CBSE Class 11 Mathematics
Important Questions
Chapter 1
Sets

1 Marks Questions

Which of the following are sets? Justify your answer.

1. The collection of all the months of a year beginning with letter M

Ans. Set

2. The collection of difficult topics in Mathematics. Let A = {1,3,5,7,9}. Insert the appropriate symbol ∈ or ∉ in blank spaces :– (Question- 3,4)

Ans. Not a set

3. 2—A

Ans. ∈

4. 5 – A

Ans. ∈

5. Write the set A = { x : x is an integer, –1 $\leq$ x < 4} in roster form

Ans. A = {–1, 0, 1, 2, 3}

6. List all the elements of the set,

$A = \{ x : x \in Z, -1/2 < x < 11/2 \}$

Ans. A = { 0,1,2,3,4,5}

7. Write the set B = {3,9,27,81} in set-builder form. Which of the following are empty sets? Justify.

Ans. B = { x : x = 3^n , n ∈ N and 1 ≤ n ≤ 4}

8. A = { x : x ∈ N and 3 <x <4}

Ans. Empty set

9. B = { x : x ∈ N and x^2 = x}Which of the following sets are finite or Infinite? Justify.

Ans. Non-empty set

10. The set of all the points on the circumference of a circle.

Ans. Infinite set

11. B = { x : x ∈ N and x is an even prime number}

Ans. Finite set

12. Are sets A = { –2,2}, B = { x : x ∈ Z, x^2 –4 = 0} equal? Why?

Ans. Yes

13. Write (–5,9] in set-builder form

Ans. { x : x ∈ R, –5 < x ≤ 9}

14. Write { x : –3 ≤ x <7} as interval.

Ans. [–3,7)

15. If A = { 1,3,5}, how many elements has P(A)?

Ans. $2^3 = 8$

16. Write all the possible subsets of A = {5,6}. If A = {2,3,4,5}, B = { 3,5,6,7}

Ans. ∅, { 5}, {6}, {5,6}

17. A ∪ B

Ans. A ∪ B = {2,3,4,5,6,7}

18. A ∩ B

Ans. A ∩ B = {3, 5}

19. If A = {1,2,3,6} , B = {1, 2, 4, 8} find B – A

Ans. B – A = {4,8}

20. If A = {p, q}, B = {p, q, r}, is B a superset of A? Why?

Ans. Yes, because A is a subset of B

21. Are sets A = {1,2,3,4}, B = { x : x ∈ N and 5 ≤ x ≤ 7} disjoint? Why?

Ans. es, because A ∩ B = ∅

22. If X and Y are two sets such that n(X) = 19, n(Y) = 37 and n(X ∩ Y) = 12, find n(X ∪ Y).

Ans. n(X ∪ Y) = 44

23.Describe the set in Roster form

$\{x: x \text{ is a two digit number such that the sum of its digit is } 8 \}$

Ans. { 17, 26, 35, 44, 53, 62, 71, 80 }

24.Are the following pair of sets equal? Give reasons.

A = { x:x is a letter in the word FOLLOW}

B = { y:y is a letter in the word WOLF}

Ans. A= {F, O, L, W}

B = {W, O, L, F }

Hence A=B

25.Write down all the subsets of the set {1,2,3}
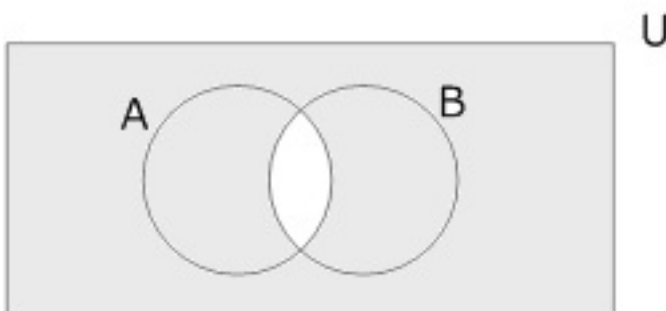
Ans. ϕ, {1},{2},{3},{1,2},{1,3},{2,3},{1,2,3}

26.Let A = { 1,2,{3,4,},5} is $\big\{\{3,4\}\big\} \in A$ is incorrect. Give reason.

Ans. {3,4} is an elements of sets A, therefore $\big\{\{3,4\}\big\}$ is a set containing element {3,4} which is belongs to A

Hence $\big\{\{3,4\}\big\} \in A$ is correct

27.Draw venn diagram for $(A \cap B)'$

Ans. $(A \cap B)' = U- (A \cap B)$

4

28. Write the set in roster form A = The set of all letters in the word T R I G N O M E T R Y

Ans. A = {T, R, I, G, N, O, M, E, Y}

29. Are the following pair of sets equal? Give reasons

A, the set of letters in "ALLOY" and B, the set of letters in "LOYAL".

Ans. A = {A, L, O, Y}

B = {L, O, Y, A}

Hence A = B

30. Write down the power set of A , A = {1, 2, 3}

Ans. $P(A) = \{\phi, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$

31. A = {1, 2, {3, 4}, 5} which is incorrect and why. (i) $\{3, 4\} \subset A$ (ii) $\{3, 4\} \in A$

Ans. {3, 4} is an element of set A.

Hence $\{3,4\} \in A$ is correct and

$\{3,4\} \subset A$ is incorrect.

32. Fill in the blanks.

(i) $A \cup A' =$ --------

(ii) $\left(A'\right)' =$ ---------

(iii) $A \cap A' =$ --------

Ans. (i) U

(ii) A

(iii) ϕ

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

Ans. $\left\{x : x = \dfrac{n}{n+1}, \text{ where n is a natural no. and } 1 \le n \le 6\right\}$

34. Is set C = { x : x – 5 = 0} and E = {x : x is an integral positive root of the equation $x^2 – 2x – 15 = 0$} are equal?

Ans. C = {5}

$$x^2 - 2x - 15 = 0$$
$$x^2 - 5x + 3x - 15 = 0$$
$$x(x-5) + 3(x-5) = 0$$
$$(x-5)(x+3) = 0$$
$$x = 5$$
$$x = -3 \quad \left[x = -3 \text{ reject}\right]$$
$$x = 5$$
$$E = \{5\}$$
Henc C = E.

35. Write down all possible proper subsets of the set {1, {2}}.

Ans. $\phi, \{1\}, \{\{2\}\}, \{1, \{2\}\}$

36. State whether each of the following statement is true or false.

(i) {2, 3, 4, 5} and {3, 6} are disjoint sets.

(ii) {2, 6, 10} and {3, 7, 11} are disjoint sets

Ans. (i) $\{2,3,4,5\} \cap \{3,6\} = \{3\} \neq \phi$

Hence false

(ii) $\{2,6,10\} \cap \{3,7,11\} = \phi$

true

37.Fill in the blanks

(i) (A $\cup$ B)´ = ---------

(ii) (A ∩ B)′ = ---------

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

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

38.Write the set of all vowels in the English alphabet which precede k in roster Form

Ans. A = {b, c, d, f, g, h, j}

39.Is pair of sets equal? Give reasons.

A = {2, 3} B = x : x is solution of x^2 + 5x + 6 = 0}

Ans. A = {2, 3}

B = {- 2, - 3}

A ≠ B

$[\because x^2 + 5x + 6 = 0$

$x^2 + 3x + 2x + 6 = 0$

x = - 2 – 3

40.Write the following intervals in set builder form: (-3, 0) and [6, 12]

Ans. (- 3, 0) = {x : x ∈ R, - 3 < x < 0}

[6, 12] = {x : x ∈ R, 6 ≤ x ≤ 12}

41.If X = {a, b, c, d}

Y = {f, b, d, g}

Find X – Y and Y – X

Ans. X – Y = {a, b, c, d} – {f, b, d, g}
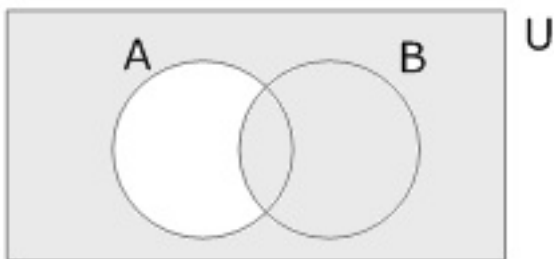
= {a, c}

Y – X = {f, b, d, g} – {a, b, c, d}

= {f, g}

42.If A and B are two given sets, Then represent the set (A – B)′, using Venn diagram.

Ans. (A – B)′ = ∪ - (A – B)

43.List all the element of the set A = { x : x is an integer x^2 ≤ 4}

Ans. {-2, -1, 0, 1, 2}

44.From the sets given below pair the equivalent sets.

A = { 1, 2, 3}, B = {x, y, z, t}, C = {a, b, c} D = {0, a}

Ans. A = {1, 2, 3} B = {a, b, c} are equivalent sets $\left[\because n(A) = n(B)\right]$

45.Write the following as interval

(i) {x : x ∈ R, - 4 < x ≤ 6}

(ii) {x : x ∈ R, 3 ≤ x ≤ 4}

Ans. (i) (-4, 6]

(ii) [3, 4]

46.If A = {3, 5, 7, 9, 11}, B = {7, 9, 11, 13}, C = {11, 13, 15} Find (A ∩ B) ∩ (B ∪ C)

Ans. A ∩ B = {7, 9, 11}

B ∪ C = {7, 9, 11, 13, 15}

(A ∩ B) ∩ (B ∪ C) = {7, 9, 11}

47.Write the set $\left\{\dfrac{1}{3}, \dfrac{3}{5}, \dfrac{5}{7}, \dfrac{7}{9}, \dfrac{9}{11}, \dfrac{11}{13}\right\}$ **in set builder form.**

Ans. $\left\{\dfrac{2n-1}{2n+1} : \text{ n is a natural no. less than } 7\right\}$

CBSE Class 12 Mathematics
Important Questions
Chapter 1
Sets

4 Marks Questions

1. In a group of 800 people, 500 can speak Hindi and 320 can speak English. Find

(i) How many can speak both Hindi and English?

(ii) How many can speak Hindi only?

Ans. (i) 20 people can speak both Hindi and English

(ii) 480 people can speak Hindi only

2. A survey shows that 84% of the Indians like grapes, whereas 45% like pineapple. What percentage of Indians like both grapes and pineapple?

Ans. 29% of the Indians like both grapes and pineapple.

3. In a survey of 450 people, it was found that 110 play cricket, 160 play tennis and 70 play both cricket as well as tennis. How many play neither cricket nor tennis?

Ans. Hint : ∪ – set of people surveyed

A – set of people who play cricket

B – set of people who play tennis

Number of people who play neither cricket nor tennis

= n[(A ∪ B)'] = n(U) – n(A ∪ B)

= 450 – 200

= 250

4. In a group of students, 225 students know French, 100 know Spanish and 45 know both. Each student knows either French or Spanish. How many students are there in the group?

Ans. There are 280 students in the group.

5. If A = [–3, 5), B = (0, 6] then find (i) A – B, (ii) A ∪ B

Ans. (i) [–3, 0]; (ii) [–3, 6]

6. 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.

Ans. Let A denote the set of students taking apple juice and B denote the set of students taking orange juice

n(U) = 400, n(A) = 100, n (B) = 150 n(A ∩ B) =75

n (A' ∩ B') =   n(A ∪ B)$'$

=n(∪) – n(A ∪ B)

= n(∪) – [n(A) + n(B) – n(A ∩ B)]

=400-100-150+75=225

7. A survey shows that 73% of the Indians like apples, whereas 65% like oranges. What % Indians like both apples and oranges?

Ans. Let A=set of Indian who like apples

B= set of Indian who like oranges

n (A)= 73, n (B) = 65

n(A ∪ B)=100

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

$= 73 + 65 - 100$

$= 38$

38% like both

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?

Ans. $n(M \cup P) = 20$, $n(M) = 12$

$n(M \cap P) = 4$

$n(M \cup P) = n(M) + n(P) - n(M \cap P)$

$n(P) = 12$

9. Let U = {1, 2, 3, 4, 5, 6} A = {2, 3} and B = {3, 4, 5}

Find $A' \cap B'$, $A \cup B$ and hence show that $(A \cup B)' = A' \cap B'$.

Ans. $A' = U - A$

$= \{1, 4, 5, 6\}$

$B' = U - B$

$= \{1, 2, 6\}$

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

$(A \cap B)' = U - (A \cup B)$

$= \{1, 6\}$

$A' \cap B' = \{1, 6\}$

Hence proved.

10. For any two sets A and B prove by using properties of sets that:

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

Ans. L. H. S. = $(A \cap B) \cup (A - B)$

$= (A \cap B) \cup (A \cap B') \quad \{\because (A - B) = (A \cap B')\}$

$= A \cap (B \cup B') \quad \{\text{Distributine Law}\}$

$= A \cap (U) \quad \{\because B \cup B' = U\}$

$= A$

11. If A and B, are two sets and U is the universal set such that n(U) = 1000, n(A) = 300, n(B) 300 and n(A $\cap$ B) = 200 find n $\left(A' \cap B'\right)$.

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

$= n(U) - n(A \cup B)$

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

$= 1000 - [300 + 300 - 200]$

$= 1000 - 400$

$= 600$

12. There are 210 members in a club. 100 of them drink tea and 65 drink tea but not coffee, each member drinks tea or coffee.

Find how many drink coffee, How many drink coffee, but not tea.

Ans. n (T) = 100

n (T – C) = 65

n (T ∪ C) = 210

n (T – C) = n (T) – n (T ∩ C)

65 = 100 – n (T ∩ C)

n (T ∩ C) = 35

n (T ∪ C) = n (T) + n (C) – n (T ∩ C)

210 = 100 + n (C) – 35

n (C) = 145.

Now,

$$n(C-T)=n(C)-n(C\cap T)$$

$$n(C-T)=145-35$$

$$n(C-T)=110$$

13. If P (A) = P (B), Show that A = B

Ans. $\forall$ a $\in$ A

$\Rightarrow \{a\} \subset$ A

$\Rightarrow \{a\} \in$ P(A)

$\Rightarrow \{a\} \in$ P(B) $\left[\because\ P(A) = P(B) \right]$

$\Rightarrow \{a\} \in$ B

$\Rightarrow a \subset$ B

$\Rightarrow$ A $\subset$ B

for all b $\in$ B

$\Rightarrow \{b\} \subset B$

$\Rightarrow \{b\} \in P(B) \left[\because P(A) = P(B)\right]$

$\Rightarrow \{b\} \in P(A)$

$\Rightarrow \{b\} \subset A$

$\Rightarrow b \in A$

$\Rightarrow B \subset A$

Thus $A \subset B$

and $B \subset A$

$\Rightarrow A = B$

14. In a class of 25 students, 12 have taken mathematics, 8 have taken mathematics but not biology. Find the no. of students who have taken both mathematics and biology and the no. of those who have taken biology but not mathematics each student has taken either mathematics or biology or both.

Ans. n (M) = 12, n (M – B) = 8

$n(M \cup B) = 25$

$n(M \cup B) = n(M) + n(B - M)$

$25 = 12 + n(B - M)$

$13 = n(B-M)$

$n(M \cup B) = n(M-B) + n(M \cap B) + n(B-M)$

$25 = 8 + n(M \cap B) + 13$

$n(M \cap B) = 4$

15. A and B are two sets such that n (A – B) = 14 + x , n (B – A) = 3x and n (A ∩ B) = x. Draw a Venn diagram to illustrate this information. If n (A) = n (B), Find (i) the value of

x (ii) n (A ∪ B)

Ans. (i) n (A) = n (A – B) + n (A ∩ B)

= 14 + x + x

= 14 + 2x

N (B) = n (B – A) + n (A ∩ B)

= 3x + x

= 4x

but n (A) = n (B) (Given)

14 + 2x = 4x

x = 7

(ii) n (A ∪ B) = n (A – B) + n (B – A) + n (A ∩ B)

= 14 + x+ 3x + x

= 14 + 5x = 14 + 5 ⋇ 7 = 49

16. If A and B are two sets such that A ∪ B= A ∩ B, then prove that A = B

Ans. Let a ∈ A, then a ∈ A ∪ B

Since A ∪ B = A ∩ B

a ∈ A ∩ B . So a ∈ B

Therefore A ⊑ B

Similarly if b ∈ B,

Then b ∈ A ∪ B. Since

A ∪ B = A ∩ B, b ∈ A ∩ B

So b ∈ A

Therefore, B ⊂ A

Thus A=B

17. Prove that if A ∪ B = C and A ∩ B = ϕ then A = C – B

Ans. C – B = A

$$= \left(A \cup B\right) - B$$

= (A ∪ B) ∩ B'

= B' ∩ (A ∪ B)

= (B' ∩ A) ∪ (B' ∩ B)

= (B' ∩ A) ∪ ϕ

= B' ∩ A

= A ∩ B'

= A – B

= A (Proved) $\left[\because A \cap B = \phi\right]$

18. 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?

Ans. Let C = the set of people who like cricket and

T = the set of people who like tennis.

n (C ∪ T) = 56, n (C) = 40

n (C ∩ T) = 10

n (C ∪ T) = n (C) + n (T) − n (C ∩T)

65 = 40 + n (T) − 10

n (T) = 35

Now,

$$n\left(T-C\right)=n\left(T\right)-n\left(T\cap C\right)$$

$$35-10$$

$$= 25$$

19. Let A, B and C be three sets A ∪ B = A ∪ C and A ∩ B = A ∩ C show that B = C

Ans. Let b ∈ B $\Rightarrow$ b ∈ A ∪B

$\Rightarrow$ b ∈ A∪C [∵ A∪B = A∪C
$\Rightarrow$ b ∈ A or b ∈C

if b ∈ C then B ⊂ C
if b ∈ A, then b ∈ A∩B [∵ A∩B = A∩C

$\Rightarrow$ b ∈ A∩C
$\Rightarrow$ b ∈ C $\Rightarrow$ B⊂C

thus in both cases B⊂C

Simiularly C⊂B
Hence B = C

20. If ∪ = {a, e, i. o. u}

A = {a, e, i}

And B = {e, o, u}

C = {a, i, u}

Then verify that A ∩ (B – C) = (A ∩ B) – (A ∩ C)

Ans. B – C = {e, o}

A ∩ (B – C) = e

A ∩ B = {e}

A ∩ C = {a}

(A ∩ B) – (A ∩ C) = e

Hence proved.

CBSE Class 12 Mathematics
Important Questions
## Chapter 1
Sets

6 Marks Questions

1. In a survey it is found that 21 people like product A, 26 people like product B and 29 like product C. If 14 people like product A and B, 15 people like product B and C, 12 people like product C and A, and 8 people like all the three products. Find

(i) How many people are surveyed in all?

(ii) How many like product C only?

Ans. Hint : Let A, B, C denote respectively the set of people who like product

A, B, C.
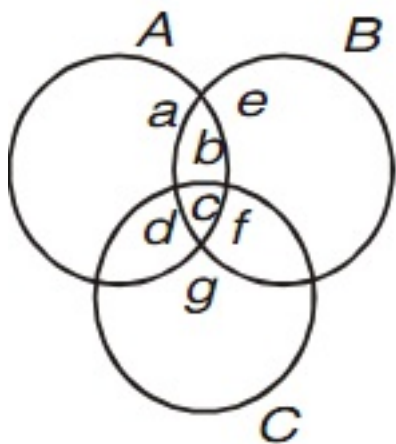
a, b, c, d, e, f, g – Number of elements in bounded region

**(i)** Total number of Surveyed people = a + b + c + d + e + f + g = 43

(ii) Number of people who like product C only = g = 10

2. A college awarded 38 medals in football, 15 in basket ball and 20 in cricket. If these medals went to a total of 50 men and only five men got medals in all the three sports,

how many received medals in exactly two of the three sports?

Ans. people got medals in exactly two of the three sports.

Hint :
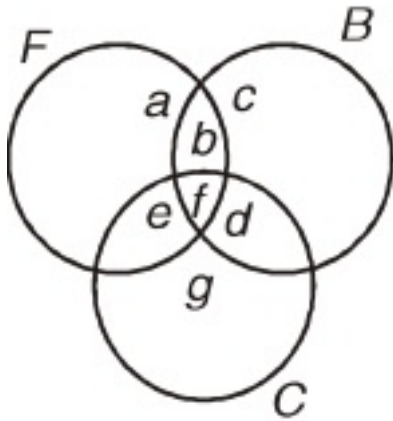
$f = 5$

$a + b + f + e = 38$

$b + c + d + f = 15$

$e + d + f + g = 20$

$a + b + c + d + e + f + g = 50$

we have to find $b + d + e$

3.There are 200 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 number of individuals exposed to

(1) chemical C_1 but not chemical C_2

(2) chemical C_2 but not chemical C_1

(4) chemical C_1 or chemical C_2

Ans. A denote the set of individuals exposed to the chemical C_1 and B denote the set of

individuals exposed to the chemical C_2

n(U) = 200, n(A) = 120, n(B) = 50, n(A$\cap$B) = 30

(i) n(A-B) = n(A) – n(A$\cap$B)

=120-30=90

(ii) n(B-A) = n(B) – n(A$\cap$B)

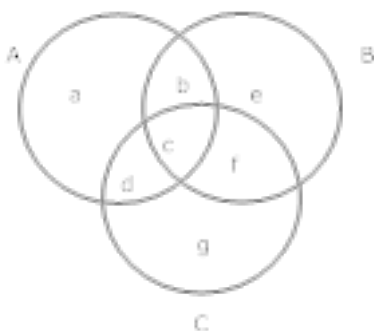=50-30 = 20

(iii) n(A∪B) =n(A)+ n(B)-n(A$\cap$B)

=120+50-30

=140

4.In a survey it was found that 21 peoples liked product A, 26 liked product B and 29 liked product C. If 14 people liked products A and B, 12 people like C and A, 15 people like B and C and 8 liked all the three products. Find now many liked product C only.

Ans. a + b + c + d = 21

b + c + e + f = 26

c + d + f + g = 29

b + c = 14, c + f =15, c + d = 12

c = 8

d = 4,c = 8,f = 7,b = 6,g = 10,e = 5,a = 3

like product c only = g = 10

5.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 medal in all the three sports, how many received medals in exactly two of the three sports?

Ans. Let A, B and C denotes the set of men who received medals in football, basketball and cricket respectively.

n (A) = 38, n (B) = 15, n (C) = 20

n (A $\cup$ B $\cup$ C) = 58 and n (A ∩ B ∩ C) = 3
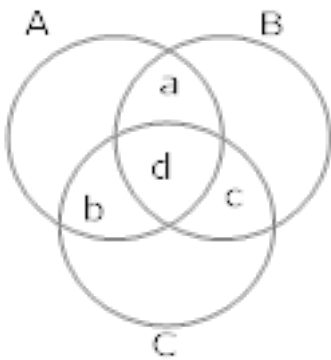
n (A $\cup$ B $\cup$ C) = n (A) + n (B) + n(C) – n (A ∩ B) – n (B ∩ C) – n (C ∩ A) + n (A ∩ B ∩ C)

58 = 38 + 15 + 20 – (a + d) – (d + c) – (b + d) + 3

18 = a + d + c + b + d

18 = a + b + c + 3d

18 = a + b + c + 3 $\times$ 3

9 = a + b + c

6.In a survey of 60 people, it was found that 25 people read news paper 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

newspaper. Find

(i) The no. of people who read at least one of the newspapers.

(ii) The no. of people who read exactly one news paper.

Ans. a + b + c + d = 25

b + c + e + f = 26

c + d + f +g = 26

c + d = 9

b + c = 11

c + f = 8

c = 3

f = 5, b = 8, d = 6, c = 3, g = 12

e = 10, a = 8

(i) a + b + c + d + e + f + g = 52

(ii) a + e + g = 30

7.These 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) Two classes meet at the same hour

(ii) The two classes met at different hours and ten students are enrolled in both the courses.

Ans. Let C be the set of students in chemistry class and P be the set of students in physics class.

n (C) = 20, n (P) = 30

(i) $C \cap P = \phi \Rightarrow n(C \cap P) = 0$

n $(C \cup P)$ = n (C) + n (P) + $n(C \cap P)$

$= 20 + 30 + 0$
$= 50$

(ii) n $(C \cap P) = 10$

n $(C \cup F)$ = n(C) + n(F)-n(C $\cap$ P)

$= 20 + 30 - 10$

$= 40$

8.In a survey of 25 students, it was found that 15 had taken mathematics, 12had 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 three subjects.
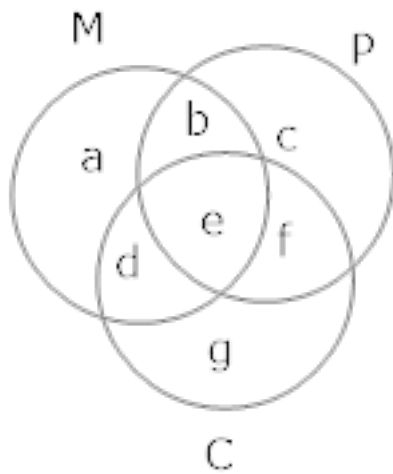
Find the no. of students that had taken

(i) only chemistry (ii) only mathematics (iii) only physics

(iv) physics and chemistry but mathematics (v) mathematics and physics but not chemistry (vi) only one of the subjects (vii) at least one of three subjects

(viii) None of three subjects.

Ans. n(M)=a+b+d+e=15

$n(P) = b + c + e + f = 12$

$n(C) = d + e + f + g = 11$

$n(M \cap P) = b + e = 9$

$n(M \cap C) = d + e = 5$

$n(P \cap C) = e + f = 4$

$e = 3$

so $b = 6$, $d = 2$, $f = 1$

$a = 4$, $g = 5$, $c = 2$

(i) $g = 5$,
(ii) $a = 4$,

(iii) $c = 2$
(iv) $f = 1$,

(v) $b = 6$,
(vi) $g + a + c = 11$

(vii) $a + b + c + d + e + f + g + = 23$
(viii) $25 - (a + b + c + d + e + f + g) = 25 - 23 = 2$

9. In a survey of 100 students, the no. 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

(i) How many students were studying Hindi?

(ii) How many students were studying English and Hindi?

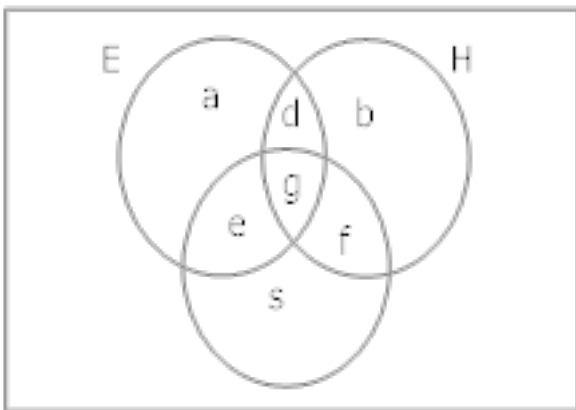**Ans.** ∪ = 100, a = 18

a + e = 23, e + g = 8

a + e + g + d = 26

e + g + f + c = 48

g + f = 8

so, e = 5, g = 3, d = 0, f = 5, c = 35

(i) d + g + f + b = 0 + 3 + 5 + 10 = 18

(ii) d + g = 0 + 3 = 3

10. In a class of 50 students, 30 students like Hindi, 25 like science and 16 like both.

Find the no. of students who like

(i) Either Hindi or science

(ii) Neither Hindi nor science.

Ans. Let $\cup$ = all the students of the class ,H = students who like Hindi

S = Students who like Science

(i) n (H $\cup$ S) = n (H) + n (S) – n (H $\cap$ S)

= 30 + 25 – 16

= 39

(ii) n ($H' \cap S'$) = n (H $\cup$ S$)'$

= $\cup$ - n (H $\cup$ S)

= 50 – 39

= 11

11.In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C. 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three papers. Find the no. of families which buy
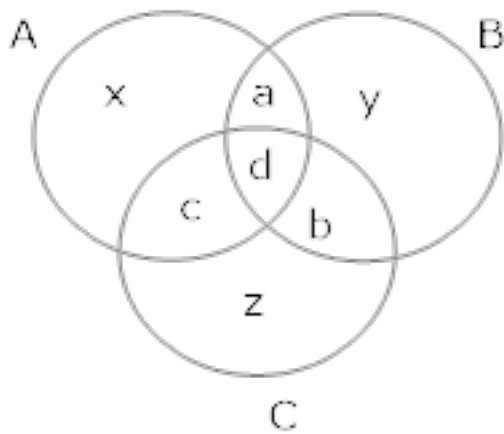
(i) A only (ii) B only (iii) none of A, B, and C.

Ans. x + a + c + d = 4000

y + a + d + b = 2000

z + b + c + d = 1000

a + d = 500, b + d = 300, C + d = 400 d = 200

On Solving a = 300, b = 100, c = 200

(i) x = 4000 – 300 – 200 – 200 = 3300

(ii) y = 2000 – 300 – 200 – 100 = 1400

(iii) z = 1000 – 100 – 200 – 200 = 500

None of these = 10,000 – (3300 + 1400 + 500 + 300+ 100 + 200 + 200)

= 10,000 – 6000

= 4000

12.Two finite sets have m and n elements. The total no. of subsets of the first set is 56 more than the total no. of subsets of second set. Find the value of m and n.

Ans. Let A and B be two sets having m and n elements respectively

no of subsets of A = 2^m

no of subsets of B = 2^n

According to question

$2^m = 56 + 2^n$

$2^m - 2^n = 56$

$2^n (2^{m-n} - 1) = 56$

$2^n (2^{m-n} - 1) = 2^3 (2^3 - 1)$

$2^n = 2^3$

$n = 3$

$m - n = 3$

$m - 3 = 3$

$m = 6$