LESSON NOTES FOR TERM 1 2022

SET CONCEPTS

TERM 1: WEEK 1(Lesson 1 Review of P.6 work on sets)

Definition of a set: A set is a collection of well-defined elements.

Kinds/types of Sets

a) Equal set and unequal sets
b) Equivalent set and nonequivalent sets
c) Joint(intersecting sets) and disjoint sets
d) Union sets
e) Difference and complement of sets
f) Universal sets and the concept of subsets
g) Subsets and proper subsets

WEEK 1: Lesson 2.

Equal sets

Equal sets are sets with exactly the same members and the same number of elements. The set symbol for equal sets is" =" and unequal sets have the same members but with different number of elements and "≠ "is the symbol for unequal sets

Examples of equal sets

1. Set A = { 1, 2, 3, 4} and set B = {3, 1, 4, 2}

2. Set C = {u, o, i, a, e} and Set D = {a, e, i, o, u}

3. Set M = {A, ,B, C, D, E} and set N ={D, E, B, A, C}

Examples of unequal sets

1. Set A = { 1, 2, 3, 4} and set B = {1, 4, 2}
2. Set C = {u, o, i, a, e} and Set D = {i, o, u}
3. Set M = {C, D, E} and set N ={D, E, B, A, C}

<u>**Equivalent sets**</u>**:** These are sets with same number of members but different number. The symbol is "↔ "

Examples of equivalent sets

1. Set A= {1, 2, 3, 4, 5} and set B={a, e, i, o, u}
2. Set M={A, B, C, D} and set N={ p, u, t, k}
3. Set G={1, 4, 9} and set H={ a, e, i}

<u>**Nonequivalent sets**</u>**:** These are sets with different number of elements and different members.

Examples of Nonequivalent sets

1. Set A= {1, 2, 3, 4, 5} and set B={e, i, o, u}
2. Set M={C, D} and set N={ p, u, t, k}
3. Set G={1, 4, 9} and set H={i}

Evaluation activity

State the relationship between sets below using equal or equivalent sets.

1. A= {q, e, t, w} and B= {1, 2, 3, 4}

2. B= {1, 3, 5, 7} and C= {5, 7, 1, 3}
3. D= {A, D, G, 4, H} and K= {a, e, i, o, u}
4. E= {MAP, S} and H= {map, s}
5. P= { M, A, R, K} and L= {m, a, r, k}
6. R= { 1, 2, 3, 5, 6} and P= { 5, 6, 1, 3, 2}

Ref: MK Pupils` book 5 page 3

WEEK I: Lesson 3

Joint and Disjoint sets

Joint sets are sets with common member(s).

Examples of Joint sets

1. R= {1, 3, 5, 8, 9} and P= {5, 7, 1, 3, 2} i.e. 1, 3, and 5 are common in both sets.
2. D= {A, D, G, 4, H} and K= {a, A, E, u, D} i.e. A and D are common in both sets.

Disjoint sets are sets with no common member.

Examples of disjoint sets

1. D= {A, D, G, 4, H} and K= {a, e, i, o, u}
2. E= {MAP, S} and H= {map, s}

Evaluation activity

State the relationship between sets below using joint or disjoint sets.

1. G= {q, e, t, w} and D= {1, 2, 3, 4}
2. W= {1, 3, 5, 7} and F= {5, 7, 1, 3}
3. R= {A, D, G, 4, H} and K= {a, e, i, o, u}
4. B= {MAP, S} and C= {map, s}
5. D= { 1, 2, 3, 5, 11} and P= { 5, 8, 1, 0, 2}
6. A= { k, e, f, s} and B= { c, h. e, f}

WEEK 1: Lesson 4

Intersection sets. These are sets which form common members. The set symbol for intersection of sets is "∩"

Listing members of intersection of sets

Examples:

1. Given that set K= { 1, 2, 3, 4} and set R= {3, 4, 5, 6, 8},
   K ∩ R = {3, 4}
2. Given that set A= { a, e, I, o, u} and set B= { 1, 4, e, o},
   A ∩ B= {e, o}

Union set: This is a set of all members without repeating the common members.

Listing the Union sets.

Examples:

1. Given that set G= {q, e, t, w} and D= {e, w, y, q, o},
   G ∪ D = {q, e, t, w, y, o}

2. Given that set D= {2, 4, 6, 8} and set E= { 1, 2, 3, 4},

$D \cup E = \{2, 4, 6, 8, 1, 3\}$

Evaluation activity

1. Set G= {q, e, t, w} and set D= {a, e, i. o, u}

   Find; a) $G \cap D$ b) $G \cup D$

2. Set W= {1, 3, 0, 5, 7} and set F= {5, 7, 9, 3}

   Find; a) $W \cap F$ b) $W \cup F$

3. Set R= {A, D, G, 4, H} and set K= {G, W, 2, 4, 5}

   Find; a) $R \cap K$ b) $R \cup K$

4. Set B= {1, 3, 5, 7} and set C= {2, 3, 5, 8, 9}

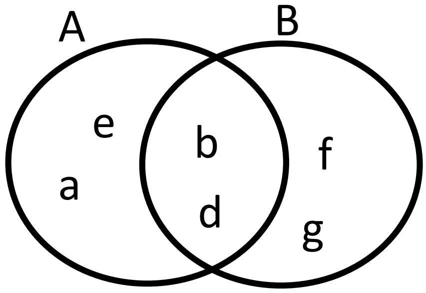
   Find; a) $B \cap C$ b) $B \cup C$

WEEK : Lesson 5

Difference of sets

Examples:

1. Study the Venn diagrams below and answer the questions that follow.



a) Find n(A – B)

A-B= {e, a}

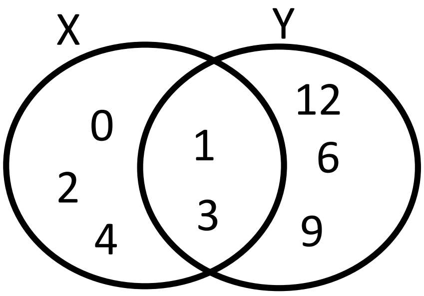
n(A-B)= 2

b) n(B – A)

B-A= {f, g}

n(B-A)= 2

2. Given that X = { 0, 1, 2, 3, 4} and Y = { 1, 3, 6, 9, 12}



a) Find n(X-Y)

X-Y = {0, 2, 4}

n(X-Y)= 3

b) n(Y-X)

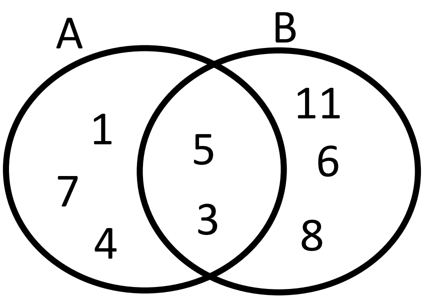
Y-X = {12, 6, 9}

n(Y-X)= 3

Evaluation activity

Study the venn diagrams below and answer the questions that follow.

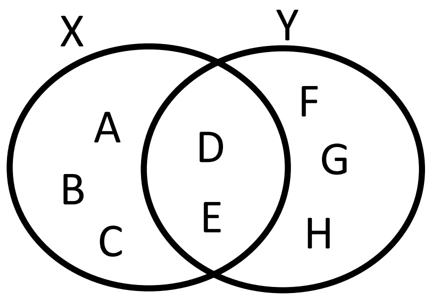
1.



a) Find n(A – B)

b) Find n(B-A)

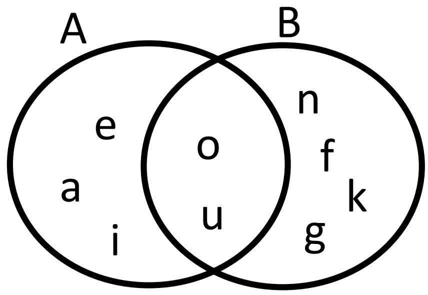
1.



a) Find n(X-Y)

b) Find n(Y-X)

2.



a) Find n(A-B)

b) Find n(B-X)

WEEK : Lesson 6

Complement of sets.

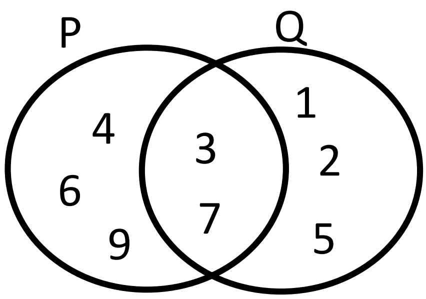
Complement of a set means a set of members not in the given set.

OR

Elements in the universal set but not in the given set.

Example

1. Given that; P = {4, 3, 6, 7, 9} and Q = {1, 2, 3, 5, 7}



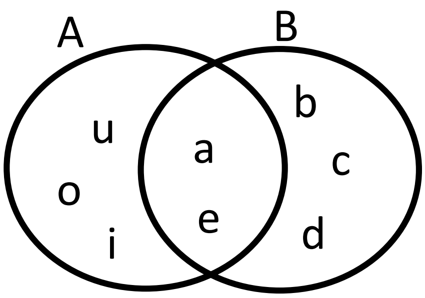
a) Write down members in P' (Complement of set P)

P' = {1, 2, 3}

b) Write down members in Q' (Complement of set Q)

Q' = {4, 6, 9}

2. Given that; A = {a, e, i, o, u} and B = {a, b, c, d, e}



a) Write down members in A' (Complement of set A)

A' = {b, c, d}

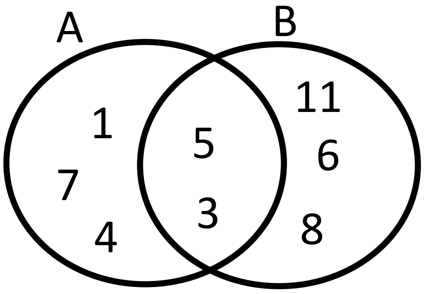
c) Write down members in B' (Complement of set B)

B' = {u, o, i}

Evaluation activity

Use the venn diagrams below to answer the questions that follow

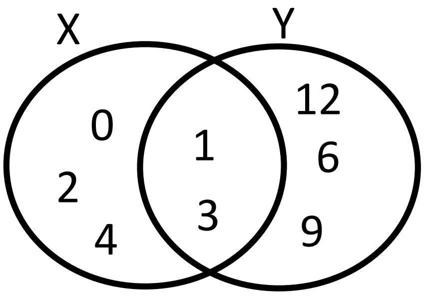
1.



a) Write down members in A' (Complement of set A)

b) Write down members in B' (Complement of set B)

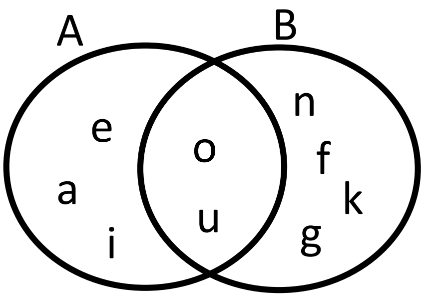
2.



a) Write down members in X' (Complement of set X)

b) Write down members in Y' (Complement of set Y)

3.



a) Write down members in A' (Complement of set A)

b) Write down members in B' (Complement of set B)

<u>WEEK : Lesson 7</u>

WEEK 1: Lesson 5

SUBSETS

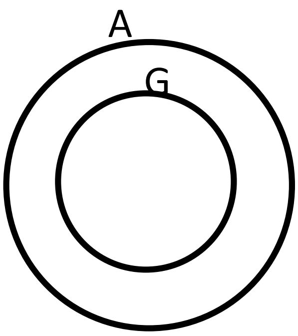
A subset is a small set got from a big set.

The bigger set from which a subset is got is called a Universal set or Super set.

The symbol for is a subset of is $\subseteq$

The symbol for is not a subset of is $\not\subseteq$. The symbol for Universal set is ξ.

1. Draw a Venn diagram to show that all goats (G) are Animals (A)



2. Given that set Q = {a, b, c}. List down all the subsets in set Q.

{a}, {b}, {c}

{a, b}, {a, c}, {b, c}

{}, {a, b, c} ⟹ 8 Subsets

3. Given that set R = {1, 2, 3, 4}. List down all the subsets in set R.= { }, {1}, {2}, {3}, {4}, {1, 2}, {1, 3}, {1, 4}, {2, 3}, {2, 4}, {3, 4}, {1, 2, 3}, {1, 2, 4}, {1, 3, 4}, {2, 3, 4}, {1, 2, 3, 4}

N.B The empty set and the set itself (universal) are subsets of every set.

Evaluation activity

List the subsets for each of the following sets:

1. B = {p, q}
2. C= {x, y, z}
3. D= { t }
4. E={ p, q, r, s}
5. { }
6. Draw a venn diagram to show that ;
   a) All dogs (D) are animals (A)
   b) All girls (G) are female (F)
   c) All boys (B) are male (M)

<u>WEEK: Lesson 6</u>

<u>Finding number of subsets:</u>

To find the number of subsets in set i.e. Z = {7, 5, 3},

No. of subsets = 2^n where n represents the number of elements in the given set.

$\therefore$ Set Z has 3 elements

$\therefore$ No. of subsets = 2^n

= 2^3

= 2 x 2 x 2

= 4 x 2

<u>= 8 subsets</u>

NB: Adequate examples can be given before the activity

Evaluation activity

How many subsets are in each of the sets below?

1. Set K= {a, e}
2. Set M= {1, 2, 3}
3. Set H= {w, y, z, u}
4. Set N= {1, 4, 9, 16, 25}
5. Set P= {a, e, I, o, u}

<u>Finding number of elements when given number of subsets</u>

<u>**Examples**</u>

Set A has 8 subsets. How many elements are in set A?

2^n = No. of subsets

$2^n = 8$

2	8
2	4
2	2
	1

$2^n = 2^3$

$n = 3$

Note: Give adequate examples to the learners before giving the activity.

Evaluation activity

Find the number of elements in a set with the following number of subsets;

1. 4 subsets
2. 16 subsets
3. 32 subsets
4. 64 subsets
5. 128 subsets
6. 256 subsets

WEEK: Lesson 7

PROPER SUBSETS

A Proper subset is a sub set with less members.

The symbol for is a proper subset of is $\subset$

The symbol for is not a proper subset of is $\not\subset$. The symbol for Universal set is ξ.

1. Given that set Q = {a, b, c}. List down all the proper subsets in set Q.

   {a}, {b}, {c}

   {a, b}, {a, c}, {b, c}, { } $\Longrightarrow$ 7 proper Subsets

2. Given that set R = {1, 2, 3, 4}. List down all the proper subsets in set R.= { }, {1}, {2}, {3}, {4}, {1, 2}, {1, 3}, {1, 4}, {2, 3}, {2, 4}, {3, 4}, {1, 2, 3}, {1, 2, 4}, {1, 3, 4}, {2, 3, 4}

N.B The empty set is a proper subsets of every set.

Evaluation activity

List the proper subsets for each of the following sets:

1. B = {p, q}
2. C= {x, y, z}
3. D= { t }
4. E={ p, q, r, s}
5. { }

WEEK: Lesson 8

Finding number of proper subsets:

To find the number of proper subsets in set i.e.

Z = {7, 5, 3},

No. of proper subsets = $2^n - 1$ where n represents the number of elements in the given set.

∴ Set Z has 3 elements

∴ No. of subsets = $2^n - 1$

$= 2^3 - 1$

$= (2 \times 2 \times 2) - 1$

$= (4 \times 2) - 1$

$= 8 - 1$

$= 7$ proper subsets

NB: Adequate examples can be given before the activity

Evaluation activity

How many proper subsets are in each of the sets below?

1. Set K= {a, e}
2. Set M= {1, 2, 3}
3. Set H= {w, y, z, u}
4. Set N= {1, 4, 9, 16, 25}
5. Set P= {a, e, I, o, u}

Finding number of elements when given number of proper subsets

Examples

Set A has 7 proper subsets. How many elements are in set A?

$2^n - 1 =$ No. of proper subsets

$2^n - 1 = 7$

$2^n - 1 + 1 = 7 + 1$

$2^n = 8$

8	4	2	1
2	2	2	

$2^n = 2^3$

$n = 3$

Note: Give adequate examples to the learners before giving the activity.

Evaluation activity

Find the number of elements in a set with the following number of proper subsets;

1. 3 proper subsets
2. 15 proper subsets
3. 31 proper subsets
4. 63 proper subsets
5. 127 proper subsets
6. 255 proper subsets

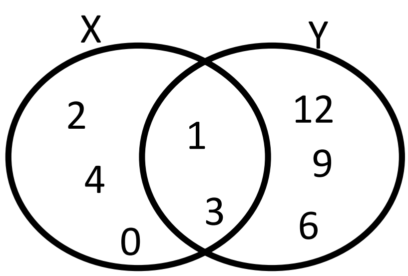
WEEK: Lesson 9

Listing and finding number of number of elements from venn diagrams:

Examples

Given that X = {0,1 2, 3 4} and Y = {1,3 6, 9, 12}

a) Represent the two sets on the Venn diagram



b) Find $n(X-Y)$

$X-Y = \{2, 4, 0\}$

$n(X-Y) = 3$

c) Find $n(Y-X)$

$Y-X = \{12, 9, 6\}$

$n(Y-X) = 3$

d) Find $n(X\cap Y)$

$X\cap Y = \{1, 3\}$

$n(X\cap Y) = 2$

e) Find $n(X \cup Y)$

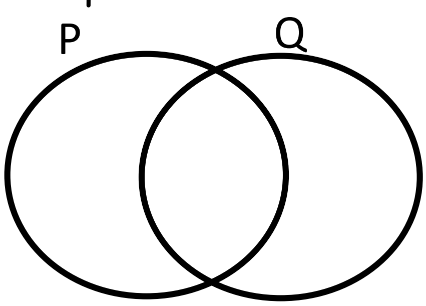
$X \cup Y = \{2, 4, 0, 1, 3, 12, 9, 6\}$

$n(X \cup Y) = 8$

Evaluation activity

1. Given that set $P=\{3, 4, 6, 7, 9\}$ and set $Q= \{1, 2, 3, 5, 7\}$

a) Represent the two sets on the Venn diagram



b) Find $n(P-Q)$

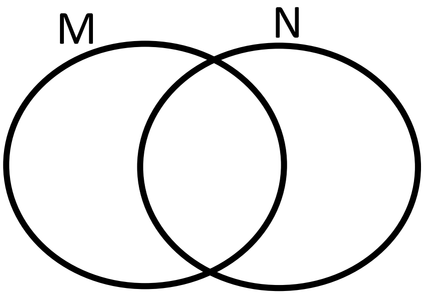
c) Find $n(Q-P)$

d) Find $n(P\cap Q)$

e) Find $n(P \cup Q)$

2. Given that set M={a, e, I, o, u} and set N ={a, b, c, d, e}.

a) Represent the two sets on the Venn diagram



a) Find $n(M)'$

b) Find $n(N)'$

c) Find $n(M \cap N)$

d) Find $n(M \cup N)$

e) Find $n(M)$

f) Find $n(N)$

g) Find $n(M-N)$

h) Find $n(N-M)$

WEEK: Lesson 10

Representing sets on venn diagram

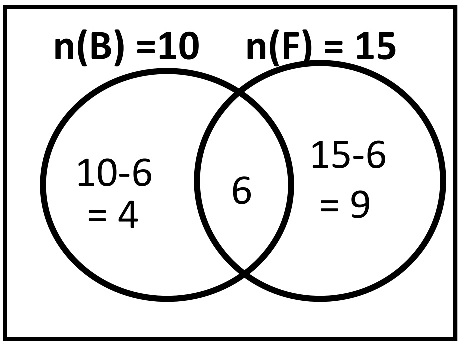
In a group of swimmers, 15 do free style (F) 10 do backstroke (B) and 6 do both

$n(F) = 15$

$n(B) = 10$

$n(F \cap B) = 6$

a) Represent the above information on a Venn diagram.



b) How many swimmers swim only back stroke?

$10 - 6$

<u>4 swimmers</u>

c) How many do only free style?

$15 – 6$

<u>19 swimmers</u>

d) How many swimmers are in that group?

$(10 + 6) + 6 + (15 – 6)$

$4 \quad + \quad 6 + \quad 9$

$10 + 9$

<u>= 19 swimmers</u>

e) How many swim only one style?

Backstroke only + free style

$(10 – 6) + 15 – 6$

$4 \quad + \quad 9$

<u>= 13 swimmers</u>

Evaluation activity

1. Given that n (A) = 15 n (B) = 25 n ($A \cap B$) = 5

a) Represent the above information on a Venn diagram

b) Find n($A \cup B$)

c) Find n($A \cap B$)'

d) Find n(A-B)

2. In a class, 30 pupils like Mathematics (M) 20 like Science (S) and 5 pupils like both subjects

   a) Represent the above information on a Venn diagram

   b) How many pupils do not like Science?

   c) How many pupils do not like Mathematics?

   d) How many pupils are in the class altogether?

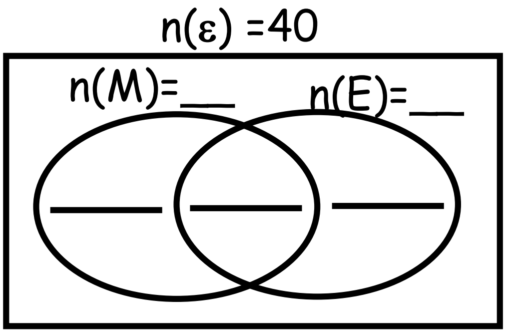
   e) How many pupils like only one subject?

<u>WEEK: Lesson 11</u>

<u>Interpreting venn diagrams</u>

1. In a class of 40 pupils, 23 pupils like Maths (M), K pupils like English (E) and 4 pupils like both subjects.

a) Complete the Venn diagram below.



b) Find the value of K.

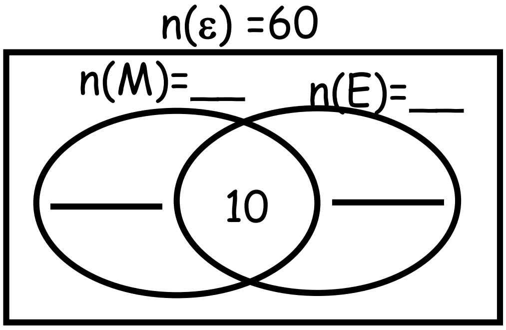
2. In a class of 60 pupils, 23 pupils like Mathematics (M), 28 pupils like English (E), and some pupils like both subjects. If 3 pupils like neither of the subjects.

a) Draw a venn diagram to show the above information.

b) How many pupils like both subjects?

3. In a class of 60 pupils, 28 pupils like mathematics (M), k pupils like English and 10 pupils like both subjects.

a) Complete the Venn diagram below.

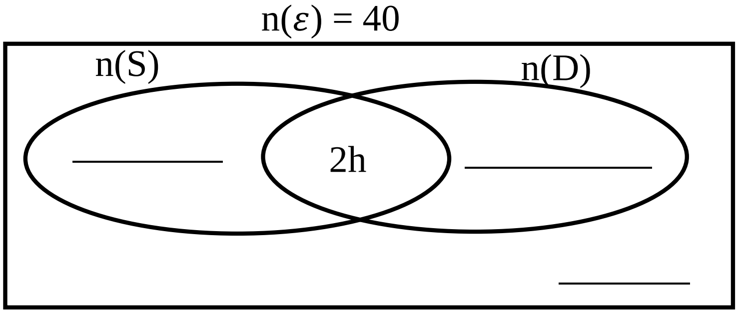


b) Find the value of K.

c) How many pupils like English only?

4. In a class of 40 pupils, 20 like English (E), 25 like Mathematics (M), 2h like both subjects while 5 pupils do not like any of the two subjects.

a) Complete the Venn diagram below.



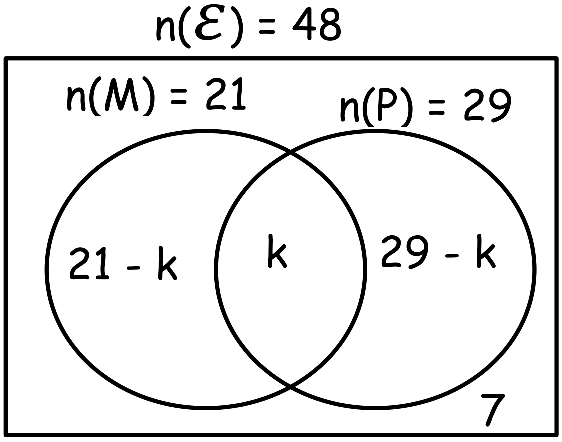
b).Find the value of h.

Solving problems using venn diagrams

Example 1. Given that n ($\mathcal{E}$) = 48, n (M) = 21, n (P) = 29,

n (M∩P) = K and n (M∪P)'=7

a) Represent the above information on the Venn diagram below.



b) Find the value of k.

$(21 - k) + k + (29 - k) + 7 = 48$

$21 - k + k + 29 - k + 7 = 48$

$21 + 29 + 7 - k = 48$

$57 - k = 48$

$57 - 57 - k = 48 - 57$

$-k = -9$

$\frac{-k}{-1} = \frac{-9}{-1}$

$k = 9$

c) Find $n(M \cup P)$

$n(M \cup P) = (21 - k) + k + (29 - k)$

$= (21 - 9) + 9 + (29 - 9)$

$= 12 + 9 + 20$

$= 41$

OR

$n(M \cup P) = 48 - 7$

$= 41$

d) Find $n(P)'$

$n(P)' = (21 - k) + 7$

$= (21 - 9) + 7$

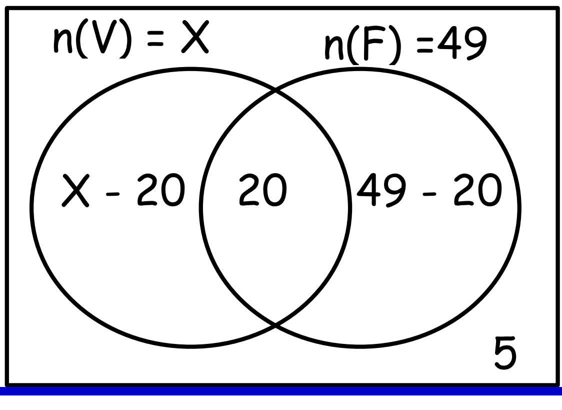
$= 12 + 7$

$= 19$

Example 2. In a P.6 club of 80 players, X players play Volleyball (V), 49 players play football (F), 20 players play both games while 5 players play other games.

a) Represent the above information on a Venn diagram below.

$n(\mathcal{E}) = 80$



b) Find the value of X

$(X-20)+20+(49-20)+5=80$

$X-20+20+29+5=80$

$X+34=80$

$X+34-34=80-34$

$X = 46$

C) How many players play one game only?

One game only = (x - 20) + (49 - 20)

= (46-20) + (49-20)

= 26 + 29

= 55

d) What is the probability that a player picked at random to be the team captain doesn't play football at all?

(F)' = (X - 20) + 5

= (46 -20) + 5

= 26 + 5

= 31

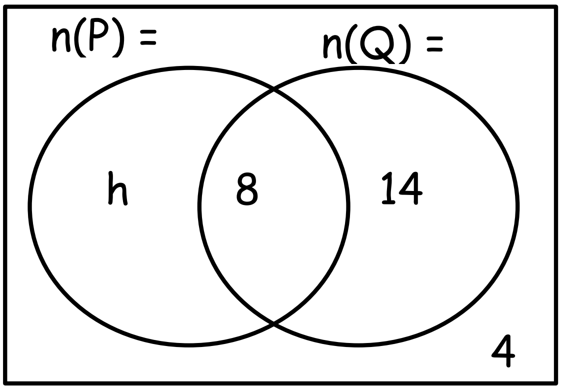
Probability = $\frac{\text{n (desired chance)}}{\text{n (total chances)}}$

$= \frac{31}{80}$

More about venn diagrams

Example 3. Study the Venn diagram below carefully and use it to answer the question that follows

n($\mathcal{E}$) =



a) Given that n(P) = 20, Find the value of h.

h + 8 = 20

h + 8 – 8 = 20 -8

h = 12

b) Find;

i) n(Q)

n(Q) = 14 + 8

= 22

ii) n(PU Q)

= X + 8 + 14

= 12 + 22

= 34

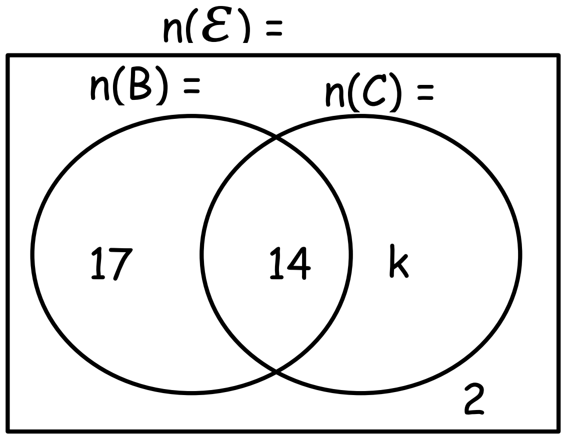
ii) n($\mathcal{E}$)

= h + 8 + 14 + 4

= 12 + 26

= 38

Example 4. The $n(B \cup C)$ on the Venn diagram below is 47.



a) Find the value of k

$k + 14 + 17 = 47$

$k + 31 = 47$

$k + 31 - 31 = 47 - 31$

$k = 16$

c) How many members are in set,

i) $(B \cap C)'$

$n(B \cap C)' = 17 + y + 2$

$= 17 + 16 + 2$

$= 35$

ii) $\mathcal{E}$

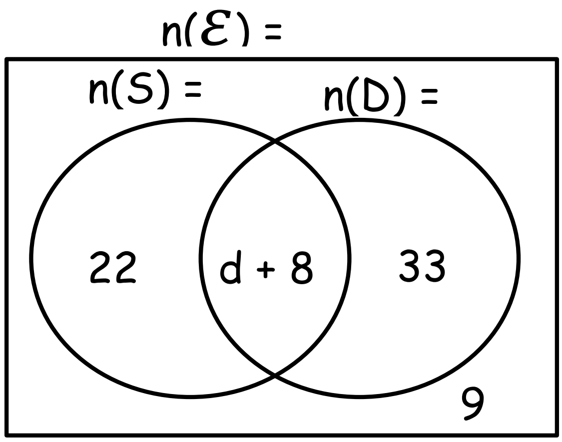
$n(\mathcal{E}) = 17 + 14 + y + 2$

$= 31 + 16 + 2$

$= 49$

Evaluation activity

1. The Venn diagram below shows the number of P.7 pupils who participate in scouting(S) and debate (D).

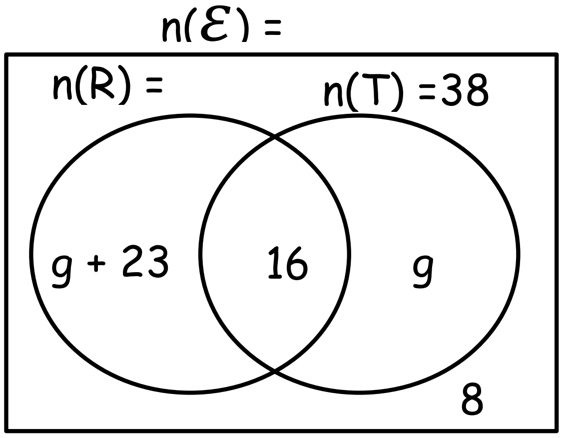


a) If 25 pupils participate in both scouting and debate, find the value of d.

b) Find the total number of pupils in the class.

c).What is the probability of picking a pupil at random who participate in debate to chair a class meeting?

2. Study the Venn diagram below carefully and use it to answer the questions about it.



a) Find the value of g

b) Find;

i) $n(\mathcal{E})$

ii) $n(R \cup T)$

PROBABILITY: This refers to the likelihood for an event to happen. Probability is also known as chance.

Probability = $\frac{No.of\ total\ chances}{No.of\ desired\ chances}$

<u>Tossing a coin</u>

A coin has 2 faces ahead and a tail. When it is tossed, the probability of a head or a tail showing up is a half.

Example: A coin is tossed once, what is the probability that a head will show up?

Total chances = 2 i.e. a head and a tail

Desired chances = 1 i.e. a head

Probability = $\frac{1}{2}$

<u>Tossing a dice</u>

A dice has 6 faces i.e. {1, 2, 3, 4, 5, 6}.The probability of getting one of the faces showing up is a sixth.

Example: A die is tossed once, what is the chance that an even number will show on top?

Total chances = 6 i.e. {1, 2, 3, 4, 5, 6}

Desired chances = 3 i.e. {2, 4, 6)

Probability = $\frac{3}{6}$

Evaluation activity

1. A coin is tossed once, what is the probability that;
   a) A head will show up?
   b) A tail will show up?
2. A die is tossed once, what is the probability that;
   a) An odd number will show up?
   b) A number less than 3 will show up?
   c) A multiple of 3 will show up?
   d) A prime number will show up?
   e) A number greater than 4 will show up?

WEEK 3: Lesson 2

More about probability

Example.

1) What is the probability of picking a ripe mango, if there are 4 ripe mangoes and 6 rotten mangoes in a basket?

   Total chances = 10 i.e. 4+6 = 10

   Desired chances = 4 i.e. 4 ripe mangoes

   Probability = $\frac{4}{10}$

2) We shall go on a tour next week. What is the probability that we shall go on a day that begins with letter "T"?

Total chances = 7 i.e. {Mon, Tue, Wed, Thurs., Fri, Sat, Sun}

Desired chances = 2 i.e. {Tue, Thurs}

Probability = $\frac{2}{7}$

3) Our school will play a football match with Kampala Parents` School. What is the probability that our school will win the match?

Total chances = 3 i.e. {win, lose, draw}

Desired chances = 1 i.e. {win}

Probability = $\frac{1}{3}$

Evaluation activity

1. What is the probability of picking a ripe mango, if there are 4 ripe mangoes and 5 raw mangoes in a basket?
2. We shall go for a wedding party next week. What is the probability that we shall go on a day that begins with letter "S"?
3. In a bag, there are 3 red pens, 5 black pens, 7 green pens and 4 blue pens. Find the chance of picking;
   a) a back pen.

b) a red pen.

4. The probability that Moses will pass the test is $\frac{3}{7}$
   What is the probability that he will fail it?
5. The probability of picking an apple in a bag of 45 fruits is $\frac{5}{9}$. How many apples are in the bag?
6. What is the chance that a cow will fly tomorrow?
7. Next year Uganda will host the COMESA meeting. What is the chance that it will host in a month that begins with letter "J"

END OF SET CONCEPTS