

Sum: 4

A Survey discloses that 20 students are interested in music, 19 are interested in Photography and 10 like sports.

Further 15 are interested in music and photography, five are interested in Music and sports, 3 are interested in photography and sports and 2 are interested in all the 3. Find out the total number of students surveyed.

Soln:

Number of Students interested in Music = $n(M)$
 $= 20$

Number of Students interested in photography
 $= n(P) = 19.$

Number of Students interested in sports
 $= n(S) = 10.$

Number of Students interested in both
music and photography
 $= n(M \cap P) = 15.$

Number of Students interested in both
Music and sports = $n(M \cap S) = 5$

Number of students interested in both

Photography and sports = $n(P \cap S) = 3$

Number of students interested in all three
Photo, sports and Music = $n(P \cap S \cap M) = 2$

$$\begin{aligned} \text{W.k.T } n(M \cup P \cup S) &= n(m) + n(p) + n(s) - \\ &\quad n(m \cap p) - n(p \cap s) - n(m \cap s) + \\ &\quad n(m \cap p \cap s) \end{aligned}$$

$$= 20 + 19 + 10 - 15 - 5 - 3 + 2$$

$$= 51 - 23$$

$$n(m \cup p \cup s) = 28$$

Hence, the total number of students survey is 28.

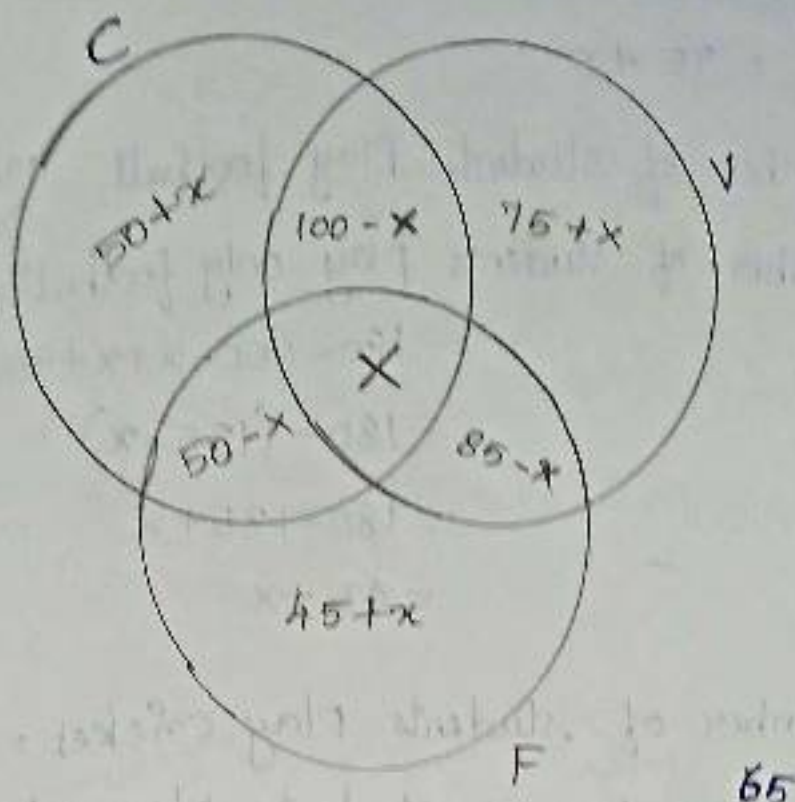
Exm: 5 (ix)

In a school of 500 students, 65 do not play any game, 200 play Cricket, 180 play football and 260 Volley Ball, 50 play both Cricket and football, 85 play both football and Volley ball and 100 play Volleyball and Cricket. find

- i) How many students play all the three?
- ii) How many play cricket but not others?
- iii) How many play football only?
- iv) How many play volley Ball only?
- v) How many play only one Game?

Show by Venn Diagram.

Soln: Let C, f and V represents the sets consisting of students playing Cricket, football and Volley ball respectively.



Since, The number of students playing all the play is not given, with take a Count as X i.e) $n(C \cap F \cap V) = X$

No of Students play Volley ball and Cricket = 100

No of student play Football and Volleyball

Area common to V and C but not F has 100-x students

No of students play Football and Volleyball = 85

Area Common to V and F but not C has 85-x students

No of Students cricket and Football = 50

Area Common to C and F but not V has 50-x students

No of students play Volleyball = 260

$\therefore$ Num of student play only Volleyball =

$$\begin{aligned}
 &= 260 - (100 - x + x + 85 - x) \\
 &= 260 - 185 + x \\
 &= 75 + x
 \end{aligned}$$

6/2/23 Number of students play football = 180

$$\begin{aligned}
 \text{Number of students play only football} &= \\
 &180 - (50 - x + x + 85 - x) \\
 &= 180 - (135 - x) \\
 &= 180 - 135 + x \\
 &= 45 + x
 \end{aligned}$$

Number of students play cricket = 200

$$\begin{aligned}
 \therefore \text{Number of students play only cricket} &= \\
 &= 200 - (50 - x + x + 100 - x) \\
 &= 200 - (150 - x) \\
 &= 200 - 150 + x \\
 &= 50 + x
 \end{aligned}$$

Number of students play } = \text{Total no. of } \left. \begin{array}{l} \text{students} \\ \text{do not} \\ \text{play any} \\ \text{of the game} \end{array} \right\} \text{ atleast one game}

$$\left. \begin{array}{l} 50 + x + 100 - x + 7x + x \\ + 50 - x + x + 85 - x + 45 + x \end{array} \right\} = 500 - 65$$

$$405 + x = 435$$

$$x = 435 - 405$$

$$x = 30$$

∴ Number of students playing on the game = 30.

ii) Number of student playing Cricket but not others = $50 + x = 50 + 30 = 80$

iii) No. of Students playing only Football = $45 + x = 45 + 30 = 75$

iv) No. of students playing Volleyball = $75 + x = 75 + 30 = 105$

v) No. of Students Play only one game
= $80 + 75 + 105$
= 260