?

(viii) What is  $A - (B - C)$ ?

(ix) What is  $A^c$ ?

(x) What is  $A^c \cup (B^c \cap C^c)$  ?



**Watch Video Solution**

3. If  $U = \{a, e, l, o, u\}$ ,  $A = \{a, e, i\}$ ,  $B = \{e, o, u\}$ ,

$C = \{a, l, u\}$ , then :

(i) What is  $A \cup U$ ?

(iii) What is  $A \cap U$ ?

(iii) What is  $A \cup \phi$ ?

(iv) What is  $A \cap \phi$ ?



**Watch Video Solution**

4. Prove that :

(a) (i)  $A \subset (A \cup B)$

(ii)  $B \subset (A \cup B)$

(b) (i)  $(A \cap B) \subset A$

(ii)  $(A \cap B) \subset B$ .



[Watch Video Solution](#)

5. Prove that :

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

(ii)  $B^c - A^c = A - B$ .



[Watch Video Solution](#)

6. If  $A^c \cup B = U$ , show that  $A \subset B$ .



[Watch Video Solution](#)

7. Let  $U = \{1,2,3,4,5,6\}$ ,  $A = \{2,3\}$  and

$B = \{3,4,5\}$ . Find  $A \cap B$ ,  $A \cap B'$ ,  $A \cup B$  and hence show that

$$(A \cup B)' = A' \cap B.$$



[Watch Video Solution](#)

### Exercise 1 E Long Answer Type Questions I

1. (a) If  $U = \{1,2,3,\dots,10\}$ ,  $A = \{1,2,3,4,5\}$ ,  $B = \{1,3,5,7,9\}$ ,  $C = \{2,4,8,10\}$ , verify that :

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

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

(iii)  $A - B = A \cap B^c$

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

(b) If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,

$A = \{2,4,6,8\}$  and  $B = \{2,3,5,7\}$ .

Verify that : (i)  $(A \cup B)^c = A^c \cap B^c$

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



[Watch Video Solution](#)

2. If  $A = \{1,2,3,4,5\}$ ,  $B = \{2,3,5,6\}$  and  $C = \{4,5,6,7\}$ , then verify that :

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



[Watch Video Solution](#)

3. If  $A = \{1,2,3,4,5\}$ ,  $B = \{2,3,5,7,9\}$  and

$C = \{3,4,6,8,10\}$ , then prove that :

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C).$$



[Watch Video Solution](#)

4. Prove the following :

(i)  $B - A = B \cap A^c$

(ii)  $(A \cup B) - A = B - A.$



[Watch Video Solution](#)

5. For any 3 sets A, B and C, prove that :

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

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

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

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

(v)  $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$ .



[Watch Video Solution](#)

6. If A and B are subsets of the universal set U , then shown that :

(i)  $B \subset A \cup B$

(ii)  $(A \cap B) \subset A$

(iii)  $(A \cap B) \subset B$

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

(v)  $A \cap (A \cup B) = A$ .



[Watch Video Solution](#)

7. If  $A = \{a, b, c, d, e\}$ ,  $B = \{a, c, e, g\}$  and  $C = \{b, e, f, g\}$  verify that :

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

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



[Watch Video Solution](#)

8. Prove that :

$A \cap (B - A) = \phi$

(ii)  $(A - B) \cap (B - A) = \phi$

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

(iv)  $\phi - A = \phi$ .



[Watch Video Solution](#)

9. Let A and B be two sets . Prove that :

$(A - B) \cup B = A$  if and only if  $B \subset A$ .



[Watch Video Solution](#)



10. If  $A, B$  and  $C$  are three sets such that  $A \cup B = C$  and  $A \cap B = \phi$ , then prove then  $A = C - B$ .

 [Watch Video Solution](#)

11. For any sets  $A$  and  $B$ , prove that :

$$P(A \cap B) = P(A) \cap P(B).$$

 [Watch Video Solution](#)

12. Prove that (i) if a set has only one element, then it has 2 subsets .

(ii) If  $B \subset A$  and if  $B$  has one elements less than that of  $A$ , prove that  $A$  has twice as many subsets as  $B$  .

(iii) Deduce from these two results that a set with 2 elements has  $2^2$  subsets, a set with 3 elements has  $2^3$  subsets, and so on .

How many subsets does a set with  $n$  elements have ?

 [Watch Video Solution](#)

13. If  $A$  and  $B$  are two sets, then prove that  $A^c - B^c = B - A$ .



[Watch Video Solution](#)

### Exercise 1 E Long Answer Type Questions II

1. Prove that :

$$(i) (A \cup B \cup C)^c = A^c \cap B^c \cap C^c$$

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

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



[Watch Video Solution](#)

2. For any two sets  $A$  and  $B$ , prove that :

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



[Watch Video Solution](#)

3. Let  $A=\{1,2,3,4,5\}$ ,  $B=\{2,3,5,7\}$  and

$U= \{1,2,3,4,5,6,7,8,9,10\}$ . (i)  $A'$  (ii)  $B'$  (iii)  $(A - B)'$  (iv)  $(B - A)'$

 [Watch Video Solution](#)

### Exercise 1 F Short Answer Type Questions

1. If  $X$  and  $Y$  are two sets such that  $X \cup Y$  has 50 elements,  $X$  has 28 elements and  $Y$  has 32 elements, how many elements does  $X \cap Y$  have?

 [Watch Video Solution](#)

2. If  $A$  and  $B$  are two sets such that  $A \cup B$  has 20 elements,  $A$  has 8 elements and  $B$  has 16 elements, how many elements does  $A \cap B$  have?

 [Watch Video Solution](#)

3. If  $X$  and  $Y$  are two sets such that  $X$  has 40 elements,  $X \cup Y$  has 50 elements and  $X \cap Y$  has 20 elements, how many elements does  $Y$  have?

 [Watch Video Solution](#)

4. Let  $A$  and  $B$  be two sets such that :

(i)  $n(A) = 20$ ,  $n(A \cup B) = 42$  and  $n(A \cap B) = 4$

(ii)  $n(A) = 17$ ,  $n(A \cup B) = 38$  and  $n(A \cap B) = 2$ . Find  $n(B)$ ,  $n(A-B)$  and  $n(B-A)$ .

 [Watch Video Solution](#)

5. Choose the correct answer: 1. If  $A$ ,  $B$  and  $C$  are three sets and  $U$  is the universal set such that  $n(U) = 700$ ,  $n(A) = 200$ ,  $n(B) = 300$  and  $n(A \cap B) = 100$ . Find  $n(A \cap B')$

 [Watch Video Solution](#)

6. A survey shows that 63 % of the Americans like cheese where as 76 % like apples. If  $x$  % of the Americans like both cheese and apples then

 [Watch Video Solution](#)

7. In a group of 400 people, 250 can speak Hindi and 200 can speak English. How many people can speak both Hindi and English?

 [Watch Video Solution](#)

8. In a school there are 20 teachers who teach mathematics or physics. Of these, 12 teach mathematics and 4 teach both physics and mathematics. How many teach physics?

 [Watch Video Solution](#)

9. (i) In a group of 50 people , 35 speak Hindi , 25 speak both English and Hindi and all people speak atleast one of the two languages . How may

people speak only English and not Hindi ? How many people speak English?

(ii) In a group of people , 50 speak both English and Hindi and 30 people speak English but not Hindi All the people speak at least one of the two languages . How many people speak English ?

 [Watch Video Solution](#)

### Exercise 1 F Long Answer Type Questions I

1. In a group of students , 90 students know Hindi , 50 know English and 15 know both Each students knows either Hindi or English . How many students are there in the group ?

 [Watch Video Solution](#)

2. Out of 80 students who secured first class marks in Matchematics or in Physics , 50 obtained first class marks in Mathematics and 10 in both

Physics and Mathematics.

How many students secured first class marks in Physics only ?

 [Watch Video Solution](#)

3. In a survey of 600 students in a school, (i) 160 students were found to be taking tea , 215 taking coffee , 150 were taking both tea and coffee.

(ii) 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 neither tea nor coffee.

 [Watch Video Solution](#)

4. 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?

 [Watch Video Solution](#)

5. In a class of 25 students, 12 have taken mathematics, 8 have taken mathematics, but not biology. Find the number of students who have taken both mathematics and biology and the number of those who have taken biology but not mathematics. Each student has taken either mathematics or biology or both.

 [Watch Video Solution](#)

6. A survey shows that 74% of the Indians like apples, whereas 68% like oranges. What percentage of the Indians like both apples and oranges?

 [Watch Video Solution](#)

7. 75 Students secured first division marks either in English or in Mathematics or in both. If 50 of them secured first division in Mathematics and 10 in both English and Mathematics, then how many got first division in English?

 [Watch Video Solution](#)



## Exercise 1 F Long Answer Type Questions li

1. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports?



[Watch Video Solution](#)

2. In a group of 50 people, 30 like to play cricket, 25 like to play football and 32 like to play hockey. Assume that each one likes to play at least one of the three games. If 15 people like to play both cricket as well as football, 11 people like to play both football as well as hockey and 18 like to play both football as well as hockey, then

- (i) how many like to play all the three games?
- (ii) how many like to play only football?
- (iii) how many like to play only hockey?



[Watch Video Solution](#)

3. In a class , 22 studets offered Mathematics , 18 students offered Chemistry and 24 students offered Physics . All of them have to offer atleast one of these . 11 are in both Mathematics and Chemistry ,13 in Chemistry and Physics and 14 in Mathematics and Physics and 7 have offered all the three subjects Find :

(i) how many students are there in the class ?

(ii) how many students offered only Mathematics ?



[Watch Video Solution](#)

4. A class has 175 students, The following description gives the numberf of students studying one or more of the subjects in this class, Mathematics 100, physics 70, chemistry 46, Mathematics and physics 30, mathematics and chemistry 28, physics and chemistry 23, mathematics, physics and chemistry alone,

(i) how many students are enrolled in mathematics alone, physics alone

and children alone,

(ii) the number of students who have not offered any of these subjects.

 [Watch Video Solution](#)

5. In a survey of 100 students, how many of students studying the various languages were found to study: English only 18, English but not Hindi 23, English and Sanskrit 8, English 26, Sanskrit 48, Sanskrit and Hindi 8, no language 24 Find:(i) how many students were studying Hindi (ii) how many students were studying English and Hindi

 [Watch Video Solution](#)

6. In a survey of 400 students in a school , 110 were listed as taking Apple Juice , 140 as taking Orange juice and 85 were listed as taking both Apple as well as Orange juice . Find how many students were taking neither Apple juice nor Orange juice.

 [Watch Video Solution](#)

7. 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 three magazines. Find :

(i) How many read none of three magazines ?

(ii) How many read magazine C only ?



[Watch Video Solution](#)

### Ncert File Question From Ncert Book Exercise 1 1

1. Which of the following are sets? Justify your answer. (i) The collection of all the months of a year beginning with the letter J. (ii) The collection of ten most talented writers of India. (iii) A team of eleven bestcricket batsmen of the worl



[Watch Video Solution](#)

2. Let  $A = \{1, 2, 3, 4, 5, 6\}$ . Insert the appropriate symbol  $\in$  or  $\notin$  in the black spaces :

(i)  $5 \notin A$

(ii)  $8 \notin A$

(iii)  $0 \notin A$

(iv)  $4 \in A$

(v)  $2 \in A$

(vi)  $10 \notin A$



[Watch Video Solution](#)

3. Write the following sets in Roster form :

(i)  $A = \{x : x \text{ is an integer and } -3 \leq x \leq 7\}$

(ii)  $B = \{x : x \text{ is natural number less than } 6\}$

(iii)  $C = \{x : x \text{ is a two-digit natural number such that the sum of its digits is } 8\}$

(iv)  $D = \{x : x \text{ is a prime number which is divisor of } 60\}$

(v) E = The set of all letters in the word TRIGONOMETRY

(vi) F = The set of all letters in the word BETTER.

 [Watch Video Solution](#)

4. List all the elements of the following sets :

(i)  $A = \{x : x \text{ is an odd natural number}\}$

(ii)  $B = \left\{x \text{ is an integer} - \frac{1}{2} < x < \frac{9}{2}\right\}$

(iii)  $C = \{x : x \text{ is an integer, } x^2 \leq 4\}$

(iv)  $D = \{x : x \text{ is a letter in the word LOYAL}\}$

(v)  $E = \{x : x \text{ is a month of a year not having 31 days}\}$

 [Watch Video Solution](#)

5. Match each of the set on the left in the Roaster form with the same set on the right described in set-builder form :

(i)  $\{1,2,3,6\}$  (a)  $\{x : x \text{ is a prime number and a divisor of } 6\}$

(ii)  $\{2,3\}$  (b)  $\{x : x \text{ is an odd natural number less than } 10\}$

(iii)

$\{M, A, T, H, E, I, C, S\}$

(c)

$\{x : x \text{ is natural number and divisor of } 6\}$

(iv)  $\{1, 3, 5, 7, 9\}$  (d)  $\{x : x \text{ is a letter of the word MATHEMATICS}\}$ .



[Watch Video Solution](#)

## Ncert File Question From Ncert Book Exercise 1.2

1. Which of the following are the 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)  $\{y : y \text{ is a point common to any two parallel lines}\}$ .



[Watch Video Solution](#)

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.



[Watch Video Solution](#)

**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 number 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).



[Watch Video Solution](#)

**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)  $A = \{2, 4, 6, 8, 10\}$ ,

$B = \{x : x \text{ is a positive even integer and } x \leq 10\}$

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

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



[Watch Video Solution](#)

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)  $A = \{x : x \text{ is a letter in the word FOLLOW}\}$

$B = \{y : y \text{ is a letter in the word WOLF}\}$ .



[Watch Video Solution](#)

6. From the sets , given below , select examples of equal sets :

$A = \{2, 4, 12\}$ ,  $B = \{1, 2, 3, 4\}$

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

$$E = \{-1, 1\}, F = \{0, 0\},$$

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



Watch Video Solution

### Ncert File Question From Ncert Book Exercise 1.3

1. Make correct statements by filling in the symbols  $\subset$  or in the blank spaces : (i)  $\{2, 3, 4\}$   $\overset{\vdots}{\subset}$   $\{1, 2, 3, 4, 5\}$  (ii)  $\{a, b, c\}$   $\overset{\vdots}{\subset}$   $\{b, c, d\}$  (iii)  $\{x : x \text{ is a student of Class XI of your school}\}$



Watch Video Solution

2. Examine whether the following statements are true or false :

(i)  $\{a, b\} \not\subset \{b, c, a\}$

$\{a, e\} \subset \{x : x \text{ is a vowel in the English alphabet}\}$

(iii)  $\{1, 2, 3\} \subset \{1, 3, 5\}$

(iv)  $\{a\} \subset \{a, b, c\}$

(v)  $\{a\} \in \{a, b, c\}$

(vi)  $\{x : x \text{ is an even natural number less than } 6\} \subset \{x : x \text{ is a natural number which divides } 36\}$ .



[Watch Video Solution](#)

3. Let  $A = \{1, 2, \{3, 4\}, 5\}$ . Which of the following statements are correct and why?

(i)  $\{3, 4\} \subset A$

(ii)  $\{3, 4\} \in A$

(iii)  $\{\{3, 4\}\} \subset A$

(iv)  $1 \in A$

(v)  $1 \subset A$

(vi)  $\{1, 2\} \subset A$ .

(vii)  $\{1, 2, 5\} \in A$

(viii)  $\{1, 2, 3\} \subset A$ .

(ix)  $\phi \in A$

(x)  $\phi \subset A$

(xi)  $\{\phi\} \subset A$ .



Watch Video Solution

4. Write down all the subsets of the following sets :

(i)  $\{a\}$

(b)  $\{a, b\}$

(c)  $\{1, 2, 3\}$

(d)  $\phi$



Watch Video Solution

5. How many elements has  $P(A)$ , if  $A = \varphi$ ?



Watch Video Solution

6. Write the following as intervals:

(i)  $\{x : x \in R, -4 < x \leq 6\}$

(ii)  $\{x : x \in R, -12 < x < -10\}$

(iii)  $\{x : x \in R, 0 \leq x < 7\}$

(iv)  $\{x : x \in R, 3 \leq x \leq 4\}$ .



[Watch Video Solution](#)

7. Write the following intervals in set-builder form :

(i)  $(-3, 0)$

(ii)  $[6, 12]$

(iii)  $(6, 12]$

(iv)  $[-23, 5)$ .



[Watch Video Solution](#)

8. What universal set(s) would you propose for each of the following ?

(i) The set of right triangles

(ii) The set of isosceles triangles.



[Watch Video Solution](#)

9. Given the sets  $A = \{1, 3, 5\}$ ,  $B = \{2, 4, 6\}$  and  $C = \{0, 2, 4, 6, 8\}$ , which of the following may be considered as universal set(s) for all the three sets A,B and C ?

(i)  $\{0, 1, 2, 3, 4, 5, 6\}$

(ii)  $\phi$

(iii)  $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

(iv)  $\{1, 2, 3, 4, 5, 6, 7, 8\}$ .



[Watch Video Solution](#)

### Ncert File Question From Ncert Book Exercise 1 4

1. Find the union of each of the following pairs of sets :

(i)  $X = \{1, 3, 5\}$        $Y = \{1, 2, 3\}$

(ii)  $A = \{a, e, i, o, u\}$        $B = \{a, b, c\}$

(iii)  $A = \{x : x \text{ is a natural number and multiple of } 3\}$

$B = \{x : x \text{ is a natural number less than } 6\}$

(iv)  $A = \{x : x \text{ is a natural number and } 1 < x \leq 6\}$

$B = \{x : x \text{ is a natural number and } 6 < x < 10\}$

$A = \{1, 2, 3\}, B = \phi.$



[Watch Video Solution](#)

2. Let  $A = \{a,b,c\}$  and  $B = \{a,b,c,d\}$ .

Is  $A \subset B$ ? What is  $A \cup B$ ?



[Watch Video Solution](#)

3. If  $A$  and  $B$  are two sets such that  $A \subset B$ , then what is  $A \cup B$ ?



[Watch Video Solution](#)

4. If  $A = \{1,2,3,4\}, B = \{3,4,5,6\},$

$C = \{5,6,7,8\}$  and  $D = \{7,8,9,10\}.$

Find (i)  $A \cup B$

(ii)  $A \cup C$

(iii)  $B \cup C$

(iv)  $B \cup D$

(v)  $A \cup B \cup C$

(vi)  $A \cup B \cup D$

(vii)  $B \cup C \cup D$ .



Watch Video Solution

5. Find the intersection of each pair of sets of question 1 above.



Watch Video Solution

6.

If

$$A = \{3, 5, 7, 9, 11\}, B = \{7, 9, 11, 13\}, C = \{11, 13, 15\} \text{ and } D = \{15, 17\}$$

find :

(i)  $A \cap B$

(ii)  $B \cap C$

(iii)  $A \cap C \cap D$

(iv)  $A \cap C$



(v)  $B \cap D$

(vi)  $A \cap (B \cup C)$

(vii)  $A \cap D$

(viii)  $A \cap (B \cup D)$

(ix)  $(A \cap B) \cap (B \cap C)$

(x)  $(A \cup D) \cap (B \cup C)$ .



[Watch Video Solution](#)

7. Let  $A = \{x : x \text{ is natural number}\}$ ,

$B = \{x : x \text{ is an even natural number}\}$ ,

$C = \{x : x \text{ is an odd natural number}\}$ ,

$D = \{x : x \text{ is a prime number}\}$ . Find

(i)  $A \cap B$

(ii)  $A \cap C$

(iii)  $A \cap D$

(iv)  $B \cap C$

(v)  $B \cap D$

(vi)  $C \cup D$ .



[Watch Video Solution](#)

8. Which of the following pairs of sets are disjoint (i)  $\{1, 2, 3, 4\}$  and  $\{x : x \text{ is a natural number and } 4 \leq x \leq 6\}$  (ii)  $\{a, e, i, o, u\}$  and  $\{c, d, e, f\}$  (iii)  $\{x : x \text{ is an even integer}\}$  and  $\{x : x \text{ is an odd integer}\}$



[Watch Video Solution](#)

9. Let  $A = \{3, 6, 9, 12, 15, 18, 21\}$ ,

$B = \{4, 8, 12, 16, 20\}$ ,

$C = \{2, 4, 6, 8, 10, 12, 14, 16\}$  and

$D = \{5, 10, 15, 20\}$ .

Find :

(i)  $A - B$

(ii)  $A - C$

(iii)  $A - D$

(iv)  $B - A$

(v)  $C - A$

(vi) D-A

(vii) B-C

(viii) B-D

(ix) C-B

(x) D-B

(xi) C-D

(xii) D-C.



[Watch Video Solution](#)

10. If  $X = \{a, b, c, d\}$  and  $Y = \{f, b, d, g\}$ , find :

(i)  $X - Y$

(ii)  $Y - X$

(iii)  $X \cap Y$ .



[Watch Video Solution](#)

11. If  $R$  is the set of real numbers and  $Q$  is the set of irrational numbers , then what is  $R - Q$ ?



[Watch Video Solution](#)

12. State whether each of the following statement is true or false , Justify your answer .

- (i)  $\{2,3,4,5\}$  and  $\{3,6\}$  are disjoint sets .
- (ii)  $\{a,e,l,ou\}$  and  $\{a,b,cd\}$  are disjoint sets.
- (iii)  $\{2,6,10,14\}$  and  $\{3,7,11,15\}$  are disjoint sets.
- (iv)  $\{2,6,10,14\}$  and  $\{3,7,11\}$  are disjoint sets.



[Watch Video Solution](#)

### Ncert File Question From Ncert Book Exercise 1 5

1. Let  $U = \{1,2,3,4,5,6,7,8,9\}$ ,

$A = \{1,2,3,4\}$ ,

$B = \{2,4,6,8\}, C = \{3,4,5,6\}$ .

Find : (i)  $A'$

(ii)  $B'$

(iii)  $(A \cup C)$

(iv)  $(A \cup B)$

(v)  $(A - B)$

(vi)  $(B - C)$ .



[Watch Video Solution](#)

2. If  $U = \{a,b,c,d,e,f,g,h\}$ , find the complement of the following sets:

$A = \{a,b,c\}$ ,  $B = \{d,e,f,g\}$ ,  $C = \{a,c,e,g\}$ ,  $D = \{f,g,h,a\}$ .



[Watch Video Solution](#)

3. Taking the set of natural numbers as the universal set, write down the complements of the following sets :

(i)  $\{x : x \text{ is an even natural number}\}$

(ii)  $\{x : x \text{ is an odd natural number}\}$

(iii)  $\{x : x \text{ is a positive multiple of 3}\}$

(iv)  $\{x : x \text{ is a prime number}\}$

(v)  $\{x : x \text{ is a natural number divisible by 3 and 5}\}$

(vi)  $\{x : x \text{ is a perfect square}\}$

(vii)  $\{x : x \text{ is a perfect cube}\}$

(viii)  $\{x : x + 5 = 8\}$

(ix)  $\{x : 2x + 5 = 9\}$

(x)  $\{x : x \geq 7\}$

(xi)  $\{x : x \in N \text{ and } 2x + 1 > 10\}$ .



[Watch Video Solution](#)

4. If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,

$A = \{2,4,6,8\}$ ,

$B = \{2,3,5,7\}$ . Verify that :

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

∴



[Watch Video Solution](#)

5. Draw appropriate Venn diagram for each of the following : (i)  $(A \cup B)'$

(ii)  $A' \cap B'$  (iii)  $(A \cap B)'$  (iv)  $A' \cup B'$



[Watch Video Solution](#)

6. Let  $U$  be the set of all triangles in a plane. If  $A$  is the set of all triangles with at least one angle different from  $60^\circ$ , what is  $A'$  ?



[Watch Video Solution](#)

7. Fill in the blanks to make each of the following a true statement :

(i)  $A \cup A = \dots\dots$

(ii)  $\phi \cap A = \dots\dots$

(iii)  $A \cap A = \dots\dots$

(iv)  $U \cap A = \dots\dots$



[Watch Video Solution](#)

1. If  $X$  and  $Y$  are two sets such that  $n(X) = 17$ ,  $n(Y) = 23$  and  $n(X \cup Y) = 38$ , find  $n(X \cap Y)$ .

 [Watch Video Solution](#)

2. If  $X$  and  $Y$  are two sets such that  $X \cup Y$  has 17 elements,  $X$  has 7 elements and  $Y$  has 15 elements, how many elements does  $X \cap Y$  have?

 [Watch Video Solution](#)

3. In a group of 400 people, 250 can speak Hindi and 200 can speak English. How many people can speak both Hindi and English?

 [Watch Video Solution](#)

4. If  $S$  and  $T$  are two sets such that  $S$  has 21 elements,  $T$  has 32 elements, and  $S \cap T$  has 11 elements, how many elements does  $S \cup T$  have?





[Watch Video Solution](#)

5. If  $X$  and  $Y$  are two sets such that  $X$  has 40 elements,  $X \cup Y$  has 60 elements and  $X \cap Y$  has 10 elements, how many elements does  $Y$  have?



[Watch Video Solution](#)

6. In a group of 70 persons, 37 like coffee and 52 like tea. Each person like atleast one drink. Find how many persons like both drink ?



[Watch Video Solution](#)

7. 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?



[Watch Video Solution](#)

8. In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?



[Watch Video Solution](#)

### Miscellaneous Exercise On Chapter 1

1. Decide, among the following sets, which sets are subsets of one and another:  $A = \{x : x \in R \text{ and } x \text{ satisfies } x^2 - 8x + 12 = 0\}$ ,  $B = \{2, 4, 6\}$ ,  $C = \{2, 4, 6, 8, \dots\}$



[Watch Video Solution](#)

2. In each of the following determine whether the statement is true or false. If it is true prove it . if it is false, give an example: If  $x \in A$  and  $A \in B$ , then  $x \in B$ .



[Watch Video Solution](#)

 Watch Video Solution

3. 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  $B = C$

 Watch Video Solution

4. Show that the following four conditions are equivalent: (i)  $A \subset B$  (ii)  $AB = \varphi$  (iii)  $A \cup B = B$  (iv)  $A \cap B = A$

 Watch Video Solution

5. Show that  $A \subset B$  then  $C - B \subset C - A$

 Watch Video Solution

6. Assume that  $P(A) = P(B)$ . Show that  $A = B$

 Watch Video Solution

Watch Video Solution

7. Is it true that for any sets  $A$  and  $B$ ,  $P(A) \cup P(B) = P(A \cup B)$ ? Justify your answer.

 [Watch Video Solution](#)

8. Show that for any sets  $A$  and  $B$ ,  $A = (A \cap B) \cup (A - B)$  and  $A \cup (B - A) = A \cup B$

 [Watch Video Solution](#)

9. Using properties of sets, show that :

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

(ii)  $A \cap (A \cup B) = A$ .

 [Watch Video Solution](#)

10. Show that  $A \cap B = A \cap C$  need not imply  $B=C$ .

 [Watch Video Solution](#)

11. Let  $A$  and  $B$  be sets. If  $A \cap X = B \cap X = \phi$  and  $A \cup X = B \cup X$  for same set  $X$ , prove that  $A=B$ .

 [Watch Video Solution](#)

12. Find sets  $A, B$  and  $C$  such that  $A \cap B, B \cap C$  and  $A \cap C$  are non empty sets and  $A \cap B \cap C = \phi$

 [Watch Video Solution](#)

13. 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 neither tea nor coffee?



[Watch Video Solution](#)

**14.** In a group of students, 100 students know Hindi, 50 know English and 25 know both. Each of the students knows either Hindi or English. How many students are there in the group?



[Watch Video Solution](#)

**15.** 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: (i) the number of people who read



[Watch Video Solution](#)

**16.** In a survey it was found that 21 people liked product A, 26 liked product B and 29 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 h

 [Watch Video Solution](#)

## Exercise

1. Write the following sets in the roaster from.

(i)  $A = \{x : x \in R, 2x + 11 = 15\}$

(ii)  $B = \{x \mid x^2 = x, x \in R\}$

$C = \{x \mid x \text{ is a positive factor of a prime number } p\}$

 [Watch Video Solution](#)

2. If  $Y = \{x \mid x \text{ is a positive factor of the number } 2^{p-1}(2^p - 1) \text{ where } 2^p - 1 \text{ is a prime number}\}$  Write Y in roaster form.

 [Watch Video Solution](#)

3. Give that  $N = \{1, 2, 3, \dots, 100\}$ . The, write

(i) the subset of  $N$  whose elements are even numbers.

(ii) the subset of  $N$  whose elements are perfect square numbers.

 [Watch Video Solution](#)

4.  $A$ ,  $B$  and  $C$  are subsets of universal set  $U$ . If  $A = \{2, 4, 6, 8, 12, 20\}$ ,  
 $B = \{3, 6, 9, 12, 15\}$ ,  $C = \{5, 10, 15, 20\}$  and  $U$  is the set of all whole numbers, draw a Venn diagram showing the relation of  $U$ ,  $A$ ,  $B$  and  $C$ .

 [Watch Video Solution](#)

5. For all sets  $A$  and  $B$ , prove that  $(A - B) \cup (A \cap B) = A$ .

 [Watch Video Solution](#)

6. For all sets  $A$ ,  $B$  and  $C$ , if  $A \subset B$ , then  $A \cup C \subset B \cup C$ .

 [Watch Video Solution](#)



7. 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

(i) in English and Mathematics but not in Science.

(ii) in Mathematics and Science but not in English.

(iii) in Mathematics only.

(iv) in more than one subject only.

[Watch Video Solution](#)

8. In a survey of 200 students of a school, it was found that 120 study Mathematics, 90 study Physics and 70 study Chemistry, 40 study Mathematics and Physics, 30 study Physics and Chemistry, 50 study Chemistry and Mathematics and 20 none of these subjects. Find the number of students who study all the three subjects.

[Watch Video Solution](#)

## Revision Exercise

1. Give an example to show that if  $A \cup B$  and  $A \cap B$  are given, then  $A$  and  $B$  may not be uniquely Determinable.

 [Watch Video Solution](#)

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

 [Watch Video Solution](#)

3. Verify the following identities :

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

$$(ii) A \cap (B \cup C) = (A \cap B) \cup (A \cap C),$$

where  $A, B$  and  $C$  are three sets defined by :

$$A = \{1, 2, 4, 5\}, B = \{2, 3, 5, 6\}$$

$$C = \{4, 5, 6, 7\}.$$



[Watch Video Solution](#)

4. Let  $B$  be a subset of a set  $A$  and let  $P(A : B) = [X \in P(A) : X \subset B]$ .

(i) Show that:  $P(A : \phi) = P(A)$  (ii) If  $A = \{a, b, c, d\}$  and  $B = \{a, b\}$ .

List all the members of the set  $P(A : B)$



[Watch Video Solution](#)

5. For any three sets  $A, B, C$ , prove that :

$$n(A \cup B \cup C) = [n(A) + n(B) + n(C) + n(A \cap B \cap C)] - [n(A \cap B) + n(A \cap C) + n(B \cap C)] + n(A \cap B \cap C)$$



[Watch Video Solution](#)

6. A market research group conducted a survey of 2000 consumers and reported that 1720 consumers liked product  $P_1$  and 1450 consumers like product  $P_2$ . What is the least number that must have liked both the products?



[Watch Video Solution](#)

7. In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% buy newspaper B and 10% newspaper C, 5% buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, find the number of families which buy :

(i) A only

(ii) B only

(iii) C only

(iv) none of A, B and C.



[Watch Video Solution](#)

## Objective Type Questions A Multiple Choice Questions

1. Suppose  $A_1, A_2, \dots, A_{30}$  are thirty sets each having 5 elements and  $B_1, B_2, \dots, B_n$  are  $n$  sets each having 3 elements, Let

$$\bigcup_{i=1}^{30} A_i = \bigcup_{j=1}^n B_j = S$$

and each element of  $S$  belongs to exactly 10 of the  $A_i$  and exactly 9 of the  $B_j$ . Find the value of  $n$ .

A. 15

B. 3

C. 45

D. 35

**Answer: c**



[Watch Video Solution](#)

2. 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. The values of  $m$  and  $n$  are, respectively.

A. 4,7

B. 7,4

C. 4,4

D. 7,7

**Answer: B**



[Watch Video Solution](#)

3. In a class of 65 students , 30 students play cricket and 20 students play tennis and 10 students play both the games Then , the number of students who play neither is :

A. 0

B. 25

C. 35

D. 45

**Answer: b**



[Watch Video Solution](#)

4. If  $X = \{8^n - 7n - 1 \mid n \in \mathbb{N}\}$  and  $Y = \{49n - 49 \mid n \in \mathbb{N}\}$ . Then

A.  $X \subset Y$

B.  $Y \subset X$

C.  $X = Y$

D.  $X \cap Y = \phi$

**Answer: A**



[View Text Solution](#)

5. If A and B are any two sets, then what is  $A \cap (A \cup B)$  equal to?

A. A

B. B

C.  $\phi$

D.  $A \cap B$

**Answer: A**



[Watch Video Solution](#)

6. Let  $S = \{x | x \text{ is a positive multiple of 3 less than 100}\}$ ,  $P = \{x | x \text{ is a prime number less than 20}\}$ .

A. 34

B. 41

C. 33

D. 30

**Answer: b**



[Watch Video Solution](#)

7. If  $X$  and  $Y$  are two sets and  $X'$  denotes the complement of  $X$  then

$X \cap (X \cup Y)$  is equal to :



A.  $X$

B.  $y$

C.  $\phi$

D.  $X \cap Y$ .

**Answer: a**

 [Watch Video Solution](#)

**8. What is Set ?? Representation of set and Different type of sets**

A. Collection of well defined objects

B. Collection of numbers

C. Well collection of objects0

D. None of these.

**Answer: a**

 [Watch Video Solution](#)

9. If  $X = \{1, 3, 5\}$ ,  $Y = \{1, 2, 3\}$ , then  $X \cap Y$  is :

A.  $\{1, 2, 3, 4, 5\}$

B.  $\{1, 2, 3, 4, 5\}$

C.  $\{1, 3\}$

D.  $\phi$

**Answer: c**



**Watch Video Solution**

10. The set  $A = \{x : x \text{ is an integer and } -3 \leq x < 2\}$  is equal to :

A.  $\phi$

B.  $\{-3, -2, -1, 0, 1\}$

C.  $\{-3, -2, -1, 0, 1, 2\}$

D. None of these.

**Answer: b**



**Watch Video Solution**

**11. Two sets A and B are not disjoint if :**

A.  $A \cup B = A$

B.  $A \cap B \neq \phi$

C.  $A \cap B = \phi$

D.  $A - B = A$

**Answer: A::B**



**Watch Video Solution**

**12. The number of proper subsets of the set :  $A = \{1,2,3,4,5\}$  is :**

A. 32

B. 31

C. 16

D. 8

**Answer: B**



[Watch Video Solution](#)

13.  $A = \{0\}$  is a/an

A. empty set

B. infinite set

C. singleton set

D. subset.

**Answer: C**



[Watch Video Solution](#)

14. If  $A = \{2,3,4,5\}$ ,  $B = \{3,4,6,7\}$ , then  $A \cup B$  is :

A.  $\{2,3,5,6,7\}$

B.  $\{2,3,4,5,6,7\}$

C.  $\{4,5,6,7\}$

D. None of these.

**Answer: b**



[Watch Video Solution](#)

15. Match each of the set on the left in the Roaster form with the same set on the right described in set-builder form :

(i)  $\{1,2,3,6\}$  (a)  $\{x : x \text{ is a prime number and a divisor of } 6\}$

(ii)  $\{2,3\}$  (b)  $\{x : x \text{ is an odd natural number less than } 10\}$

(iii)  $\{M, A, T, H, E, I, C, S\}$  (c)

$\{x : x \text{ is natural number and divisor of } 6\}$

(iv)  $\{1, 3, 5, 7, 9\}$  (d)  $\{x : x \text{ is a letter of the word MATHEMATICS}\}$ .



[Watch Video Solution](#)

16. The set of girls in a boys school is :

- A. a null set
- B. a singleton
- C. a finite set
- D. infinite set .

**Answer: a**



[Watch Video Solution](#)

17. The correct match of the following is :

Column -I

(i)  $\{x : x \text{ is an integer and } -3 < x < 7\}$

(ii)  $\{3, 4, 5, 6, 7\}$

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

(iv)  $\{2, 3\}$

Column -II

(a)  $\{x : x \text{ is a prime number}\}$

(b)  $\{4, 5, 6\}$

(d) finite set

$\{M, A, T, H, E, I, C, S\}$

 [Watch Video Solution](#)

18. If  $X = \{1, 3, 5\}$ ,  $Y = \{1, 2, 3\}$ , then  $X \cup Y$  is :

A.  $\{1, 2, 4, 5\}$

B.  $\{1, 2, 3, 5\}$

C.  $\{1, 3, 5\}$

D. None of these.

Answer: b

 [Watch Video Solution](#)

19. If  $A, B, C$  are any three sets, then the correct match of the following is :

Column -I

Column -II

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

(a)  $(A \cap B) \cup (A \cap C)$

(ii)  $A \cap (B \cup C)$

(b)  $(A \cup B) \cap (A \cup C)$

(iii)  $A \cup (B \cup C)$

(c)  $(A \cap B) \cap C$

(iv)  $A \cap (B \cap C)$

(d)  $(A \cup B) \cup C$



Watch Video Solution

20. If  $A$  and  $B$  are any two sets and  $U$ , the universal set, then correct match of the following is :

Column -I

Column -II

(i)  $A \cup A$

(a)  $U$

(ii)  $A \cup U$

(b)  $A$

(iii)  $A \cup B$

(c)  $\phi$

(iv)  $A \cap \phi$

(d)  $B \cup A$



Watch Video Solution

21. If  $A$  and  $B$  are two finite sets, then correct match of the following is :

Column -I

Column -II

(i)  $(A \cup B) \cap (A \cap B)$ , (a)  $A$ , (ii)  $A \cup A$ , (b)  $U$ , (iii)  $A \cap A$ , (c)  $\phi$ , (d)  $B \cup A$



(c)AcapB'),((iv)(AuuB),,(d)"phi":}



[View Text Solution](#)

22. If A and B are two sets , then  $(A \cup B)^c$  is :

A.  $A^c \cap B^c$

B.  $\phi$

C.  $A^c \cup B^c$

D. None of these.

**Answer: A**



[Watch Video Solution](#)

23. The set of numbers which are multiples of 5 is :

A. a finite set

B. an infinite set

C. a universal set

D. None of these.

**Answer: B**



[Watch Video Solution](#)

**24.** The set of prime numbers less than 99 is :

A. Null set

B. Finite set

C. Infinite set

D. None of these.

**Answer: b**



[Watch Video Solution](#)

25. The set of circles passing through (0,0) is :

A. Infinite Set

B. Finite set

C. Null set

D. None of these.

**Answer: A**



[Watch Video Solution](#)

26. The set  $A \cup A$  is :

A. A

B. A

C.  $\phi$

D. U.

**Answer: a**



[Watch Video Solution](#)

**27.** The set  $A \cap A$  is :

A.  $\phi$

B. U

C. A

D. A'

**Answer: c**



[Watch Video Solution](#)

**28.** The set  $\phi$  is :

A. null set

B. U

C. U

D. None of these.

**Answer: a**



[Watch Video Solution](#)

**29.** If  $U = \{1,2,3,4,5,6,7,8,9,10\}$  and  $A = \{3,4,7,9\}$ , then B equals :

A.  $\{1,2,8,10\}$

B.  $\{1,2,5,8,10\}$

C.  $\{1,2,5,6,8,10\}$

D. None of these.

**Answer: b**



[Watch Video Solution](#)

30. If  $A = \{1,2,3,4,5,6,7\}$  and  $B = \{7,8,9,10\}$  , then  $A-B$  equals :

A.  $\{7,9\}$

B.  $\{3,4,8,10\}$

C.  $\{7\}$

D. None of these.

**Answer: d**



[Watch Video Solution](#)

## Objective Type Questions B Fill In The Blanks

1. The set of all vowels in the English alphabet , which precede q is .....



[Watch Video Solution](#)

2. If  $A = \{1,2,3,4\}$  ,  $B = \{3,4,5,6\}$  and  $C = \{5,7,8\}$  , then  $A \cup B \cup C = \dots\dots\dots$  .



Watch Video Solution

3. Let  $A = \{3, 6, 12, 15, 18, 21\}$  and  $B = \{4, 8, 12, 16, 20\}$  and  $C = \{2, 4, 6, 8, 10, 12, 14, 16\}$ , then

:

(i)  $A - B = \dots\dots\dots$

(ii)  $B - C = \dots\dots\dots$



Watch Video Solution

4. If  $U = \{1, 2, 3, 4, 5, 6\}$ ,  $A = \{1, 2\}$ ,  $B = \{3, 4, 5\}$ , then :

(i)  $A^c \cap B^c = \dots\dots\dots$

(ii)  $A \cup B = \dots\dots\dots$



Watch Video Solution

5. If  $A = \{a, e, i, o, u\}$  and  $B = \{a, i, u\}$ , then  $A \cup B = \dots\dots\dots$



Watch Video Solution

6. If  $A = \{1,2,3,4,5,6\}$  and  $B = \{3,4,5,6,7,8\}$ , then  $(A-B) \cup (B-A) = \dots\dots\dots$

 [Watch Video Solution](#)

7. (i)  $(A \cup B)^c = \dots\dots\dots$

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

 [Watch Video Solution](#)

8. If  $U = \{1,2,3,4,5,6,7,8,9\}$  and  $A = \{1,2,3,4\}$ , then  $(A^c)^c = \dots\dots\dots$

 [Watch Video Solution](#)

9. If  $X$  and  $Y$  are two sets such that  $X \cup Y$  has 17 elements,  $X$  has 8 elements and  $Y$  has 14 elements. Then the number of elements of  $X \cap Y = \dots\dots\dots$

 [Watch Video Solution](#)



10. If A and B are two sets containing 3 and 6 elements respectively, what can be the maximum number of elements in  $A \cup B$ .

Find also the minimum number of elements in  $A \cup B$ .

 [Watch Video Solution](#)

### Objective Type Questions C True False Questions

1. The solution of the set  $\{x : x \in R, x^2 = 9, 2x = 9\}$  is an empty set .

 [Watch Video Solution](#)

2. Which of the following statements are true or false ?

(i)  $\{a, e, o\} = \{i, u, o\}$

(ii)  $\{5, 1, 3\} = \{1, 3, 5\}$

(iii)  $\{x : x \in R, x \text{ is multiple of } 5\} = \{5,10,15,20,\dots\}$

(iv)  $\{x : x \text{ is an even prime}\} = \{2\}$ .

 [Watch Video Solution](#)

3. (i) The sets  $A=\{2\}$  and  $B= \{\{2\}\}$  are equal

(ii) Every set has a proper subset .

 [Watch Video Solution](#)

4. Let  $A= \{\{1,2,3\},\{4,5\}, \{6,7,8,9\}\}$  .

(i)  $\{1,2,3\} \subset A$

(ii)  $\{\{4,5\}\} \subset A$ .

 [Watch Video Solution](#)

5. If  $A$  and  $B$  are any two sets, prove that

$P(A) = P(B)$  implies  $A = B$ .

 [Watch Video Solution](#)

## Objective Type Questions D Very Short Answer Type Question

1. Write the set  $\{3,6,9,12\}$  in set Builder Form.

 [Watch Video Solution](#)

2. Write the set  $\{x:x \text{ is a positive integer and } x^2 < 40\}$  in the Roster Form.

 [Watch Video Solution](#)

3. Write the set of all vowels in the English alphabet , which precede r.

 [Watch Video Solution](#)

4. What is the total number of proper subsets of a set containing  $n$  elements?

 [Watch Video Solution](#)

5. The number of elements of the power set of a set containing  $n$  elements is

 [Watch Video Solution](#)

6. Write the number of elements in the power set of null set.

 [Watch Video Solution](#)

7. Write the power set of the following :

(i)  $\{1,2\}$

(ii)  $\{1,2,3\}$ .





Watch Video Solution

8. If  $A = \{1, 2\}$ ,  $B = \{3, 4, 5\}$ , find  $A \cup B$  and  $A \cap B$ .



Watch Video Solution

9. If  $A = \{(x, y) : y = e^x, x \in \mathbb{R}\}$  and  $B = \{(x, y) : y = e^{-x}, x \in \mathbb{R}\}$ , then write  $A \cap B$ .



Watch Video Solution

10. If  $X = \{a, b, c, d\}$ ,  $Y = \{f, b, d, g\}$ , find:

(i)  $X - Y$

(ii)  $Y - X$ .



Watch Video Solution

11. Let  $A = \{1,2,3,4,5,6\}$  and  $B = \{3,4,5,6,7,8\}$  find  $(A - B) \cup (B - A)$ .

 [Watch Video Solution](#)

12. If  $U = \{1,2,3,4,5,6,7,8,9,10\}$  and  $A = \{1,3,5,7,9\}$ , find  $A^c$ .

 [Watch Video Solution](#)

13. Let  $u$  be universal set of all the students of Class XI of a coeducational school and  $A$  be the set of all girls in Class XI. Find  $A'$ .

 [Watch Video Solution](#)

14. If  $A$  and  $B$  are two sets such that  $A \subset B$ , then write  $B^c - A^c$  in terms of  $A$  and  $B$ .

 [View Text Solution](#)

15. If  $A$  and  $B$  are two sets such that  $n(A) = 115$ ,  $n(B) = 326$ ,  $n(A - B) = 47$ , then write  $n(A \cup B)$ .



[Watch Video Solution](#)

16. If  $A$  and  $B$  are two sets such that  $n(A) = 20$ ,  $n(B) = 25$  and  $n(A \cap B) = 5$ , then write  $n(A \cup B)$ .



[Watch Video Solution](#)

17. Let  $A$  and  $B$  be two sets containing 3 and 5 elements respectively. Find the minimum numbers of elements in  $A \cup B$ .



[Watch Video Solution](#)

**Check Your Understanding**

1. Define empty set .



[Watch Video Solution](#)

2. What is the order of (i) an empty set (ii) a singleton set ?



[Watch Video Solution](#)

3. Define singleton set.



[Watch Video Solution](#)

4. Is the universal set unique ?



[Watch Video Solution](#)



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

(i)  $\{1,2,3,\dots\}$

(ii)  $\{1,2,3,\dots,999,1000\}$

(iii) Set of prime numbers less than 100 .

(iv) Set of concentric circles in a plane.



[Watch Video Solution](#)

6. Which of the following are empty sets ?

(i) Set of odd natural numbers divisible by 2

(ii)  $\{x : x < 5 \text{ and } x > 7, x \in N\}$

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



[Watch Video Solution](#)

7. What is Disjoint sets ?



[Watch Video Solution](#)

8. Fill in the blanks :

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

(ii)  $A \cap (B \cap C) = \dots\dots\dots$



[Watch Video Solution](#)

9. Fill in the blanks :

(i)  $(A \cup B)^c = \dots\dots\dots$

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



[Watch Video Solution](#)

10. What is  $n(A \cup B \cup C)$ ?



[Watch Video Solution](#)

1. The set  $S = \{1, 2, 3, , 12\}$  is to be partitioned into three sets A, B, C of equal size. Thus,  $A \cup B \cup C = S$ ,  $A \cap B = B \cap C = A \cap C = \varphi$  . The number of ways to partition S is

- A.  $\frac{12!}{3!(3!)^4}$
- B.  $\frac{12!}{(4!)^3}$
- C.  $\frac{12!}{(3!)^4}$
- D.  $\frac{12!}{3!(4!)^3}$ .

**Answer: B**



[Watch Video Solution](#)

2. Let  $X = \{1, 2, 3, 4, 5\}$  . The number of different ordered pairs (Y, Z) that can be formed such that  $Y \subseteq X$ ,  $Z \subseteq X$  and  $Y \cap Z$  is empty is\_\_\_

- A.  $5^2$
- B.  $3^5$

C.  $2^5$

D.  $5^3$ .

**Answer: B**

 [Watch Video Solution](#)

3. Let  $A$  and  $B$  be two sets containing 2 elements and 4 elements respectively. The number of subsets of  $A \times B$  having 3 or more elements is (1) 220 (2) 219 (3) 211 (4) 256

A. 220

B. 219

C. 211

D. 256

**Answer: b**

 [Watch Video Solution](#)

4. If  $X = \{4^n - 3n - 1 : n \in N\}$  and  $Y = \{9(n - 1) : n \in N\}$ , where  $N$  is the set of natural numbers, then  $X \cup Y$  is equal to

A. Null set

B.  $Y - X$

C.  $X$

D.  $Y$ .

**Answer: D**



[Watch Video Solution](#)

5. Let  $A$  and  $B$  be two sets containing four and two elements respectively.

Then the number of subsets of the set  $A \times B$ , each having at least three elements is : (1) 219 (2) 256 (3) 275 (4) 510

A. 219

B. 256

C. 275

D. 510

**Answer: a**



**Watch Video Solution**

6. If  $f(x) + 2f\left(\frac{1}{x}\right) = 3x, x \neq 0$  and

$S = \{x \in R: f(x) = f(-x)\}$ , then  $S$

A. is an empty set

B. contains exactly one element

C. contains exactly two elements

D. contains more than two elements .

**Answer: C**



**Watch Video Solution**

7.

Let

$$S = \{x \in \mathbb{R} : x \geq 0 \text{ and } 2 | (\sqrt{x} - 3 | + \sqrt{x}(\sqrt{x} - 6) + 6 = 0\}$$

then S (1) is an empty set (2) contains exactly one element (3) contains exact;y two elements (4) contains exactly four elements

- A. is an empty set
- B. contains exactly one element
- C. contains exactly two elements
- D. contains exactly four elements.

**Answer: c**



[Watch Video Solution](#)

8. Two sets A and B are as under

$$A = \{(a, b) \in \mathbb{R} \times \mathbb{R} : |a - 5| < 1 \text{ and } |b - 5| < 1\} B = \{(a, b) \in \mathbb{R} \times \mathbb{R} : |a - 5| < 1 \text{ and } |b - 5| < 1\}$$

(1)  $B \subset A$  (2)  $A \subset B$  (3)  $A \cap B = \phi$  (an empty set) (4)  $\neq$  either  $A \subset B$  or  $B \subset A$

A.  $B \subset A$

B.  $A \subset B$

C.  $A \cap B = \phi$  (an empty set)

D. Neither  $A \subset B$  nor  $B \subset A$ .

**Answer: c**



**Watch Video Solution**

9. Let  $S = \{1, 2, 3, \dots, 100\}$ . The number of non-empty subsets  $A$  to  $S$  such that the product of elements in  $A$  is even is

A.  $2^{100} - 1$

B.  $2^{50} + 1$

C.  $2^{50}(2^{50} - 1)$



D.  $2^{50} - 1$

**Answer: C**



**Watch Video Solution**

## Chapter Test 1

1. The set of girls in a boys school is :

- A. a null set
- B. a singleton
- C. a finite set
- D. infinite set .

**Answer: C**



**Watch Video Solution**

2. If  $x = \{1, 3, 5\}$ ,  $y = \{1, 2, 3\}$ , then  $x \cap y$  is :

A.  $\{1, 2, 3, 4, 5\}$

B.  $\{1, 2, 3, 4, 5\}$

C.  $\{1, 3\}$

D.  $\emptyset$

**Answer: c**

 [Watch Video Solution](#)

3. How many elements has  $P(A)$ , if  $A = \emptyset$ ?

 [Watch Video Solution](#)

4. If  $A$  and  $B$  are two sets such that  $A \subset B$ , then what is  $A \cup B$ ?

 [Watch Video Solution](#)

5. If  $X$  and  $Y$  are two sets such that  $n(X) = 17$ ,  $n(Y) = 23$  and  $n(X \cup Y) = 38$ , find  $n(X \cap Y)$ .

 [Watch Video Solution](#)

6. Prove that  $A \subseteq B$ ,  $B \subseteq C$  and  $C \subseteq A \Rightarrow A = C$ .

 [Watch Video Solution](#)

7. Prove that  $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$ .

 [Watch Video Solution](#)

8. Show that  $A \cap B = A \cap C$  need not imply  $B = C$

 [Watch Video Solution](#)

9. Prove that  $A^c - B^c = B - A$ .



Watch Video Solution

10. In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?



Watch Video Solution

11. Prove that :

(i)  $(A \cup B \cup C)^c = A^c \cap B^c \cap C^c$

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



Watch Video Solution

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. Find: (i) the number of people who read



[Watch Video Solution](#)