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FACTS ABOUT THE AUTHOR

The author has been handling mathematics and physics at both Ordinary and Advanced levels for 10 years, in schools like St.Micheal High school, Uganda Martyrs secondary school sonde, Bukerere College School, Lira Town College, St. Katherine Secondary School, Light Vocational Secondary School, Kikomeko memorial s.s, Tihan Islamic Primary School and many more.

This book will be of value to most especially S.3 and S.4 though S.1 and S.2 have some work they can handle. It has 21 chapters but will be releasing chapter by chapter after a certain short period of time. He has invented a new method of teaching mathematics and all sciences at large called Hip hop mathematics where he raps mathematics with his students when teaching (Edutainment).He makes songs like, Mensuration a chapter on measurements/capacity and Fractions which are to be uploaded soon on our website. For suggestions or assistance contact him on Tel: +256779909219/+256758862688 Whatsapp: +256774649237, E mail:kaiznash@gmail.com,Website:www.numht.wordpress.com.KaizNash aka Kayizzi Nasser

CHAPTER ONE

SETS (Sets and Logic)

Definition:   
You already know at primary level that a set is a collection of things or elements. This has no difference with sets at this level; it’s only more techniques added in. Meaning “as things move further, the more content added in”. So we are to discuss the sets of three Venn diagrams and may be complementary sets no matter whether they are of 2 or 3 Venn diagrams.   
1.1-Complements and probability in sets   
Example 1   
Given that n (∑) = x, (AnB) 1 = 14, where n (A) 1=8 and (AuB) 1=2 yet n (B) =14.Fnd   
(i) n (AnB) =   
(ii) n (∑) =

n(∑) =

n(A)=

n(B) = 14

2

8

4

Solution   
n (A) 1 means elements which are not found in a set A (AnB)1 means elements which are not found in the region (AuB)1 means elements which are not found in region (AuB)

(i) But n (B) = 14   
(ii) n (B) = n (A) 1 + n (AnB)   
14=8 +n (AnB)   
n (AnB) = 14- 8 =6

(AnB)1= 14   
n(A)1 = 8   
n(AuB)1=2   
n(B)1= n(A) – n(AnB)

n(∑) = 20

n(A) = 10

n(B) =14

(ii) n(∑) = n (A) 1+n (B) 1+n(AnB)+n(AuB)1

4

8

6

2

X = 8 + 4 +6 + 2

=20

Example II

Wakasanke has 35 subscribers where 17 are subscribed to MTN, 13 subscribed to Mango and 20 subscribed to Celtel, 9are subscribed to mango and Mtn, 3 are subscribed to both Mango and C ELTEL, 2 are subscribed to all the three networks, n (CnMTNnMa1) =8.Use a Venn diagram to interpret this information .Then find: (i)   
those subscribed to MTN only   
(ii) those subscribed to at least 2 of the three networks   
(iii) probability of those there phones were stolen.

n(MT)= 17

n(Ma) = 13

9-7

2

3-2

n(C) = 20

Solution.   
If we need to locate (CnMTNnMa1) easily we have to use sets of your own choice. e.g.   
C={1,2,7,9,12}   
Mtn={1,10,7,11}   
Ma={2,1 1,1,9}   
Ma1={7,10,12}   
N.B   
I have thought of these sets on my own so that I can find out that area to put 8.   
Ma1 mean those which are not found in set Ma.

n(∑) =

n(C) =

71

10

n(MT) =

12

9

2

1

0

n(Ma) =

n (MT) = 17

n (Ma) =13

(2) So 8 is supposed to be placed in that position on your Venn diagrams n(CnMT) only =8

n(∑) = 35

7

n(Ma) =13

n(MT) =17

0

2

3

1

n(C) = 20

5

8

9

These 5 are outside the Venn diagrams but inside the box .These may be lost their phones   
or got stolen.   
(i) 0, no one is subscribed to MTN only   
(ii) 8+2+1+7=1 8subscribers   
(iii) P= = or   
 1.2 DIRECT APPROACH   
Example III   
This is about direct questions concerning 3 Venn diagrams. Am going to show you the phenomenon used on every set of the same type.

Question   
Jiibwa has a team of 35 players where 2 did not participate in MTN sponsored league .17 play basketball, 13 play volleyball and 21 play cricket.   
5 play7 both Basket and Volleyball   
6 play both cricket ball and Volleyball   
11 play both cricket and Basketball   
With the aid of a Venn diagram Find;   
(i) those playing all the games   
(ii) those playing at least 2 games   
(iii) those playing only one game   
(iv) the probability of those playing no game.   
We are to sum up all the figures in and out of the Venn diagram. .equating to the total (universal set)

SOLUTION

n(∑) = 35

n(C) = 21

n(V) = 13

2 + x

5 - x

1 + x

x

11 - x

4 + x

6 - x

2

n(B) = 17

Let n (Bnvnc) = x

n (∑ ) = 35

n (B n V) = 5

n (c n v) = 6

n (c n B) = 11

n ( Buvuc)1 = 2.

n (B) only

17- (5-x + x + 11 –x)

17 – (16 – x)

17 – 16 + x

1 +x

n (v) only

13 – (5-x + x +6-x)

13-(11 –x)

2-11 + x

2 +x

n(c) only

21-(11-x+x+6-x)

21-(17-x)

21-17+x

4+x  
1+x+5+x+11 -x+4+x+6 - x+2+x+2=35   
X + 31 = 35   
X+31 - 31 =35 - 31   
X=4   
we have to use another Venn diagram when we have removed x so that we can answer the questions asked.

n(∑) = 35

n(V) =13

n(B) = 17

1

6

5

7

4

2

8

2

n(C) = 21

(i) 4 (ii) 2 + 1 + 4 + 7 = 14 (iii) 8 + 6 + 5 = 19 (iv) P = =

1.3 COMPLICATED SETS   
EXAMPLE IV   
 Starting with this example and more, we are going to see how we could attempt complicated numbers using 3 Venn diagrams. That’s why we call them sets and logic

Question   
In Agakhan High school, there are 35 students participating in their inter house games. Those of sack racing were equal to those of blind racing which were equaling to those of crawling racing.2 participated in all inter house games where;   
10 participated in blind and crawling racing   
9 participated in sack and crawling racing   
8 participated in sack and blind racing   
With the help of Venn diagrams find;   
(i) participants in crawling racing.   
(ii) Participants in only one game.   
(iii) The probability of those participating in no game   
Solution.

n (∑) = 35

n(∑) = 35

n (S) = k

n (C) = k

y

**6**

8

2

X

7

Z

n ( B) = k

n (∑ ) = 35 let n(S) = n(B) = n(C) = K   
n(SnBnC) =2   
n(BnC) =10   
n(SnC) =9   
n(SnB) =8   
x+7+2+6=k ,therefore k = x+ 15 ------ (i)   
y+6+2+8 = k,therefore k= y+16 ------- (ii)   
z+7+2+8 =k,therefore k = z+ 17-------- (iii)   
x+ 6+2 + 7+8 +y+z= 35

x+y+z+23 = 35   
x+y+z =12-------------- (IV)   
from equation (i) above let’s make x the subject of the formula.   
X=k – 15 ------- (i)   
from equation (ii) above let’s make y the subject of the formula.   
Y=k – 16 ------- (ii)   
from equation (iii) above let’s make z the subject of the formula.   
Z=k – 17 ---------- (iii)   
Substituting for x, y and z in equation (iv)   
k-15 +k - 16+k-17= 12 -------- (iv)   
3 k - 48 = 12 ----------- (iv)   
3 k - 48 +48 = 12+48 -------- (iv)

= therefore k = 20

n (∑) = 35

n (B) = 20

n (S)= 20

6

5

4

8

73

2

3

n (C)= 20

(i) 20 students   
(ii) 5 + 3 + 4 = 12 students   
(iii) P= = = 0

4. Example V   
In Luutu’s project (sectrac), there are 3 sections where A has 14 members, C has members which are a half of those in B.   
8 members work in both A and B   
5 members work in both A and C   
9 members work in both B and C   
There is 1 member in C only, and there are 4 members in A only. With the use of Venn diagrams, find;   
(i) those working in all the section   
(ii) those in section C   
(iii) those of section B only

(iv) The total number of members.

Solution   
Let n(c) = x, n (A) =14, n(C) = x, n (B) = 2x,   
n (AnB) = 8, n (AnB) = 5, n (BnC) =9,   
N(C) only =1, n (A) only =4, n (AnBnC) = z,

n(∑) =

n(A) = 14

n(B) = 2x

8 - z

4

M

9 - z

z

5 - z

1

n(C) = x

n(A) = 14

4 + 8-z+z+5-z =14

1. 17-z = 14

–z = 14-17

=

Therefore z=3

If z=3, lets, let’s get x

1. z+5-z +9-7+1= x

5+9-3+1= x

5+6+1= x

x=12

1. But n (B) = 2x and x =12

Therefore n (B) = 2 x 12 = 24

To get M or n(B) only

z +8-z +9-2+m = 24

8+9-2+m=24

14+m=24

m=24-14

m=10  
(i) 3 members   
(ii) 12 members   
(iii) 10 members   
(iv) 31 members

n(∑) = 31

n (B) = 24

n (A) = 14

10

5

4

6

3

1

2

n (C) = 12

Example Vi   
In Rwabojo’s lecture room of 28 students, the number of those taking Religious studies (Rs) and Sociology (S) are 6 of which 4 take both (R) and (S) only. Those taking both sociology (s) and political science (Ps) are 3, 7 take both Religious studies (Rs) and political science (Ps) only.18 students take (R) and 6 take Sociology only. With the aid of a Venn diagram, find;   
(i) those taking all the 3 subjects.   
(ii) Those taking sociology   
(iii) Those taking R only   
(iv) Those taking only political science   
(v) The probability of those taking political science   
SOLUTION   
n(∑) = 28

n(Rs) = 18   
n(RsnS) = 6

n(S) only = 6

n (RnS) 4   
n (SnP) = 3   
n (RnP) = 7   
(i) 6 - 4 = 2students   
(ii) 4+2+1+6=l3students   
(iii) 18 - [4 + 5 + 2] = 7students   
(iv) 7+4+2+5+1 +6+y = 28   
25 +y =28   
25-25 +y=28—25   
y=3   
(v) probability = =

n(∑) = 28

n(S) = 13

n(Rs) =18

6

4

7

2

5

1

Y = 3

n(Ps) = 11

EXERCISE   
(1) Given that n (s) = 20, n (AnB) = 4 where n (A1nB) =x and n (B1n A) = y yet n (B) =11.   
Find: -   
(i) the value of x   
(ii) n (R) and n (Q)   
(iii) n (s)   
(2) In kyembambe girls school, 39 students were supposed to put on 155 kits, 22 muscle tights and 21 blouses. Where 6 put on skins and muscles tight, 11 put on muscle tights and blouses. All the girls put on at least one of the clothing. Find   
(i) those putting on all the clothing.   
(ii) Those putting on at least 2 of the 3 types of clothing.   
(iii) Those putting on at most one clothing.   
(4) Nannyomo was advised by the doctor to eat 20 eggs, 16 carrots and 18 apples per week in the 3 items at once, she should eat a maximum of 3 for both items only.   
If she’s to eat only eggs then they must be 6 and if she’s to eat apples only   
then they must be 4 with the aid of a Venn diagram. Find the number of her eating Eggs, carrot and apple   
(ii) the total number of items.   
(iii) The probability of the eating only two items.

(5) Bakasana organized seminar of 50 students where 30 attended Mathematics. 27 physics and 30chemistry. The number of those who attended all the 3 subjects is 6times the number of those who don’t attend, those who attended mathematics and physics are 16, and those who attended physics and chemistry only are 7. Yet 15 attended both mathematics and chemistry. Find: -   
(i) those who attend all the subjects   
(ii) those who attended at most 2 subjects.   
(iii) The probability of those who attended only one subject   
(v) the probability of those who didn’t attend.   
(6) In kawempe Muslim s.s, 43 students were at the age of voting for the Coming electrons. 29 are to vote for FDCS, 14 are to vote for DPS and 24 are to vote for NRM. some few students were allowed to vote for the 3 , 9 voted for FDC and DC 7 voted for DP and NRM and 11 voted fort FDC and NRM, Find :-

(I) those who voted for all the 3 parties.   
(II) those who didn’t vote for FDC   
(III) those who voted more than one party   
(IV) those who voted at most 2 parties.   
(7) Nganda had a group of 31 pupils of Kayizzi kindergarten, the number of those who visited Kyoga, Albert, George, was consecutive,   
6 Visited Lake Kyoga only   
8 Visited Lake Albert only   
7 Visited Lake George only   
those who visited the 3 lakes where 4, where 1 visited Kyoga and Albert only. With the aid of a Venn diagram, Find :-   
(i) those who visited Kyoga, Albert, George.   
(ii) Those who visited at most one lake.   
(iii) the probability of those who visited at least two lakes   
(8) In Namayanja’s team 14 were volleyball players, those who went for soccer were thrice those who went for netball.3 of the players fall sick that day.   
11 went for volleyball and soccer   
7 went for both soccer and netball   
4 went for both volleyball and netball   
If 9 went for soccer only and the no one went for netball only, find :—   
(I) those playing all games.   
(ii) Those playing netball.   
(iii) Those playing volleyball only   
(iv) The probability of those playing soccer.   
(9) If set A= 11 and set B= 14, set A union set B is 15 where (A1n B1) = 3.Find (i) n (∑)   
(ii) The probability of n (A n B).