

**ST ANTHONY  
NURSERY AND  
PRIMARY SCHOOL-  
KAJJANSI.  
PRIMARY SEVEN,  
MATHEMATICS  
LESSON NOTES.**

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## SETS

### Review

- Subsets
- Listing subsets
- Finding number of subsets
- Finding number of proper subsets
- Finding number of elements given subsets and proper subsets
- Describing parts of a Venn diagram.
- Representing information on a Venn diagram

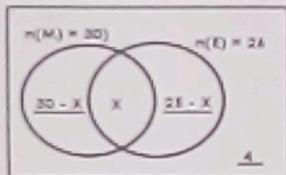
### SOLVING PROBLEMS USING A VENN DIAGRAM

A). Given the interesting as the unknown

#### Examples |

In a class of 40 pupils, 30 like math (M), 25 like English (E), X pupils like both subjects and 4 pupils like neither.

Complete the Venn diagram.



b) Find the value of  $X$ .

#### solution

$$30 - X + X + 25 - X + 4 = 40$$

$$30 + 25 + 4 - X = 40$$

$$59 - X = 40$$

$$59 - 59 - X = 40 - 59$$

$$-X = -19$$

$$\frac{-X}{-1} = \frac{-19}{-1}$$

$$X = 19$$

b) How many pupils like only one subject?

**Solution**

$$\begin{aligned}\text{Only one} &= n(m) \text{ only} + n(E) \text{ only.} \\ &= 30 - X + 25 - X \\ &= 30 - 19 + 25 - 19 \\ &= 11 + 6 \\ &= 17 \text{ pupils}\end{aligned}$$

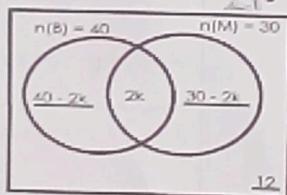
c) Find the probability of picking a pupil who does not like English from the class at random.

**Solution**

$$\begin{aligned}\text{Prob} &= \frac{n(E)}{n(P)} - \text{pupils who do not like English} \\ &\quad n(P) - \text{universal} \\ &= \frac{25 - X + 4}{40} \\ &= \frac{(25 - 19) + 4}{40} \\ &= \frac{6 + 6}{40} \\ &= \frac{12}{40}\end{aligned}$$

In a village of 60 farmers, 40 grow beans (B), 30 grow maize (M) and 2k farmers grow both crops while 12 do not grow any of the mentioned.

a) Complete the Venn diagram below.



b) Find the value of K.

$$\begin{aligned}40 + 30 + 12 - 2k &= 60 \\ 82 - 2k &= 60 \\ 82 - 82 - 2k &= 60 - 82 \\ -2k &= -22 \\ -2 &= -2 \\ K &= 11\end{aligned}$$

$$12 - (k + 2) + 3$$

$$12 - (3 + 2) + 3$$

$$12 - 5 + 3$$

$$7 + 3$$

$$10$$

the probability of

$$n(E)$$

$$n(p)$$

$$\underline{12 - (k + 2)}$$

$$28$$

$$\underline{12 - (3 + 2)}$$

$$28$$

$$\underline{12 - 5}$$

$$28$$

$$\underline{7}$$

$$28$$

a class of 36 pupils,  
meat and fish whi

ete the Venn diagram

$$n(E) = 36$$

$$= 18$$

$$n(F) = 20$$

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c) How many pupils do not like English?

Soln.

$$\begin{aligned} n(E) &= 12 - (k + 2) + 3 \\ &= 12 - (3 + 2) + 3 \\ &= 12 - 5 + 3 \\ &= 7 + 3 \\ &= 10 \end{aligned}$$

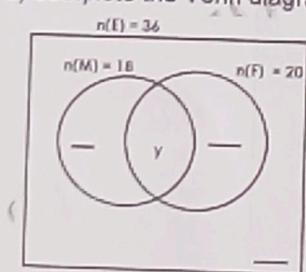
d. Find the probability of picking a person who likes math only.

$$\begin{aligned} \text{Prob} &= \frac{n(E)}{n(p)} \\ &= \frac{12 - (k + 2)}{28} \\ &= \frac{12 - (3 + 2)}{28} \\ &= \frac{12 - 5}{28} \\ &= \frac{7}{28} \end{aligned}$$

Activity:

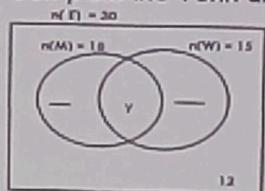
1. In a class of 36 pupils, 18 like meat (M), 20 like fish (F) and y pupils like both meat and fish while 3 pupils don't like any of the mentioned.

a) complete the Venn diagram below.

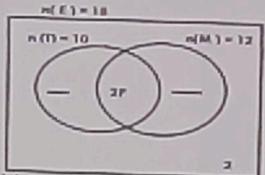


- b) Find the value of  $y$ .
- c) How many pupils like one type of food only?
- d) Find the probability of picking a pupil who likes fish only?

2. At a birth day party attended by 30 guests, 18 took soda (S) and 15 took water (W). some guests took both and 12 guests did not take any drink.
- a) Complete the Venn diagram below

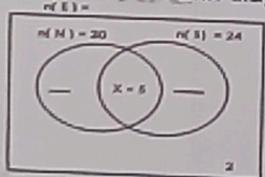


- b) How many guests took both types of drink?
- c) How many guests did not take water?
3. In a village of 18 farmers, 10 grow tobacco (T) and 12 grow millet (M), given that 2p farmers grow both and 2 farmers grow neither of the two crops.
- a) Complete the Venn diagram below.



- b) How many farmers grow both types of crops?
- c) How many farmers grow one type of crops only?
4. During a trip to Jinja town, 30 students visited Nile breweries (N) and 24 students visited steel rolling mills (S),  $(X + 5)$  students visited both and 2 students did not visit any of the two factories.

- a) Complete the Venn diagram below;



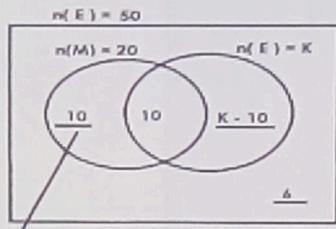
- b) Given that 41 students altogether visited Jinja Town, find the value of  $X$ .
- c) How many students visited Nile Breweries only?
- d) If a student is picked at random, what is the chance that he / she visited one type of factory only

## B GIVEN ONE OF THE SETS AT THE UNKNOWN

### Examples

1. In a class of 50 pupils, 20 like mathematics (M) and K pupils like English (E). given that 10 pupils like both subjects and 6 pupils like neither of the two.

- a) Complete the Venn diagram below.



- b) Find the value of K

Soln.

$$K - 10 + 10 + 10 + 6 = 50$$

$$K + 6 = 50$$

$$K + 6 + 16 = 50 - 16$$

$$K = 34$$

- c) How many pupils like one subject only.

Soln.

$$\begin{aligned}\text{One subject only} &= 10 + (K - 10) \\ &= 10 + (34 - 10) \\ &= 10 + 24 \\ &= 34 \text{ pupils}\end{aligned}$$

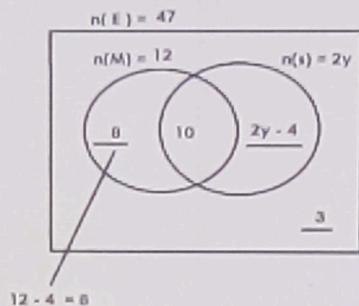
- e) Find the probability of picking a pupil who like English but not math.

Prob =  $n(E)$

$$\begin{aligned}&n(P) \\ &= \frac{k-10}{50} \\ &= \frac{34-10}{50} \\ &= \underline{\underline{24}} \\ &\quad 50\end{aligned}$$

**Example 2.**

2. In a class of 47 pupils, 12 like music (M) and 2y like swimming (S). 4 pupils like both and 3 do not like any of the two activities.  
a) Complete the Venn diagram below.



- b) How many pupils like swimming only?

$$2y - 4 + 4 + 8 + 3 = 47$$

$$2y + 11 = 47$$

$$2y + 11 = 47 - 11$$

$$2y = 38$$

$$2 = 2$$

$$y = 18$$

$$\begin{aligned}\text{swimming only} &= 2y - 4 \\ &= (2 \times y) - 4 \\ &= (2 \times 18) - 4 \\ &= (36 - 4) \\ &= 32 \text{ pupils}\end{aligned}$$

- c) Find the probability of picking a pupil who like one subject only?

$$\text{One subject only} = 8 + (2y - 4)$$

$$= 8 + (2 \times 18) - 4$$

$$= 8 + (36 - 4)$$

$$= 8 + 32$$

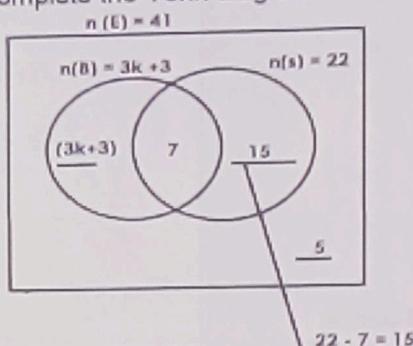
$$= 40$$

$$\begin{aligned}\text{Prob} &= \frac{n(E)}{n(P)} \\ &= \frac{40}{47}\end{aligned}$$

**Example 3.**

In a family of 41 people,  $3K + 3$  drink beers (B) and 22 drink sodas (S). 7 people drink both drink and 5 people neither drink beer nor soda.

- a) Complete the Venn diagram below.



- b) Find the value of K.

$$(3k + 3) - 7 + 7 + 15 = 41$$

$$3k + 3 + 15 + 5 = 41$$

$$3k + 23 = 41$$

$$3k + 23 - 23 = 41 - 23$$

$$3k = 18$$

$$3 = 3$$

$$K = 6$$

- c) How many people drink only one type?

Soln.

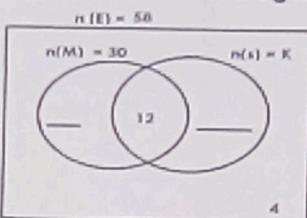
Only one =

$$\begin{aligned} &= (2k - 3) - 7 + 15 \\ &= (2 \times 6) + 3 - 7 + 15 \\ &= 18 + 3 - 7 + 15 \\ &= 21 - 7 + 15 \\ &= 21 + 15 - 7 \\ &= 36 - 7 \\ &= 29 \text{ people} \end{aligned}$$

**Activity**

1. In a class of 58 pupils, 30 like math (M) and K like science (S). given that 12 pupils like both and 4 do not like any of the two subjects.

a) Complete the Venn diagram below.



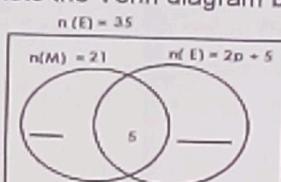
b) Find the value of K.

c) How many pupils like one type of subject only?

d) Find the probability of getting a pupil who like science only.

2. In a class of 35 pupils, 21 like math, 2pt 5 like both subjects while 4 pupils do not like any of the mentioned subject.

a) Complete the Venn diagram below.

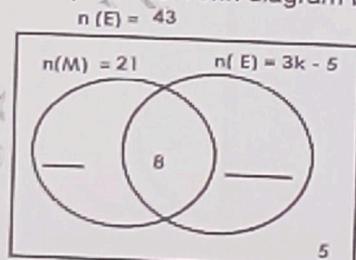


b) How many pupils like English?

c) Find the probability of picking a pupil who like English only.

3. In a village of 43 farmers, 21 grow maize, 3k - 5 grow beans, 8 grow both while 5 farmers do not grow any of the mentioned crops.

a) Complete the Venn diagram below.



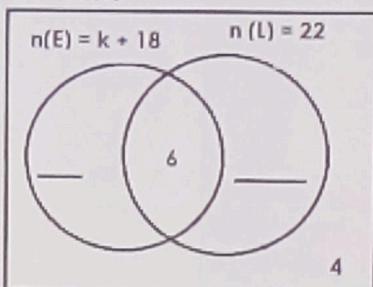
b) Find the value of K.

c) How many farmers who grow one type of crops only.

4. In a village of 53 people,  $k + 18$  speak English, 22 speak Luganda and 6 people speak both languages while 4 people do not speak any of the two languages.

a) Complete the Venn diagram below.

$$n(E) = 53$$



- b) How many people speak English only?  
c) How many people speak Luganda but not English.  
d) Find the probability of picking a person who speaks one type of language?

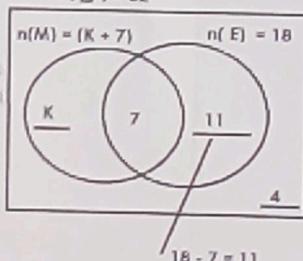
#### C). GIVEN THE DIFFERENCE OF SETS AS UNKNOWN.

Examples

1. In a class of 32 pupils, K pupils like math (M) only and 18 like English (E). given that 7 pupils like both while 4 pupils like neither.

a) Complete the Venn diagram below.

$$n(\Sigma) = 32$$



b) Find the value of K

**Soln.**

$$\begin{aligned}K + 7 + 11 + 4 &= 32 \\K + 22 &= 32 \\K + 22 - 22 &= 32 - 22 \\K &= 10\end{aligned}$$

- c) How many pupils like one subject only?

**Soln.**

$$\begin{aligned}\text{One subject only} &= k + 11 \\&= 10 + 11 \\&= 21\end{aligned}$$

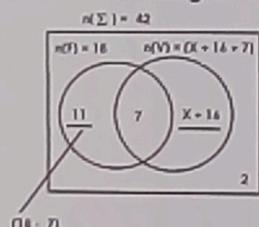
- d) Find the probability of picking a pupil who likes math.

$$\begin{aligned}n(M) &= K + 7 \\&= 10 + 7 \\&= 17\end{aligned}$$

$$\begin{aligned}\text{Probability} &= \frac{n(E)}{n(P)} \\&= \frac{17}{32}\end{aligned}$$

In a class of 42 pupils,  $X + 16$  play volleyball only, 18 play football and 7 play both games while 2 pupils do not play either of the two games.

- a) Complete the Venn diagram below.



- b) Find the value of  $X$ .

**Soln.**

$$\begin{aligned}X + 16 + 7 + 11 + 2 &= 42 \\X + 36 &= 42 \\X + 36 - 36 &= 42 - 36 \\X &= 6\end{aligned}$$

c) Find the probability of picking a pupil who likes one subject only.

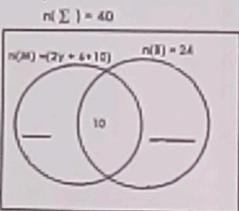
Soln.

$$\begin{aligned}\text{One subject only} &= X + 16 + 11 \\ &= 6 + 16 + 11 \\ &= 33 \\ \therefore \text{Probability} &= \frac{n(E)}{n(p)} \\ &= \frac{33}{42}\end{aligned}$$

Activity

1. In a village of 40 farmers  $2y + 6$  grow maize (M) only, 24 grow beans (B) and 10 farmers grow both crops. Given that 6 farmers grow neither.

a) Complete the Venn diagram below

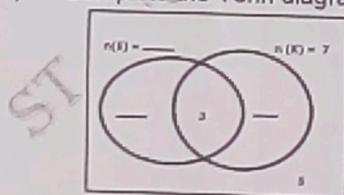


b) How many farmers grow maize?

c) How many farmers grow one type of crop only?

2. In a group of 18 taxi drivers  $X$  drivers take Entebbe (E) route only any 7 drivers take Kampala (K) route. Given that 3 drivers take both routes and 5 drivers take none.

a) Complete the Venn diagram below:



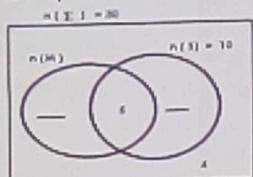
b) Find the value of  $X$ .

c) How many drivers take one route only?

d) Find the probability of picking a driver who takes Entebbe route only?

3. In a class of 30 pupils,  $(K + 2)$  like math only, 10 like SST (S) and 5 like both. Given that 4 like neither.

a) Complete the Venn diagram below.

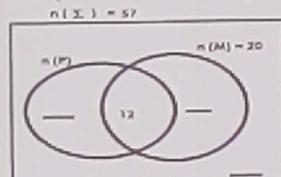


b) How many pupils like math?

c) How many pupils like one subject only?

4. At a party attended by 57 people,  $(2X + 2)$  took pepsi cola (P) only and 20 took Mirinda (M). 12 people took both and one person did not take any.

a) Complete the Venn diagram below:



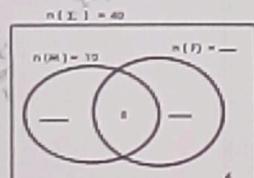
b) Find the value of  $X$ .

c) How many people took Pepsi only?

d) Find the probability of picking a person who took one type of drink only

5. In a group of 40 teachers, at St. Anthony Primary school, 10 eat meat (M) and  $(2y - 2)$  eat fish only. Given that 4 teachers eat neither, and 8 teachers eat both.

a) Complete the Venn diagram below: -



b) How many teachers eat fish.

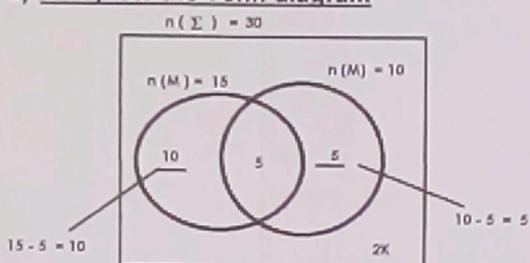
c) Find the probability of picking a teacher who eats only one type.

**D). SOLVING PROBLEMS USING A VENN DIAGRAM GIVEN UNION COMPLEMENT AS THE UNKNOWN.**

**Examples**

In a class of 30 pupils, 15 eat fish (F) 10 eat meat (M) 5 eat both dishes and 2K do not eat any of the mentioned.

- a) Complete the Venn diagram



- b) Find the value of K.

Solution.

$$2k + 10 + 5 + 5 = 30$$

$$2k + 20 = 30$$

$$2k + 20 - 20 = 30 - 20$$

$$2k = 10$$

$$\underline{2k} = \underline{10}$$

$$2 = 2$$

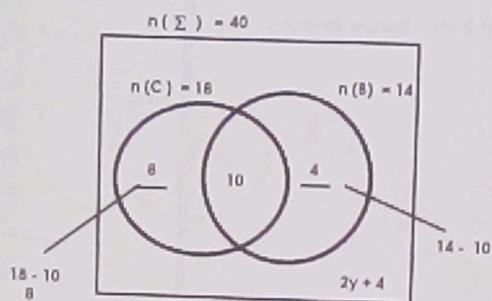
$$K = 5$$

- b) Find the probability of picking a pupil who does not eat meat.

Solution:

$$\begin{aligned} \text{Prob} &= \frac{n(E)}{n(\Sigma)} \\ &= \frac{n(P)}{n(M)} \\ &= \frac{n(M')}{n(\Sigma)} \\ &= \frac{10 + 2k}{30} \\ &= \frac{10 + (2 \times 5)}{30} \\ &= \frac{10 + 10}{30} \\ &= \frac{20}{30} \end{aligned}$$

In a village of 40 farmers, 18 grow cassava (C), 14 grow beans (B), 10 grow both while 2y + 4 farmers grow none of the mentioned. Complete the Venn diagram.



- c) How many farmers do not grow any of the mentioned crop?

Solution

$$\begin{aligned}
 2y + 4 + 4 + 10 + 8 &= 40 \text{ Farmers who don't grow any of the} \\
 2y + 26 &= 40 \\
 2y + 26 - 26 &= 40 - 26 = (2 \times 7) + 4 \\
 2y &= 14 = 14 + 4 \\
 2y &= 14 \\
 2 &= 2 \\
 Y &= 7
 \end{aligned}$$

- d) Find the probability of picking a farmer who grows only one crop.

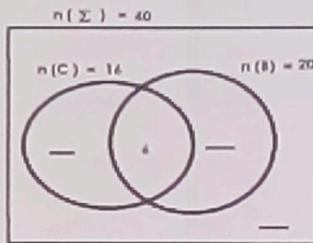
Solution

$$\begin{aligned}
 \text{Prob} &= \frac{n(E)}{n(B)} \\
 &= \frac{8 + 4}{40} \\
 &= \frac{12}{40}
 \end{aligned}$$

**Activity:**

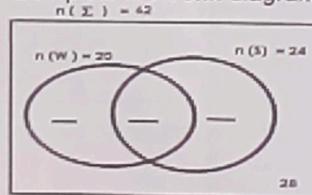
1. In a class of 40 pupils, 16 like English (E) 20 like math (M), 6 pupils like both subjects and K pupils do not like any of the mentioned subjects.

a) Complete the Venn diagram.



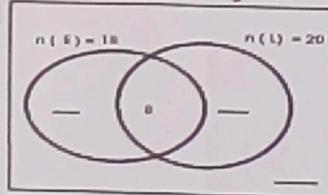
- b) Find the value of K.  
c) Find the probability of picking a pupil who do not like English from the class at a random.  
2. In a bus of 62 passengers, 20 bought water (W), 24 bought soda (S) and 8 bought both drinks while 2P passengers did not buy any of the mentioned drinks.

a) Complete the Venn diagram.

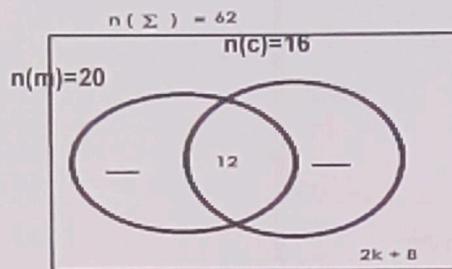


- b) Find the value of P.  
c) How many passengers bought only one drink?  
3. In a class of 40 pupils, 18 speak English (E), 20 speak Luganda (L) 8 pupils speak both any of the mentioned.

a) Complete the Venn diagram.



- b) Find the value of  $y$ .
- c) Find the probability of picking a pupil who does not speak English from the class at a random.
4. At a party attended by 48 people, 20 ate meat (M) 16 ate chicken & 12 ate both dishes while 2k + 8 did not eat any of the mentioned.
- a) Complete the Venn diagram.



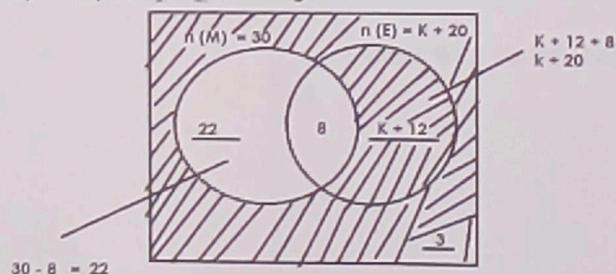
- b) How many people did not eat chicken?
- c) Find the probability of picking a person who ate only one dish at the party.

#### SOLVING PROBLEMS USING VENN DIAGRAMS BY COMPARING SETS

##### Examples

In a class, 30 pupils like math (M) K + 12 pupils like English only (E) and 8 pupils like both subjects while 3 pupils do not like any of the mentioned.

- a) Complete the Venn diagram



b) If 36 pupils do not like math. Find the value of K

**solution**

$$K + 12 + 3 = 36$$

$$K + 15 = 36$$

$$K + 15 - 15 = 36 - 15$$

$$K = 21$$

b) How many pupils like English?

**Solution**

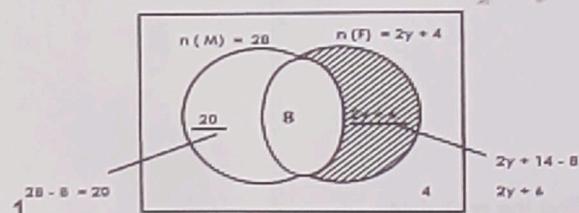
$$n(E) = K + 12 + 8$$

$$= 21 + 20$$

$$= 41$$

In a class 28 pupils like meat (M)  $2y + 14$  like Fish and 8 pupils like both dishes while 4 pupils do not like any of the mentioned.

a) Complete the venn diagram.



c) Given the 42 pupils like only one dish, how many pupils like fish.

**Solution**

$$2y + 6 + 20 = 42$$

$$2y + 26 = 42$$

$$2y + 26 - 26$$

$$2y = 16$$

$$2y = \underline{+68}$$

$$2 = 2$$

$$y = 8$$

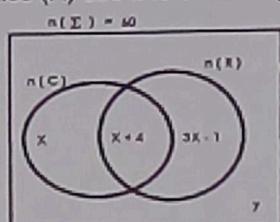
$$n(E) = 2y + 14$$

$$= (2 \times 8) + 14$$

$$= 16 + 14$$

$$= 30$$

The Venn diagram below shows the number of farmers who grow cassava (C) and Rice (R) use it to answer questions.



- a) If 24 farmers grow cassava, find the value of X.

$$X + X + 4 = 24$$

$$2X + 4 = 24$$

$$2X + 4 - 4 = 24 - 4$$

$$2X = 20$$

$$\underline{2X} = \underline{20}$$

$$2 = 2$$

$$X = 10$$

- b) How many farmers grow only one type?

$$\text{only one} = n(C) \text{ only} + n(R) \text{ only}$$

$$= X + 3X - 1$$

$$= 10 + (3 \times 10) - 1$$

$$= 10 + 30 - 1$$

$$= 10 + 29$$

$$= 39$$

- c) If a farmer is picked at random, to lead the farmers. Find the probability of picking a farmer who does not grow cassava.

Soln.

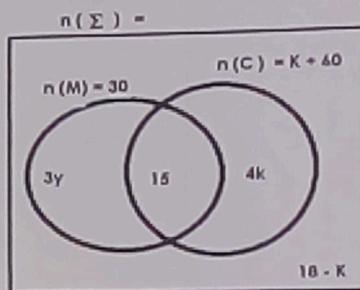
$$\begin{aligned} \text{Prob} &= \frac{n(E)}{n(P)} \\ &= \frac{3X - 1 + 7}{X + X + 4 + 3X - 1 + 7} \end{aligned}$$

$$= \frac{(3 \times 10) - 1 + 7}{10 + 10 + 4 + 30 - 1 + 7}$$

$$= \frac{30 - 1 + 7}{6}$$

$$= \frac{36}{60}$$

In the Venn diagram below, 30 farmers grow maize (M), 15 grow both crops.  
Study it and answer the questions that follow.



a) Find the value of  $y$ .

soln.

$$3y + 15 = 30$$

$$3y + 15 - 15 = 30 - 15$$

$$3y = 15$$

$$\frac{3y}{3} = \frac{15}{3}$$

$$y = 5$$

b) Find the value of  $K$ .

soln.

$$4k + 15 = k + 60$$

$$4k + 15 - 15 = k + 60 - 15$$

$$4k = k + 45$$

$$4k - k = k - k + 45$$

$$3k = 45$$

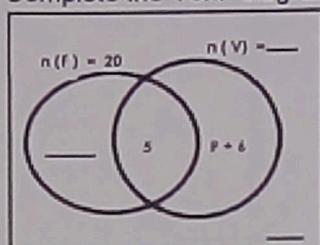
$$\frac{3k}{3} = \frac{45}{3}$$

$$k = 15$$

**Activity:**

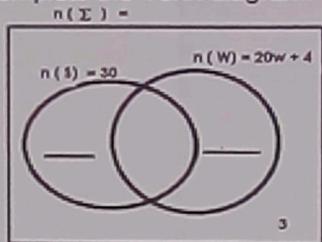
1. In a class, 20 play football (F) P + 6 play volley ball (V) only and 5 pupils play both while 2 pupils play neither of the two.

a) Complete the Venn diagram.



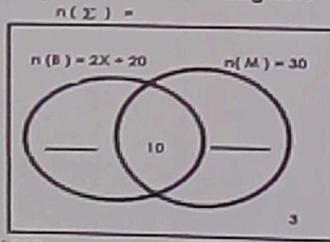
- b) If 28 pupils play volley ball, find the value of P.  
c) How many pupils play only one game?
2. In a group, 30 people take soda (S),  $2W - 4$  people take water (W) and 4 people take both drinks while 3 people do not take any of the mentioned.

a) Complete the Venn diagram.

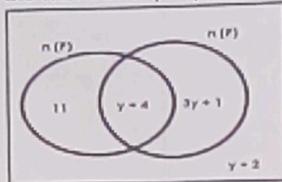


- b) Given that 40 people take only one drink. Find the number of people who take water in the group.  
c) Find the probability of picking a person who take soda only from the group at a random.
3. In a village,  $2x + 10$  farmers grow beans only (B), 30 farmers grow maize (M), 10 farmers grow both crops and  $X + 16$  farmers do not grow any.

a) Complete the Venn diagram.

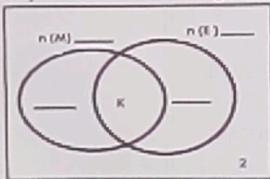


- b) Given that the number of farmers who grow beans only is the same as those who do not grow any of the mentioned crops. Find the value of  $X$ ,  
 c) How many farmers grow only one crop?  
 d) Find the number of farmers in the whole village.  
 4. In the Venn diagram, the number of people who like posho only is equal to the number of people who like rice only.

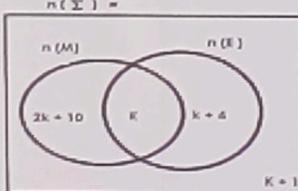


- a) Find the value of  $y$ .  
 b) Find the probability of picking a pupil who does not like posho from the class at a random.  
 5. In a class, 13 pupils like English (E) only,  $K$  like both math (M) and English  $K + 15$  like math but not English while 2 like neither of the two subjects.

- a) Complete the Venn diagram



- b) If 33 pupils like only one subject, find the value of  $K$ .  
 c) Find the probability of picking a pupil who like math from the class.  
 6. The Venn diagram below shows pupils who like math (M) and English (E). use it to answer questions if 16 more pupils like math than English.



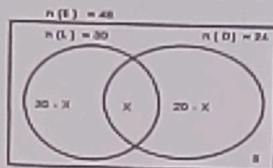
- a) Find the value of  $K$ .  
 b) How many pupils who do not like English (E)?

**SOLVING PROBLEMS USING A VENN DIAGRAM GIVEN ONE OF THE SETS AS THE UNIVERSAL**

**Example 1**

In a class of 48 pupils, all speak English (E), 30 pupils speak Luganda (L) 20 pupils speak drums (D) and X pupils speak all the three languages while 8 pupils speak English only.

- a) complete the Venn diagram.



- b) How many pupils speak all the three languages?

$$30 - X + X + 20 - X + 8 = 48$$

$$30 + 20 + 8 = X = 48$$

$$58 - X = 48$$

$$58 - 58 - X = 48 - 58$$

$$X = -10$$

$$\underline{X} = \underline{-10}$$

$$\begin{array}{r} 1 \\ -1 \\ \hline X \end{array} = 10$$

- c) How many pupils speak only two?

**Solution**

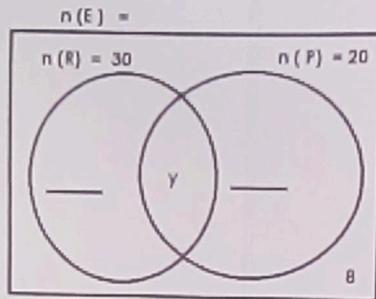
$$\begin{aligned} \text{Only two} &= 30 - x + 20 - X \\ &= 30 - 10 + 20 - 10 \\ &= 20 + 16 \\ &= 30 \text{ pupils} \end{aligned}$$

Find the probability of picking a pupil who speaks only one language.  
**Solution**

$$\begin{aligned} \text{Prob} &= \frac{n(E)}{n(P)} \\ &= \frac{8}{48} \end{aligned}$$

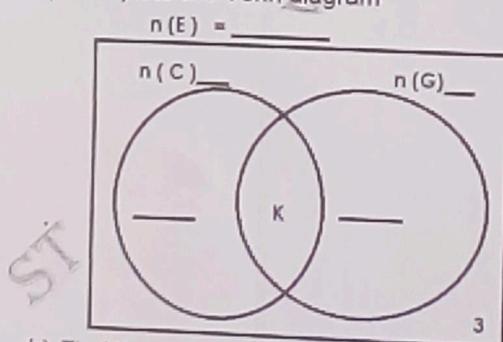
**Activity**

1. In a village of 50 farmers, all grow maize (M), 30 grow beans (B) 26 grow peas (P) and  $y$  farmers grow all the three crops while 8 farmers grow maize only.
- a) Complete the diagram.



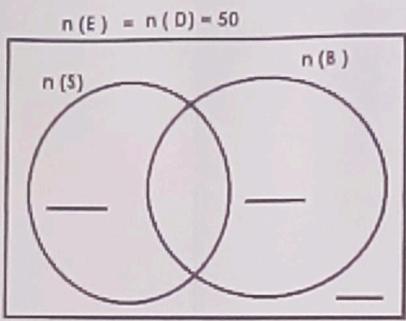
- b) Find the value of  $X$ .
- c) What is the probability of picking a farmer who do not grows only two crops?

2. In a bus of 38 passengers, all bought water (W), 20 bought chicken (c) 24 bought Ganga (G) and  $K$  passengers bought water only.
- a) Complete the Venn diagram



- b) Find the value of  $K$
- c) Find the probability of picking a passenger who bought chicken and water only.

3. In a market of 50 traders, all sell dresses (D), 36 sell shirts (S), 28 sell bags (B) while M traders sell all the three items and six traders sell dresses only.
- a) Complete the Venn diagram.



- b) How many traders sell all the three items?  
c) Find the number of traders who sell only two items.