ULTIMATE MATHEMATICS

Topic : ..... Date : ..... Page No. : .....

BY: AJAY MITTAL - 9891067390

SETS. CLASS NO: 3 (S-3)

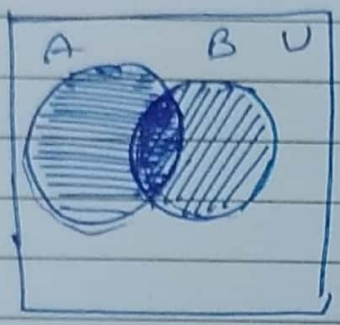
Topic: Word problems

Formula

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

$\cup$: or, either-or, atleast one

$\cap$: and, both, common, as well as, simultaneously occur.

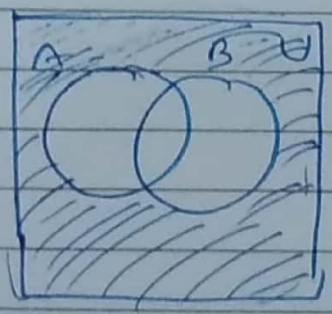


(2) $n(A' \cap B') = n(U) - n(A \cup B)$

A' : not

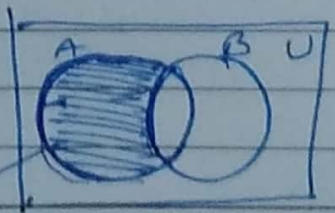
$\cap$: neither-nor

$\cup$: either-or



(3) $n(A \cap B') = n(A) - n(A \cap B)$

$A \cap B'$: A but not B, only A, A alone



$A - B = A \cap B'$

5 had taken mathematics and chemistry, 9 had taken mathematics and physics, 4 had taken physics and chemistry and 3 had taken all the three subjects. Find the number of students that had

(i) only chemistry
(ii) physics and chemistry but not mathematics
(iii) only one of the subjects
(iv) atleast one of the three subjects
(v) none of the subjects
(vi) exactly two of the subjects

Qn 5 → In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% buy 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 newspapers. Find the number of families which buy (i) A only (ii) B only (iii) none of A, B and C

Qn 6 → In a survey of 100 students, the number of students studying the various languages were found to be:
English only 18, English but not Hindi 23, English and Sanskrit 8, English 26, Sanskrit 48,

Sanskrit and Hindi 8, no language 24.
Find
(i) How many Students were Studying Hindi?
(2) How many Students were Studying English and Hindi?

Q.No.7 → A survey of 500 television viewers produced the following information; 285 watch football, 195 watch hockey, 115 watch basketball, 45 watch football and basketball, 70 watch football and hockey, 50 watch hockey and basketball, 50 do not watch any of the three games.
(1) How many watch all the three games?
(2) How many watch exactly one of the three games?

Q.No.8 → In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find:
(1) how many drink tea and coffee both
(2) How many drink coffee but not tea

Q.No.9 → out of 500 ~~cars~~ car owners investigated, 400 owned Maruti car and 200 owned Hyundai cars 50 ~~were~~ owned both cars.
Is this data correct?

Q.No.10 → If A and B be two sets containing 3 and 6 elements respectively, what can be the minimum number of elements in A∪B?
Maximum number of elements in A∪B?
~~Minim~~ Maximum number of elements in A∩B?

Soln Let A → no of students taking tea

B → " " " taking coffee

Given $n(U) = 600$

$n(A) = 150$

$n(B) = 225$

$n(A \cap B) = 100$

To find $n(A' \cap B') = ?$

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

$= 600 - [n(A) + n(B) - n(A \cap B)]$

$= 600 - [225 + 150 - 100]$

$= 600 - 275$

$n(A' \cap B') = 325$

∴ 325 students take neither Tea nor Coffee

Q.No 3 → In a class of 35 students, 24 like to play cricket and 16 like to play football.

" Also each student likes to play atleast one of the two games". How many students like to play both cricket and football?

Sol $n(A \cup B) = 35$

$n(A) = 24$

$n(B) = 16$

To find $n(A \cap B) = ?$

Q.N.4 → In a class of 35 students, 17 have taken mathematics, 10 have taken maths but not economics, find the number of students who have taken both mathematics and economics and the number of students who have taken economics but not mathematics, if it is given that each student has taken either mathematics or economics or both.

Solution = Let M → denotes the no of students who have taken mathematics

E → ------ economics

Given =
$$n(M \cup E) = 35$$
$$n(M) = 17$$
$$n(M \cap E') = 10$$

to find
$$n(M \cap E) = ?$$
$$n(E \cap M') = ?$$

we have
$$n(M \cap E') = n(M) - n(M \cap E)$$
$$10 = 17 - n(M \cap E)$$
$$\Rightarrow n(M \cap E) = 7$$

we have =
$$n(M \cup E) = n(M) + n(E) - n(M \cap E)$$
$$35 = 17 + n(E) - 7$$
$$n(E) = 25$$

we have =
$$n(E \cap M') = n(E) - n(M \cap E) = 25 - 7 = 18$$

Qn. 6 → 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 and 3 read all three newspapers. find the number of people who read

(1) atleast one newspaper

(2) exactly one newspaper

(3) exactly two newspaper

(4) none of the newspaper

(5) H and T but not I

(6) only T

(7) T and I but not H

Sol: Let H → denote no. of people who Read newspaper H

T → - - - - - - - - - - - - - - - - T

I → - - - - - - - - - - - - - - - - I

Given $n(H) = 25 = a+b+e+d$

$n(T) = 26 = b+c+e+f$

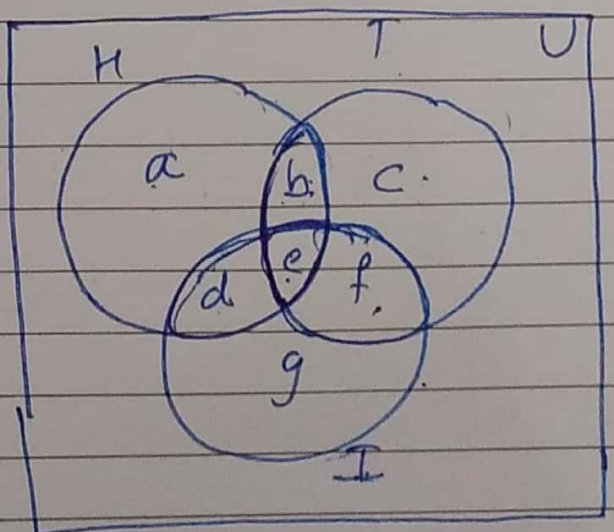
$n(I) = 26 = d+e+f+g$

$n(H \cap I) = 9 = d+e$

$n(H \cap T) = 11 = b+e$

$n(T \cap I) = 8 = e+f$

$n(H \cap T \cap I) = 3 = e$



$e=3$, $f=5$, $b=8$, $d=6$, $g=12$

$c=10$; $a=8$

(1) n(atleast one newspaper) $= a+b+c+d+e+f+g$
$= 52$

(2) n(exactly one) $= a+c+g$

(3) n(exactly two) $= b+d+f$

(4) n(none of the newspaper) $= 60-52 = 8$

(5) n(H and T but not I) $= b$

WORKSHEET NO: 3 (S-3)

Topic : SETS Date. : Page No. : (1)

Q No. 1 → 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

(i) Chemical C_1 but not chemical C_2
(ii) Chemical C_2 but not chemical C_1
(iii) Chemical C_1 or chemical C_2
(iv) neither C_1 nor C_2

Q No. 2 → In a survey of 700 students in a college, 180 were listed as drinking limca, 275 as drinking Miranda and 95 were listed as both drinking Limca as well as Miranda. Find how many students were drinking neither limca nor Miranda?

Q No. 3 → There are 40 students in a chemistry class and 60 students in a physics class. Find the number of students which are either in physics class or chemistry class in the following cases:

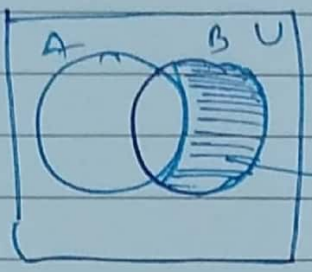
(i) the two classes meet at the same hour
(ii) the two classes meet at different hours and 20 students are enrolled in both the subjects.

Q No. 4 → In a survey of 25 students, it was found that 15 had taken mathematics, 12 had taken physics and 11 had taken chemistry.

CLASS 5-3

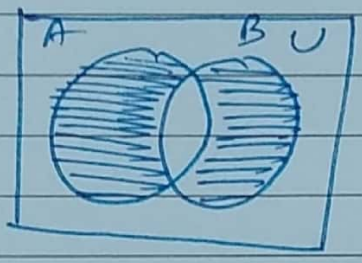
Topic : SETS Date. : Page No. : (2)

(4) $n(B \cap A') = n(B) - n(A \cap B)$

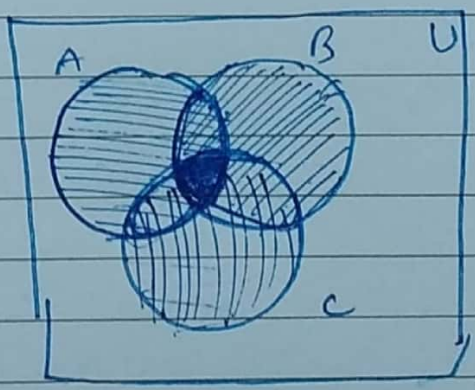


$B - A = B \cap A'$

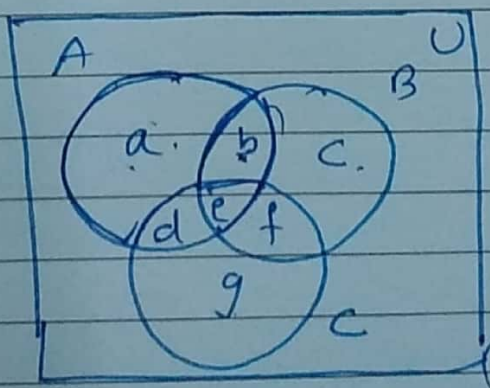
(5) $n(\text{exactly one}) = n(A \cap B') + n(B \cap A')$



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



IMP



(·) atleast one = a+b+c+d+e+f+g

(·) exactly one = a+c+g

(·) exactly two = b+d+f

(·) all three = e

CLASS : S-3

Topic : SETS | Date. : | Page No. : (3)

Q.No 1 → In a school there are 20 teachers who teach mathematics or physics, 12 teach mathematics and 4 teach both physics and mathematics. How many teach physics?

Sol: Let A → denotes the no. of teachers who teach mathematics

B → " " " " " " physics

Given: $n(A \cup B) = 20$

$n(A) = 12$

$n(A \cap B) = 4$

to find: $n(B) = ?$

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

$20 = 12 + n(B) - 4$

$n(B) = 12$

∴ 12 teachers teach physics Ans

Q.No 2 → 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?

Worksheet 5-3

Topic : SETS Date. : Page No. : 4

← ANSWERS →

Qn 1 (1) 90 (2) 20 (3) 140 (4) 60

Qn 2 → 340

Qn 3 → (1) 100 (2) 80

Qn 4 → (1) 5 (2) 1 (3) 11 (4) 23 (5) 2 (6) 9

Qn 5 → (1) 3300 (2) 1400 (3) 4000

Qn 6 → (1) 18 (2) 3

Qn 7 → (1) 20 (2) 325

Qn 8 → (1) 16 (2) 20

Qn 9 → Incorrect

Qn 10 → (1) $\min(A \cup B) = 6$
(2) $\text{Max}(A \cup B) = 9$
(3) $\text{Max}(A \cap B) = 3$

— x —