BACKGROUND OF THE AUTHOR

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THE MATHEMATICS

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TOPIC: SET CONCEPTS

GENERAL APPLICATION OF SETS

1. A primary seven class of 56 pupils voted for Tom (T) and Alice (A) as follows:

(2n+5) pupils voted Tom only, (3n-15) pupils voted Alice only and 2n pupils voted for both Tom and Alice while the number of pupils who did not vote for any of the two candidates is twice the number of those who voted for both candidates.

a) Complete the Venn diagram below.

$$n(\Sigma) = 56$$

$$n(TUA)' = 2(2n)$$
$$= 4n$$
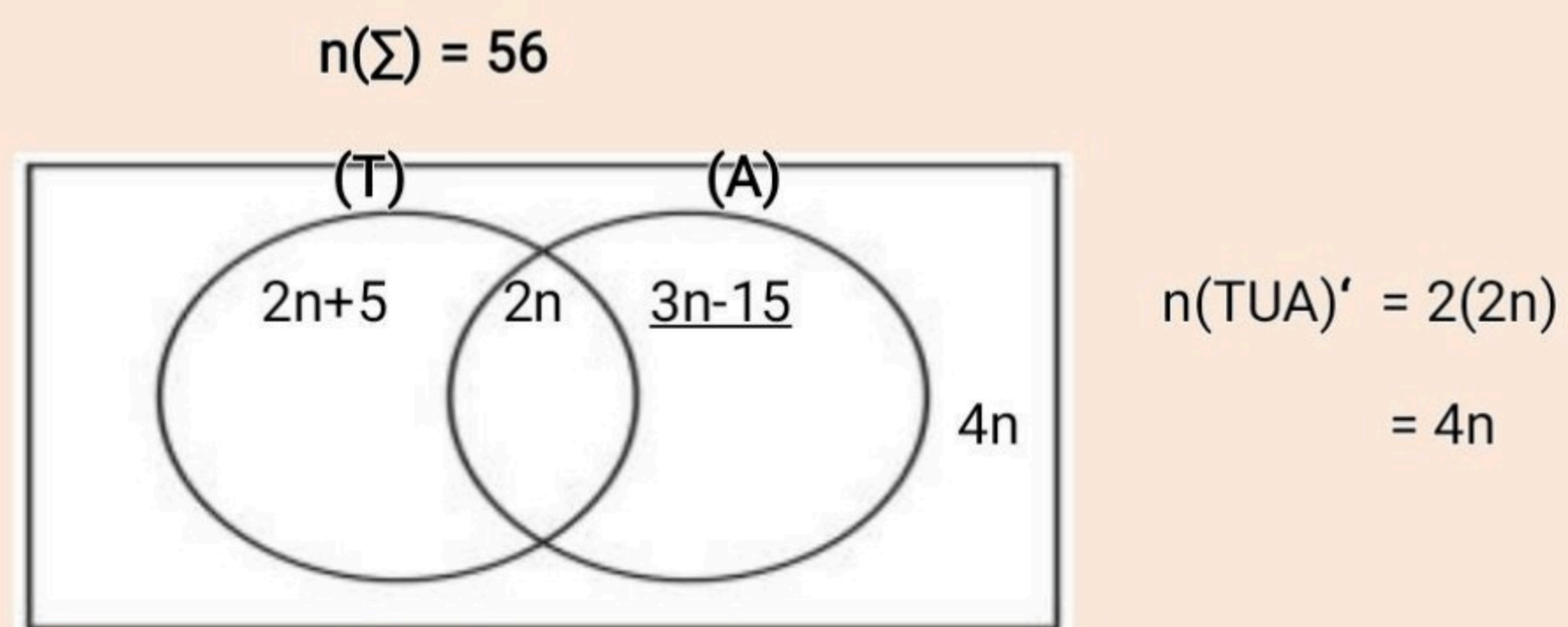
b) How many pupils voted only one candidate?

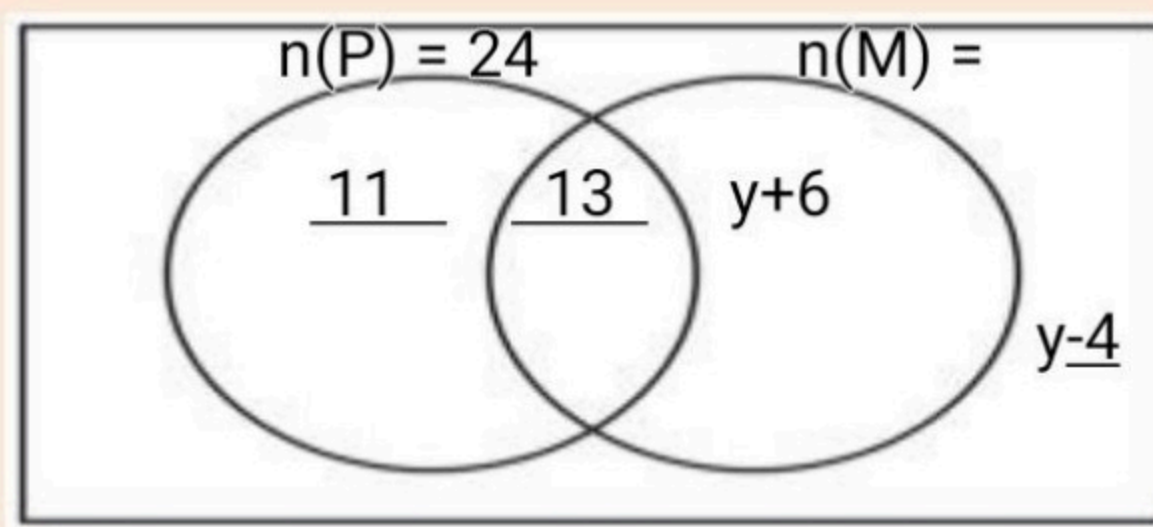|	
2n + 5 + 2n + 3n - 15 + 4n = 56	**Only one candidate**
(2n+2n+3n+4n) + 5 - 15 = 56	n(T) only + n(A) only
11n - 10 = 56	(2n+5) + (3n-15)
11n - 10 + 10 = 56 +10	(2 x n) + 5 +(3 x n) -15
11n = 66	(2 x 6)+5 +(3 x 6) - 15
$\dfrac{11n}{11} = \dfrac{66}{11}$	(12+5) + (18-15)
<u>n=6</u>	17+ 3

=20 Candidates voted only one candidate

2. In a P7 class, 24 pupils drink Pepsicola(P), (y + 6) drink Mirinda (M) only, 1 3 drink both pepsicola and mirinda while (y−4) drink neither of the two types of soda.

n(P) = 24   n(M) =

11   13   y+6

y-4

n(P) only = 24-13

= 11

(b) .Given that the number of pupils who drank only mirinda is thrice those who drank none of the two drinks, find the value of y.
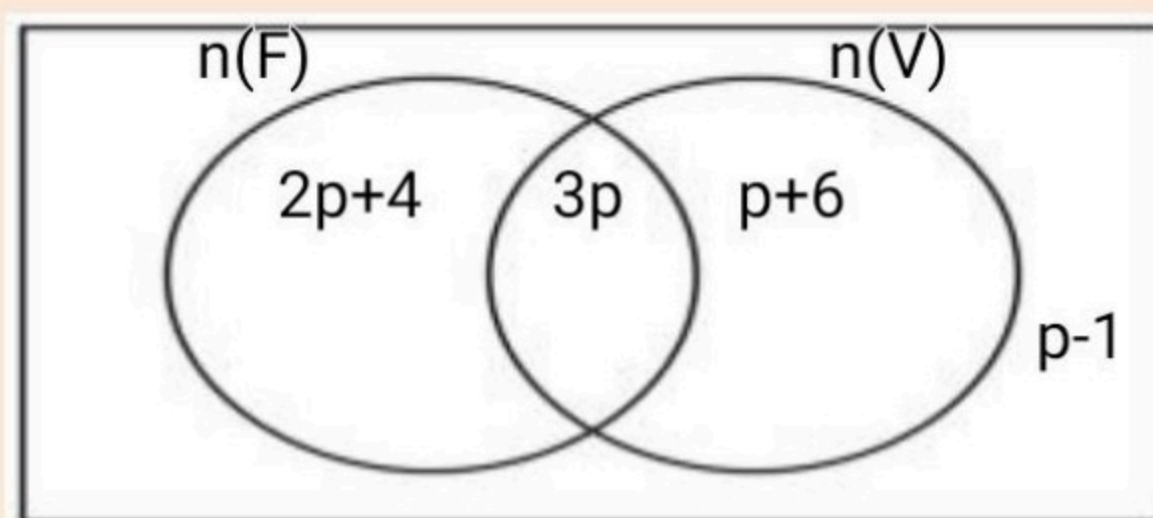
$$3[\, n(PUM)' \,] = n(M) \text{ only} \qquad 2y = 18$$

$$3(y-4) = y+6 \qquad\qquad \frac{2y}{2} = \frac{18}{2}$$

$$3y-12 = y+6 \qquad\qquad y\underline{=9}$$

$$3y-y = 6+12$$

3. On a sports day, players played football(F) and volleyball(V) as shown in the Venn diagram below. Study and use the Venn diagram to answer the questions that follow.

n(F)   n(V)

2p+4   3p   p+6

p-1

If 18 players did not play volleyball, how many players played volleyball only?

n(F) only + n(FUV)' = 18   3p = 15   (5+6)

(2p+4) + (p-1) = 18 $\frac{3p}{3} = \frac{15}{3}$ = **11 Players played volleyball only**

(2p +p) + (4 - 1) = 18   p = 5

3p + 3 = 15   **Volleyball only**

3p + 3 - 3 = 18 - 3   (p+6)

4. In a class of 50 boys, 29 play football (F), 2k play hockey (H) but not football,5 play both football and hockey while (k-6) play none of the two game.
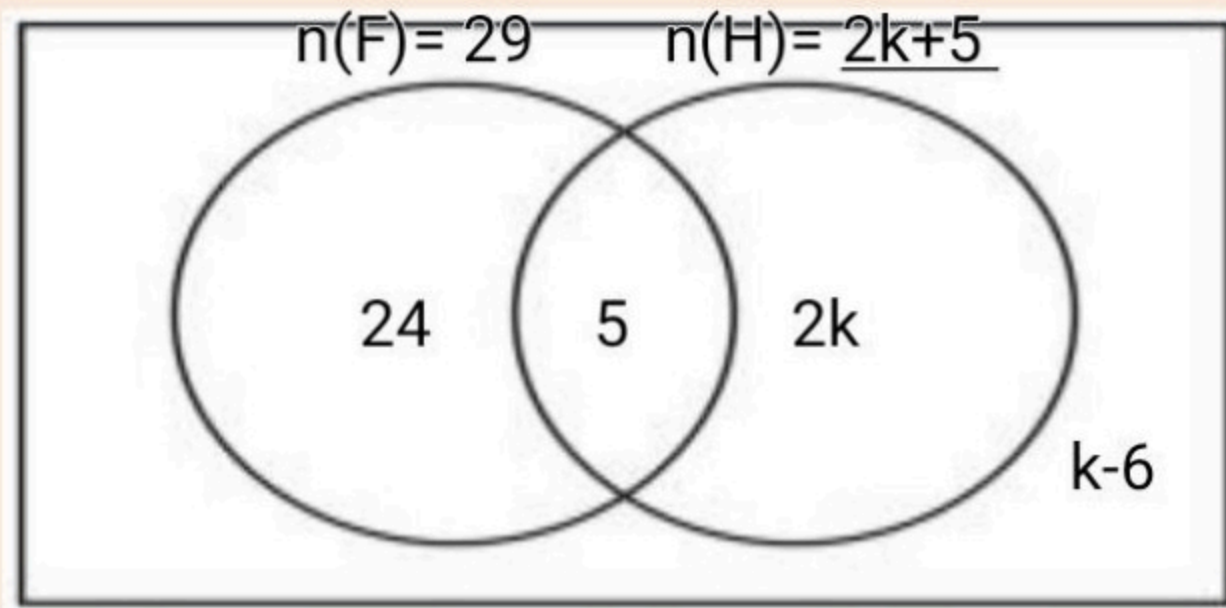
a)Use the above information to complete the Venn diagram.

$$n(\Sigma) = 50 \qquad\qquad n(F) \text{ only} = 29\text{-}5$$

n(F)= 29   n(H)= 2k+5

24   5   2k

k-6

$$= 24$$

$$n(H) \text{ only} = 2k$$

b) Find the value of k.

24 + 5 + 2k + k - 6 = 50   3k + 23 -23 = 50 - 23

(2k + k) + (24 + 5) -6 = 50   3k = 27

3k + 29-6 = 50 $\dfrac{3k}{3} = \dfrac{27}{3}$

3k + 23 = 50   <u>k = 9</u>

3k = 27

c) Find the number of those who play hockey.

n(H) = 2k+5

(2 x k) + 5

(2 x 9) + 5

18 + 5

= <u>23 boys played hockey</u>

5. The venn diagram below represents the number of tourists who visited source of the Nile   (N) and Hot loaf (H)
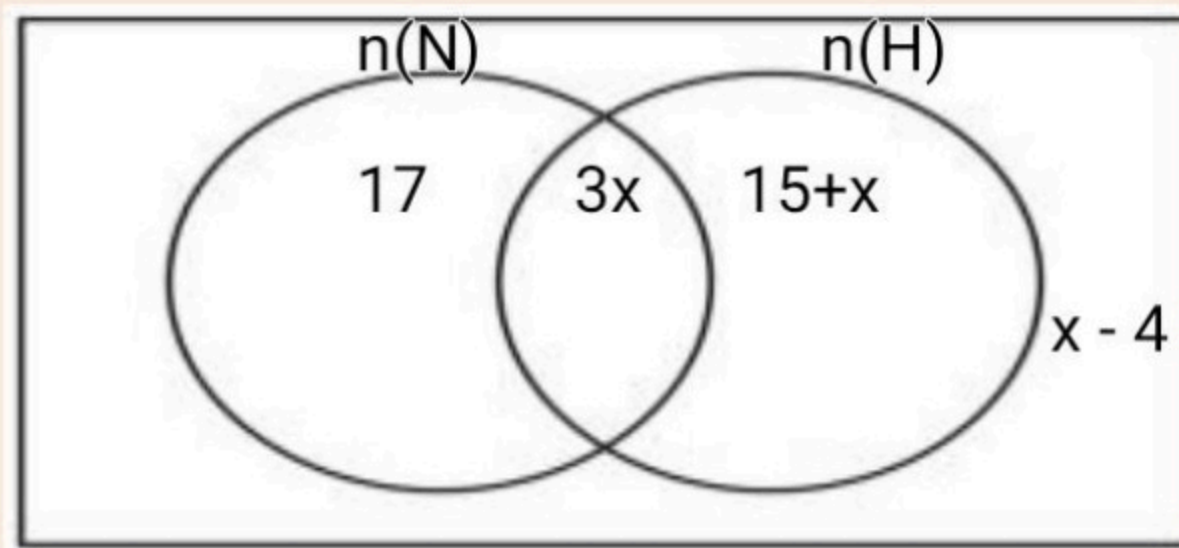
(a) If sixty tourists visited either source of the Nile (N) or Hot loaf (H), calculate the total number of tourists represented in the venn diagram above.

Note that the word **Either** .... **or** simply means n(NUM) but not n(NUM)'

Hence $17 + 3x + 15 + x = 60$ **Total number of tourists**

$(3x + x) + (17 + 15) = 60$ $17 + 3x + 15 + x + x - 4$

$4x + 32 = 60$ $(3x + x + x) + (17 + 15) - 4$

$4x + 32 - 32 = 60 - 32$ $5x + (32 - 4)$

$4x = 28$ $5x + 28$

$$\frac{4x}{4} = \frac{28}{4}$$ $(5 \times 7) + 28$

$x = 7$ $35 + 28$

                                              $\underline{= 63 \text{ Tourists}}$

(b) Find the probability of selecting a tourist at random who visited neither source of the Nile nor Hot loaf.   **Note that Neither** .... **nor** means n(NUH)'

$(x - 4)$ Total chance = 63

$(7 - 4)$ $\text{Prob} = \dfrac{\text{Desired chance}}{\text{Total chance}}$
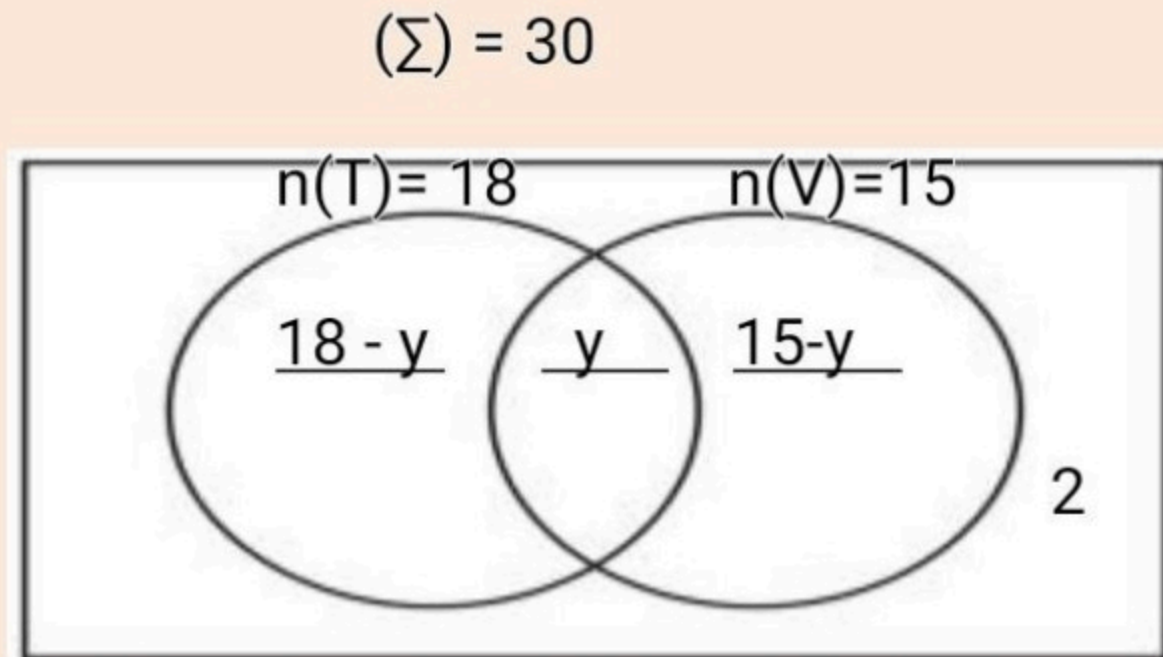
$= 3$ $\text{Prob} = \dfrac{3}{63}$

Desired chance = 3

6. In a class of 30 pupils, 18 pupils play tennis (T), 15 play volleyball (V), y pupils play both games while 2 play neither of the games.

a). Use the above information to complete the venn diagram.

(Σ) = 30   n(T) only =(18-y)

n(T)= 18   n(V)=15   n(V) only =(15-y)

18 - y   y   15-y   n(T$\cap$V) = Y

2   n(T$\cup$V)' = 2

(b) . Find the value of y

$$18 - Y + Y + 15 - Y + 2 = 30$$

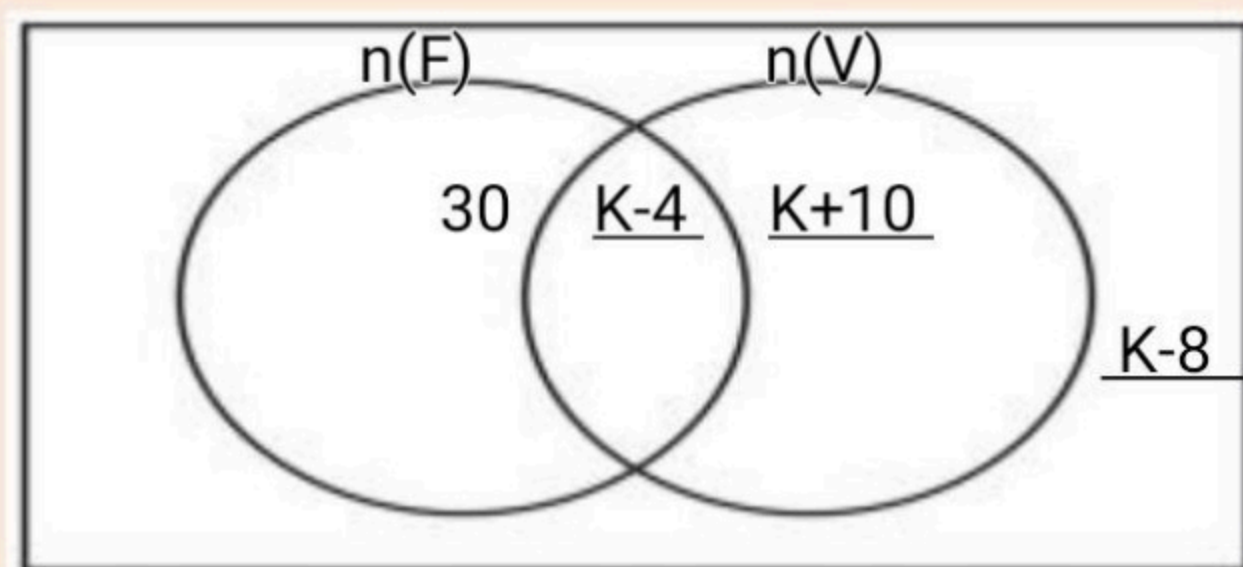$$(18 + 15 + 2) - Y = 30$$

$$35 - Y = 30$$

$$35 - 35 - Y = 30 - 35$$

$$-Y = -5$$

$$\frac{-Y}{-1} = \frac{-5}{-1}$$

$$\underline{Y = 5}$$

7. In a class, 30 pupils belong to the Football (F) club only, (k-4) pupils belong to both Football and Volley ball (V) clubs, (k-8) do not belong to any of the two clubs while (k +10) pupils belong only to the volley ball club.

(a) Complete the venn diagram below using the above information.

n(F)   n(V)   n(F$\cap$V) = (k-4)

30   K-4   K+10   n(V) only= (k+10)

K-8   n(F$\cup$V)' = (K-8)

(b) . Given that the number of pupils that belong to volleyball only is twice those who don't play any of the two games, find the value of k.

$$2[n(FUV)'] = n(V) \text{ only}$$

$$2(k-8) = k+10$$

$$2k - 16 = k+10$$

$$2k - k = 10+16$$

$$\underline{K= 26}$$

(c) How many pupils belong to the football club?
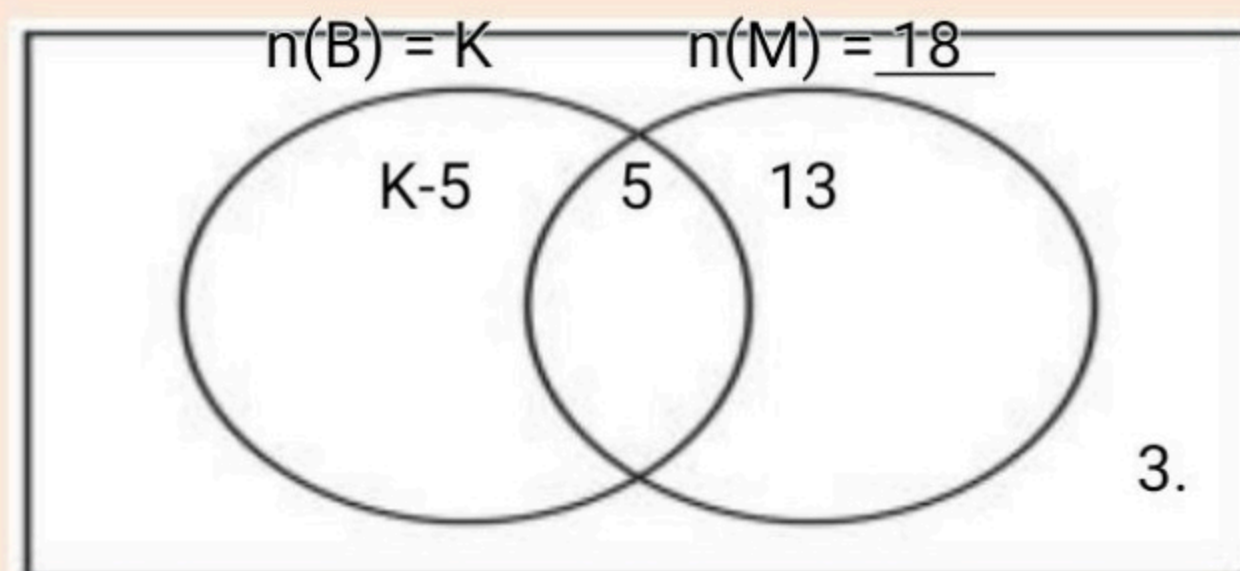
$$\text{Football club} = 30+(k-4)$$

$$30 + (26 - 4)$$

$$30 + 22$$

$$= \underline{52 \text{ pupils belong to the football club.}}$$

8. In a group of farmers who grow beans (B) and maize (M),13 farmers grow maize only, 5 farmers grow both types of crops while 3 farmers grow none of the two crops.

(a) Complete the Venn diagram below using the above information.

n(M) only = 13

n(BUM)' = 3

n(M) = (5 + 13)

= 18

n(B) only= (k-5)

(c) If 20 farmers don't grow maize, how many farmers grow beans?

Note that those who don't grow maize , grow other crops

n(B) only + n(BUM)' = 20   k-2+2 = 20 + 2

(K-5) + 3 = 20   k= 22

K +3 - 5 = 20   <u>22 farmers grow beans.</u>

K-2 = 20

(d) How many farmers are in the group altogether?

Total number of farmers = n(B) only + n(B∩M)+ n(M) only + n(BUM)'

(K-5) + 5 +13 + 3

(22-5) + 21

17 + 21

= <u>38 Farmers.</u>