THE PEARL EDUCATIONAL CONSULT KAMPALA SCHOOLS

PRIMARY SEVEN

LESSON NOTES

MATHEMATICS

TERM 1

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SPECIAL THANKS TO THE MANAGEMENT

PEARL KAMPALA SCHOOLS

BASIC FORMULAE USED IN PRIMARY MATHEMATICS

1. PERIMETER

Perimeter of a rectangle = L + W + L + W Or 2(L + W)

Perimeter of a triangle = S + S + S

Perimeter of a square = S + S + S + S Or 4S

Perimeter of the rhombus = S + S + S + S Or 4S

Perimeter of any regular polygon = No of sides X length.

Circumference of a circle = $2\pi r \ or \ \pi d$

Circumference of a semi circumference = $\frac{1}{2}\ \pi d$

Circumference of a quadrant = $\frac{1}{4}\ \pi d$

Circumference of a sector = $\frac{\theta}{360^0}\ \pi d \quad where\ \theta = angle\ sector.$

Perimeter of a semi-circle = $\frac{1}{2}\ \pi d + d$

Perimeter of a quadrant $= \frac{1}{4} \times 2\pi r + r + r$

2. AREA (Expressed in square units)

Area of a rectangle = L x W

Area of a square = S X S or S^2

Area of a triangle = $\frac{1}{2}\ b\ \times h \ \ or\ \frac{b \times h}{2}$

Area of a trapezium = $\frac{1}{2}\ h(a+b) \ \ or\ \frac{h\ (a+b)}{2}$

Area of a parallelogram = b x h

Area of a rhombus = $\frac{1}{2} \times d_1\ \times d_2\ or\ \frac{1}{2}bh\ \times 4right\ angled\ triangles$

Area of a kite = $\frac{1}{2} \times d_1\ \times d_2\ or\ \frac{1}{2}bh\ \times 4right\ angled\ triangles$

Area of a circle = πr^2

Area of a sector = $\frac{\theta}{360^0}\ \pi r^2 \ \ where\ \theta = angle\ sector.$

Area of a semi-circle = $\frac{1}{2}\ \pi r^2$

Area of a quadrant = $\frac{1}{4}\ \pi r^2$

3. TOTAL SURFACE AREA

T.S.A of cube = $6s^2$

T.S.A of a cylinder = $2(L \times W) + 2(W \times H) + 2(L \times H)$

T.S.A of closed cylinder= $2\ \pi r^2 + \ 2\pi rh$

T.S.A of open cylinder = $\ \pi r^2 + \ 2\pi rh$

T.S.A of a sphere = = $4\ \pi r^2$

T.S.A of a triangular prism= $2\left(\frac{1}{2}\ b\ \times h\right) + (L \times W) + (L \times W) + (L \times W)$

4. VOLUME (expressed in cubic units)

Volume of a cube = base area X height

= S x S x S

$=S^3$

Volume of a cuboid = base area X height.

= (L x W) x H

Volume of a triangular prism =base area X length

$= \left(\frac{1}{2} \times b \times h\right) \times L$

Volume of a cylinder = base area X height

$= (\pi r^2) \times h$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

5. MEASURES

Distance = Speed X Time (km or m)

Time = $\frac{distance}{speed}(hours)$

Speed = $\frac{distance}{time}(km/hr)$

To expressed Km/hr to m/s = $\frac{d \times 1000}{60 \times 60}(m/s)$ ***where d stands for distance given***

To expressed m/s to km/hr = $\frac{d \times 60 \times 60}{1000}(m/s)$ ***where d stands for distance given***

Capacity = $\frac{volume}{1000cm^3}$ **(litres)**

Profit = selling price – cost price

Loss= cost price – selling price

Selling = cost price + profit (when given profit)

Cost price = selling price + loss (when given loss)

Discount = cash paid – buying price

Percentage profit = $\left(\frac{profit}{cost\ price} \times 100\right)\%$

Percentage loss = $\left(\frac{loss}{cost\ price} \times 100\right)\%$

Percentage discount = $\left(\frac{discount}{marked\ price} \times 100\right)\%$

Simple interest = Principal X Rate X Time

Amount = Principal + Interest

Mean(average) = $\frac{sum\ of\ items}{number\ of\ items}$

Sum of items when given Average and number = Average X Number of items.

TRIANGULATION

Number of right angles = 2n - 4 $where\ n\ stands\ for\ sides$

Number of triangles=$(n-2) where\ n\ stands\ for\ sides$

Interior angle sum = $180^0(n-2)\ or\ 90^0(2n-4)\ where\ n\ stands\ for\ sides$

Exterior angles = $\frac{360^0}{number\ of\ sides}$

Number of sides of a regular polygon = $\frac{360^0}{Each\ exterior\ angle}$

Number of revolutions = $\frac{distance\ covered}{circumference}$

FACT SUMMARY/EQUIVALENCIES

1km = 1000m

$1m^3 = 1000 litres$

1hectare = 10,000m^2

1 tonne = 1000kg

$1m^2 = 10{,}000m^2$

1litre = 1000ml

1 day = 24 hours

1 fortnight = 14days

A score = 20 items

1dozen = 12 items

A gross = 144 items

1 hour = 60mins

1hour = 3600sec

Millennium = 1000years

Century = 100years

Golden jubilee = 50years

Silver jubilee = 25years

Decade = 10 years

Leap year = 366years

Ordinary year = 365years

THEME: SET CONCEPTS

TOPIC; SETS

A set is a group of well-defined elements

a. Describing the given sets:

1) Q = {2, 3, 5, 7}
   A set of the first 4 prime numbers
2) K = {Jan, Feb, March, April, May}
   A set of the first 5 months of the year.
3) T = {Mon, Tue, Wed, Thur, Fri, Sat, Sun}
   A set of days the week.
4) E = {1, 3, 5, 7, 9, 11, 13, 15,17, 19,21, 23, 25}
   A set of the first 13 odd numbers.
5) Y = {2, 3, 5, 7, 11, 13, 17, 19, 23, 29}
   A set of the first 10 prime numbers.

Activity

a. F = {1, 3, 6, 10, 15, 21, 28, 35}
b. W = { 1, 4, 9, 16, 25, 36, 49, 64, 81, 100}
c. G = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9}
d. H = {1, 2, 3, 4, 5, 6, 7, 8, 9}
e. R = {1, 8, 27, 64, 125, 216, 243}
f. Z = {4, 6, 8, 9, 10, 12, 14, 15}
g. K = {5, 10, 15, 20, 25, 30, 35, 40}
h. M = {10, 20, 30, 40, 50, 60, 70}

Listing elements of the given sets:

a) P = {composite numbers between 5 and 30}
   P= {4,6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 22, 24, 25, 26, 28}
b) Q = {prime numbers less than 20}
   Q = {2, 3, 5, 7, 11, 13, 17, 19}

Activity

List down the sets as described in brackets

a. W = {square numbers between 0 & 401}
b. Y = {common factors of 6 and 18}
c. R= {Factors of 24}
d. S = {multiples of 3 between 5 & 40}
e. Z = {whole numbers between 3 & 10}
f. K = {triangular numbers between 5 & 37}
g. N = {even numbers between 1 & 17}
h. T = {odd numbers between 10 & 40}

TYPES OF SETS

1. **Equal sets (=)**

These are sets with the same number of elements which are exactly the same.

e.g A= {a, b, c, d}

B= {d, b, c, a}

Set A = Set B

2. **Equivalent sets. (⟷)**

These are sets with the same number of elements which are not exactly the same.

A= {a, b, c, d}

B= {k, b, x, a}

set A ⟷ set B

3. **Empty sets** (Ø)

These are sets without members or elements.

Examples of empty sets.

A set of girls who fly in air

A set of fish that live on land.

A set of pregnant boys.

A set of pupils with two heads each

A set of breast-feeding fathers.

4. **Intersection of sets (∩)**

These are sets with common members from two or more given sets

Given that P= {1,2,3,4,5,6,7} and set T = {1,3,5,7,9}

Find P∩T

P= {1,2,3,4,5,6,7}

T= {1,3,5,7,9,11}

P∩ T = {1,3,5,7}

UNION SET

This refers to a collection of all members in the given sets without repeating the common members.

The symbol for union set is written as ∪

5. Given that:

Set P = {Petra, Peter, Petronia, Percy}

Q = {Pretty, Patience, Peter, Petronia}

Find: P∪ Q

P = {Petra, Peter, Petronia, Percy}

Q = {Pretty, Patience, Peter, Petronia}

P∪ Q = {Petra, Peter, Petronia, Percy, Pretty, Patience}

ACTIVITY

1. Given that:
   Set P = {1, 2, 3, 4, 5}
   N= {1, 3, 5, 6, 7}

a. P ∩N
b. P∪N

2. If set A = {odd numbers less than 13}
   B = {prime numbers less than 15}

a. Find A∩B
b. Find A∪B

3. Set H = {factors of 12} and set T= {composite numbers less than 10}

a. Find A∪B
b. Find A∩B

4. If set Z = {whole numbers between 3 & 10}
   K = {triangular numbers between 5 & 20}. Find the union set

5. Given that:
   Set P = {0, 2, 4, 6, 8, 10, 12}
   N = {2, 3, 5, 6, 7}

c. P ∩N
d. P∪N

6. Given that M ={ a, b, k, j}
   N = {a, c, k}
   Find:

a. M ∩ N
b. M∪N

7. If C = {2, 7, 10, 17}
   D ={5, 6, 7, 11, 15}
   Find:

a. D ∩ C
b. C∪D

8. Given that:
   X = {prime numbers less than 7}
   Y = {multiples of 2 less than 7}

a. List down the members of the two sets
b. X ∩Y

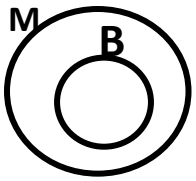
Subsets

Subsets are sets derived from the mother set

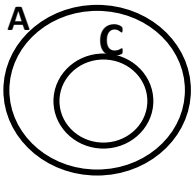
The symbol for subset is written as $\subseteq$

Examples of subsets

- All boys are males



All cows are animals



ACTIVITY

Draw the diagrams to show that:

a. All girls are females
b. All cows are animals
c. All turkeys are birds
d. All oranges are fruits
e. All Ugandans are Africans

Listing subsets

Finding subsets by listing method:

a. How many subsets are in set R?

If R = {a, b}

Subsets = { }, {a}, {b}, {a, b}, {a, b}

= 5 subsets

b. Given that A = {a, b, c}

Find the number of subsets in set A.

A= {a, b, c}

Subsets = { }, {a}, {b}, {c}, {a, b}, {a, c}, {b, c}, {a, b, c}

= 8 subsets

Activity

a. If set A ={1, 2, 3}
Find the number subsets in set A.
b. Set W = {r, s, t, y}
How many subsets are in set W?
c. Set B = { 0, 2, 4, 6}
How many subsets are in set B?
d. If set Z = {a},how many subsets are in set Z?
e. Given that set B = {2, 4}
How many subsets are in set B?
f. Given that R = {m, a, n}
Find the number of subsets in set R.

a. Finding subsets by using formula:

Subsets = 2^n

n stands for number of elements.

1. Set A = {a, b, c, d, e, f}. Find the number of subsets.

   Set A = {a, b, c, d, e, f}

   Subsets = 2^n

   = 2^6

   = $2 \times 2 \times 2 \times 2 \times 2 \times 2$

   = 64 subsets

Activity

Find the number of subsets in the following sets;

2. Set A = {a, b, c}
3. Set B = {a, d}
4. Set C = {q, r, s, t}
5. Set Z = { wa}
6. Set Y = { }
7. Set P = {1, 3, 5, 7}
8. Set R = {a, e, i, o, u}
9. Set Q = {m, a, r, k, e, t}

Proper subsets

These are subsets without a mother set

The formula for finding proper subsets is given by $2^n - 1$

Where n stands for number of elements.

Examples

1. If set A = {p, m, n, st} find the number of proper subsets of set A

Method one

By using a formula

A = {p, m, n, st}

Proper subsets = $2^n - 1$

= $2^4 - 1$

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

=$16 - 1$

= $15\ subsets$

method two

by listing down

A = {p, m, n, st}

proper subsets= { }, {p}, {m} {n}, {st}, {p,m}, {p,n}, {p, st}, {m, n}, {m, st},{n, st} {p, m, n} {p, n, st}, {p, m, st}, {m, n,st}

15 subsets.

ACTIVITY

Find the proper subsets in the following sets:

By listing down

1. Set W = {1, 2, 3}
2. Set P = {a, b, c}
3. Set Q = {Jane, James, Joan, Janet}
4. Set Z = { r, s, t, u, v}
5. Set R = {1, 2, ab}

By calculation method

Set M ={1, 2, 3, 4, 5, 6}

Set K = {a, b, c, 1, 2, 3, 4}

Set T= {Jane, James}

Set K = {0, 2, 4, 6, 8, 10, 12, 14, 16}

APPLICATION OF SUBSETS

Finding the number of elements **when given the number of subsets or proper subsets**

Examples

1. Given that set A has 16 subsets. How many members has set A?

$$subsets = 2^n$$
$$16 = 2^n$$
$$2^4 = 2^n$$
$$4 = n$$
$$n = 4$$

Set A has 4 elements.

2	16
2	8
2	4
2	2
	1

2^4

Activity

1. Set P has 16 subsets. Find the number of elements in set P.
2. Set M has 256 subsets. How many elements are in set M?
3. There are 128 subsets. Find the number of elements in that set.
4. How many elements in a set with 64 subsets?
5. Find the number of elements in a set with 32 subsets

Finding the number of elements when proper subsets are given

Example

1. Set R has 15 proper subsets. Find the number of elements in set R.

$$Proper\ subsets = 2^n - 1$$
$$15 = 2^n - 1$$
$$15 + 1 = 2^n - 1 + 1$$
$$16 = 2^n$$
$$2^4 = 2^n$$
$$4 = n$$
$$n = 4$$

Set R has 4 elements

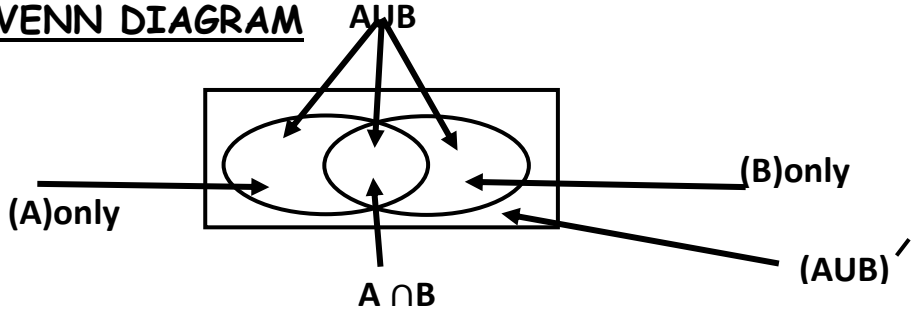
2	16
2	8
2	4
2	2
	1

2^4

Activity

1. A set has 255 proper subsets. How many elements are in the set?
2. Set P has 7 proper subsets. How many elements are in set Q.
3. Find the number of elements of a set with 63 subsets.
4. Set W has 31 proper subsets. How many elements are in set W?
5. Set Z has 127 proper subsets. How many elements are in set Z

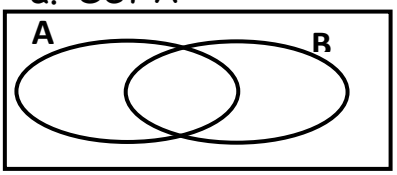
PARTS OF A VENN DIAGRAM



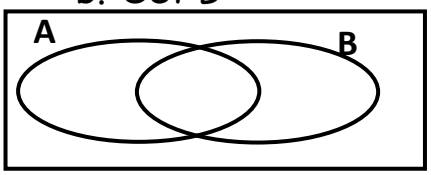
Activity

Shade the following parts of the venn diagram

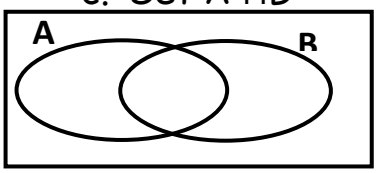
a. Set A



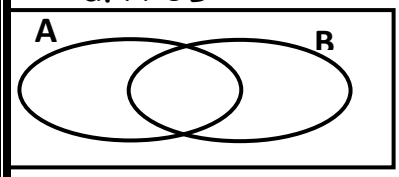
b. Set B



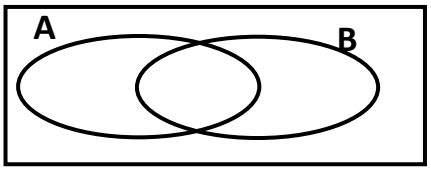
c. Set A ∩B



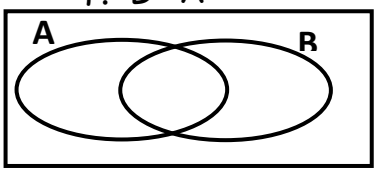
d. A ∪B



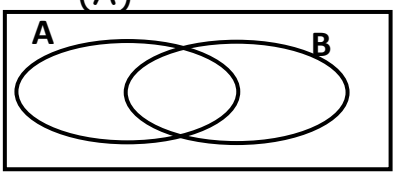
e. Set A- B



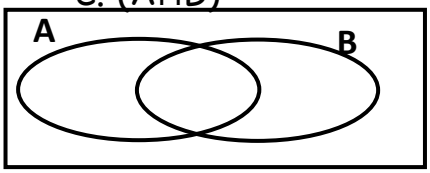
f. B- A



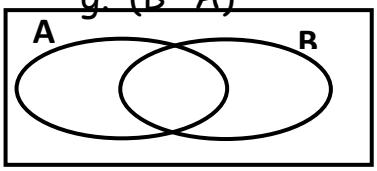
$(A)^{I}$



e. $(A \cap B)^{I}$



g. $(B-A)^{I}$



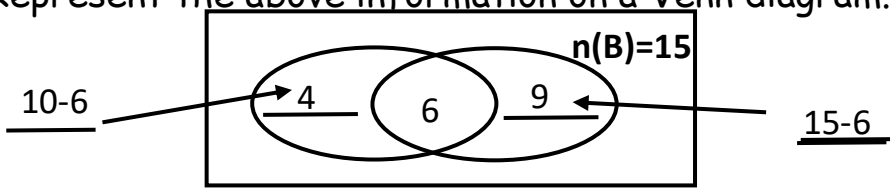
APPLICATION OF SETS

PART ONE

Example 1

1. Given that n (A) = 10, n (B) = 15 and n (A ∩ B) = 6.

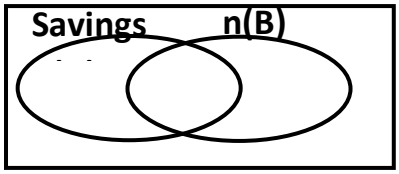
b) Represent the above information on a Venn diagram.



Activity

1. Given that n(A-B) = 10, n(B-A)=15 and n(A∩B) = 12

a. Complete a venn diagram for the above information.



a. Find the elements in;

i). Set B

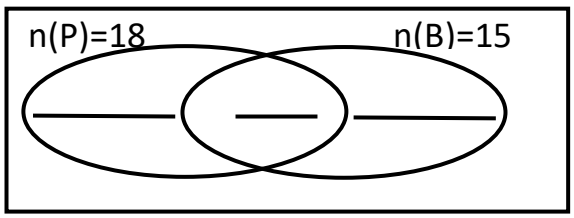
ii). Set A

iii). AuB

iv). (A∩B) complement

2. In a class, 18 pupils eat posho(P) and 15 pupils eat beans(B). If 8 eat both posho and beans,

a. Complete the venn diagram to represent the above information



b. How many pupils eat posho only?
c. How may pupils eat beans only?
d. How many pupils eat only one type of food?

3. Given that 21 farmers grow beans (B) and 17 farmers grow groundnuts (G). if 9 farmers grow both beans and groundnuts
   a. Draw a Venn diagram to represent the above information
   b. How many farmers grow beans only?
   c. How many farmers grow ground nuts only?
   d. How many farmers grow only one type of crop?
4. In a market there are 30 traders out of whom 19 sell beans(B), 11 sell both beans and cassava(C)
   a. Draw a Venn diagram to show the above information
   b. How many traders sell only cassava?
   c. How many traders sell only one type of food?
5. Given that n (K) = 42, n(Q) = 37 and n(K ∩Q) = 29
   a. Draw the Venn diagram to represent the above information
   b. Find n(k∪Q)
   c. Workout K- Q
   d. What is Q – K

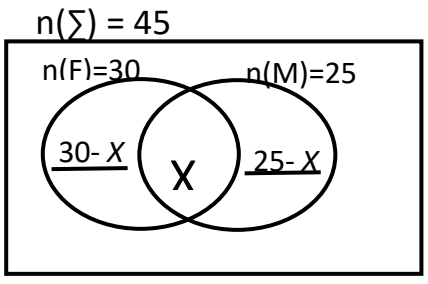
APPLICATION OF SETS

PART TWO

EXAMPLE

1. In a class of 45pupils, 30pupils fish(F) and 25 pupils eat meat(M), x pupils eat both types of dishes

a. Draw a Venn diagram to show the above information.



b. How many pupils eat both?

$$(30 - X) + X + (25 - X) = 45$$
$$30 - X + X + 25 - X = 45$$
$$30 + 25 + X - X - X = 45$$
$$55 - X = 45$$
$$55 - 55 - X = 45 - 55$$
$$-X = -10$$
$$\frac{-X}{-1} = \frac{-10}{-1}$$
$$x = 10$$

n(F∩M) =X
= 10

10 pupils eat both types of dishes

b. How many pupils eat only one type of dish?

only one type of dish = n(M) only + n()only

$= (30- X) + (25- X)$

$=(30- 10) + (25- 10)$

$= 20 + 15$

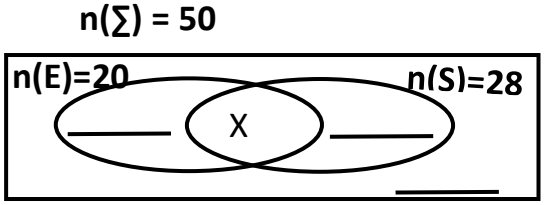
$= 35$

35 pupils eat only one type of dish

Activity

1. In a class of 50 pupils, 20 like English, 28 like Science (S), X like both subjects while 7 do not like any of the two subjects.

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

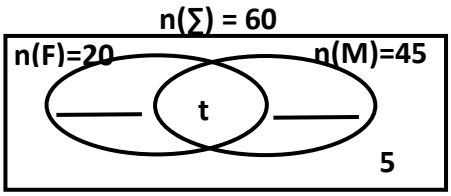


c) How many pupils like both subjects?

d) Find the number of pupils who like only one subject.

e) Find the probability that a pupil who likes only one subject is chosen at random.

2. The Venn diagram below represents pupils in a class who like Fanta (F) and Mirinda (M).if there are 60 pupils in the class.

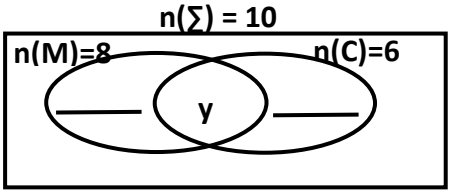


a. Find the Value of t

b. How many pupils like only one type of drink?

3. In a home of 10 people, 8 like eating meat(M), 6 like eating chicken (C) and y like eating both.

a. Complete the Venn diagram below;



a. Find the Value of y

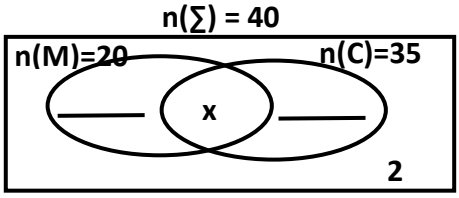
b. How many pupils like only eating;

i) meat only

ii). Meat only

4. In a class of 40 pupils 20 like English (E), 35 like Maths (M) and 2 do not like any of the two subjects.

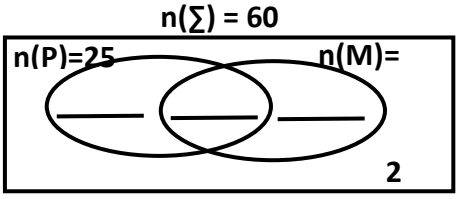
a. Complete the Venn diagram below;



a. Find the number of pupils who like both subjects.
b. Find the number of pupils who like only one type of subject.
c. How many pupils do not like English?

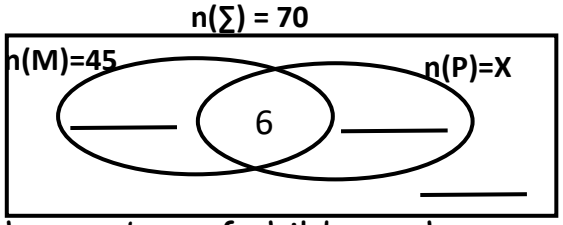
5. In a class of 60 pupils, 25 drink Pepsi cola (P), n drink Mirinda (M) only, 20 drink both types of sodas and 5 drink none.

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



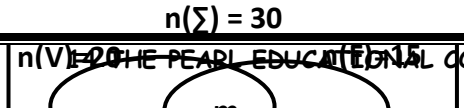
a. Find the value of n.
b. How many pupils drink only one type of soda?
C. How many pupils like Miranda altogether?

6. In a class of 50 pupils, 20 pupils like matooke(M), 35 like apples(A), 5 like neither of the two and y like both matooke and apples
   a. Draw the Venn diagram to represent the above information.
   b. Find the value of y
   c. Find the probability of selecting a pupil at random who likes only one food
7. In a class of 40 pupils, 26 like English(E) and 24 like Maths(M), If x pupils like both subjects
   a. Draw the Venn diagram to represent the above information
   b. Find the value of x
8. Seventy children were taken to a clinic for immunization. 45 were immunized against measles (M), X were immunized against polio (P), 6 were immunized against measles and polio and 1 child was not immunized at all.
   a. Represent the above information on the Venn diagram.



   b. Find the number of children who were immunized against polio only.
   c. How many children were immunized only one type of diseases?
9. In a class of 30 pupils 20 play Volleyball (V), 15 play Football (F), m play both games and 2 do not play any of the two games.

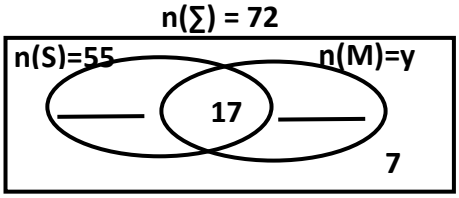
a. Use the above information to complete the Venn diagram below.



a. Find the value of m.
b. How many pupils play only one game?

10. At a birth day party, 72 guests were invited. 55 were served with sodas (S), y guests were served with mineral water (M) while 7 did not take any of the two drinks and 17 were served with both sodas and mineral water.

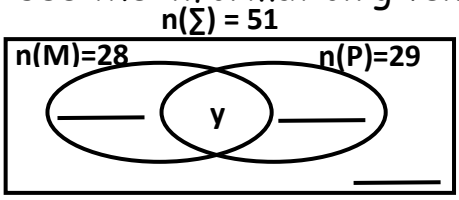
a. Represent the above information on the Venn diagram below.



a. Find the value of Y
b. How many guests were served with one drink only?

11. In a class party of 51 pupils, 28 drank Miranda (M), 29 drank pepsi (P), y drank both Miranda and pepsi while 6 did not drink any of the two sodas.

a. Use the information given above to complete the Venn diagram below.



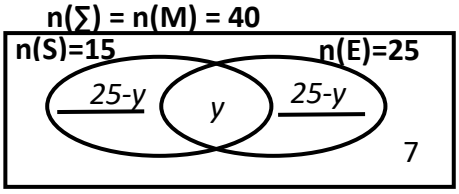
a. Find the value of y.
b. Find the number of pupils who drank one type of soda

APPLICATION OF SETS

PART THREE

1. In a class of 40 pupils, all of them like Maths (M), 7 pupils like Maths only,15 like both Science (S) and Maths and 25 like both English(E) and Maths

a. Complete the Venn diagram.



b. How many pupils like only two types of subjects?

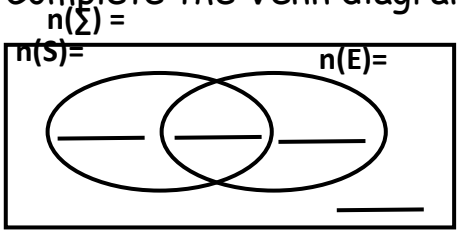
$(15 - y) + y + (25 - y) + 7 = 40$
$15 - y + y + 25 - y + 7 = 40$
$15 + 25 + 7 + y - y - y = 40$
$47 - y = 40$
$47 - 47 - y = 40 - 47$
$-y = -7$
$\frac{-y}{-1} = \frac{-7}{-1}$
$y = 7$

only one type of subject
n(M∩S) + n(M∩E)
(15-y) + (25-y)
(15-7) + (25- 7)
8 + 18
26
26 pupils like only two types of subjects

Activity

1. In an examination, all the 45 pupils sat for Mathematics(M), 20 pupils sat for both Science(S) and Maths(M), 26 sat for both English(E) and Math(M), 4 pupils sat for only Maths and x sat for all the three subjects.

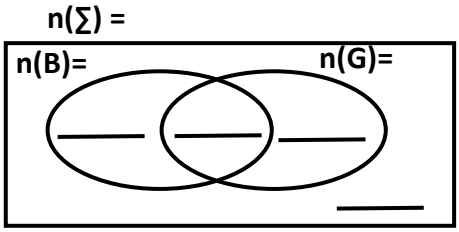
a. Complete the Venn diagram below.



a. Find the value of x
b. How many pupils sat only two subjects?
c. What is the probability of having a pupil who likes only one subject?

2. In a class of 50 pupils, all of them eat chicken(C), 25 eat both chicken and beef(B), 30 eat both G. nuts stew(G) and chicken while y eat all the three food stuffs yet 3 of them eat chicken only.

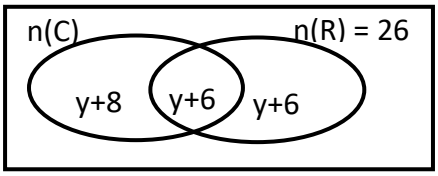
b. Complete the Venn diagram



a. Find the value of y
b. Find the probability of selecting a pupil at random who likes only two food stuffs.

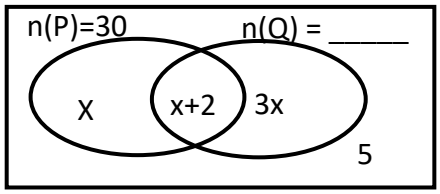
PART FOUR

1. At a part, 26 guests took Riham(R) and the rest took Coke as shown below



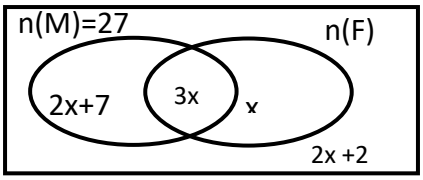
a. Find the value of y
b. How many guests took coke?
c. How many guests took both coke and Riham?

2. Study the venn diagram below and use it to answer the questions that follow



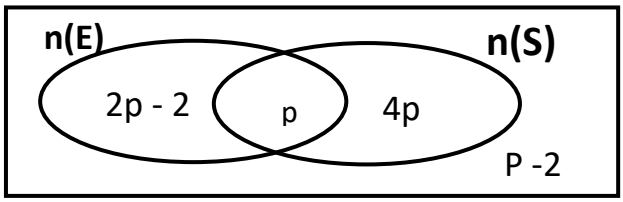
Given that n(P)= 20, Find
a. Value of x
b. n(Q)
c. n(P∩Q)

3. The Venn diagram below shows 45 children in Namuli Primary school who eat Meat(M) and fish(F). Study it to answer questions that follow.



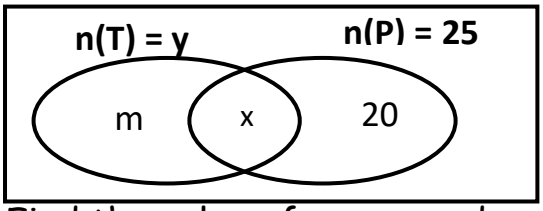
c. Find the value of x.
d. How many pupils like fish
e. If a pupil is picked at random, find the probability that he likes neither of the two sauces.

4. The Venn diagram below shows the number of pupils and the subjects they like. Some like English(E)and others like Science(S). If 34 pupils like only one subject.



a. Find the value of p	b. How many pupils like science?
c. How many pupils are in class?	d. If the pupil is picked at random, what is the probability that the pupil does not like any the two subjects?

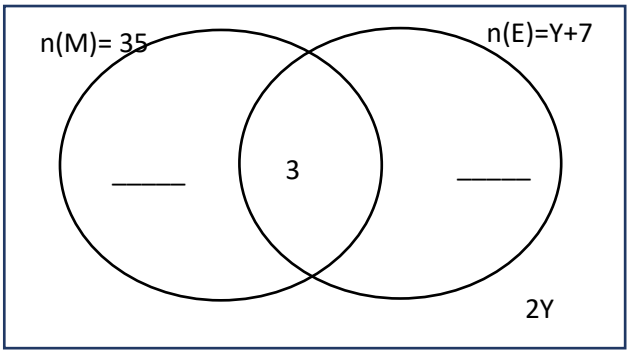
5. Study the Venn diagram below and answer the questions



Find the value of x , m , and y

6. In a class of 72 pupils in GMS, 35 like Mathematics(M), 3 Like both Mathematics and English (E), 2y like neither Mathematics nor English while y +4 Like English only.

a) Complete the Venn diagram below;



b) Find the value of Y?

c) Find the number of pupils who like one subject.

THEME: NUMERACY

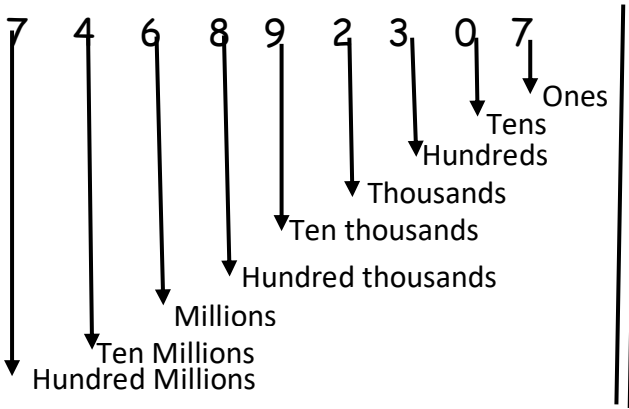
TOPIC: NUMERATION SYSTEMS AND PLACE VALUES

SUBTOPIC: WHOLE NUMBERS

- **Place values and values of whole numbers up to ten millions.**

A place value is a position of a digit in a given number.

Write the place values of each digit in the numbers 746892307



VALUES OF NUMBER

A value is a product of a digit and its place value.

Write value of each digit in the number 748372

7 4 8 3 7 2

$2 \times 1 = 2$

$7 \times 10 = 70$

$3 \times 100 = 300$

$8 \times 1000 = 8000$

$4 \times 10000 = 40000$

$7 \times 100000 = 700000$

Activity

a. Write the place value of 3 in the number 4132
b. State the place value of 4 in the number 340017.
c. What is the place value of 4 in the number 240?
d. State the place value of each digit in the number 10345.
e. Find the value of 5 in the number 65011.
f. State the value of 4 in the number 9473.
g. Identify the values of the digits 3 and 5 in the number 3958.
h. Identify the value of 4 in the number 340017.
i. Find the value of 3 in the number 4312
j. What is the value of 9 in the number 49312846?

More about place values and values

Example

Find the difference between the place value of 9 and the value of 7 in the number 9473.

9 4 7 3

$Tens = 10$

$9 \times thousands = 9 \times 1000 = 9000$

difference

9 0 0 0
- 1 0
8 9 9 0

ACTIVITY

a. Find the product of the place value of 3 and the place value of 8 in the number 3684.
b. Find the difference between the place value of 8 and the place value of 9 in the number 78593.

c. Find the sum of the value of 9 and the place value of 5 in the number 3958.
d. Find the difference between the place value of 6 and the place value of 4 in the number 684.
e. Find the product of the place value of 6 and the place value of 8 in the number 3648.
f. Find the product of the values of 2 and 4 in the number 52346.
g. Find the quotient between the place value of 6 and the place value of 3 in the number 638.
h. Find the sum of the value of 9 and the place value of 7 in the number 97845.
i. Find the quotient between the value of 3 and the place value of 5 in the number 3596.
j. Find the difference between the value of 8 and the place value of 5 in the number 8523.

EXAPANDING WHOLE NUMBERS

(a). **USING PLACE VALUES.**

Expand 6,845 using place values.

TH H T O
6 8 4 5

$(\mathbf{6 \times 1000}) + (\mathbf{8 \times 100}) + (\mathbf{4 \times 10}) + (\mathbf{5 \times 1})$

b). USING VALUES.

Expand 3983 using values

TTH TH H T O
7 3 9 8 3

$(\mathbf{7 \times 10000}) + (\mathbf{3 \times 1000}) + (\mathbf{9 \times 100}) + (\mathbf{8 \times 10}) + (\mathbf{3 \times 1})$

$\mathbf{70000 + 3000 + 900 + 80 + 3}$

c). USING POWERS OF TEN (EXPONENTS)

1. Expand 607818 using powers of 10

Powers	**5**	**4**	**3**	**2**	**1**	**0**
number	**6**	**0**	**7**	**8**	**1**	**8**

$(6 \times 10^5) + (0 \times 10^4) + (7 \times 10^3) + (8 \times 10^2) + (1 \times 10^1) + (8 \times 10^0)$

Exercise

1. Expand the following using place values.
a. 3565
b. 9991
c. 60392
d. 539073

2.Expand the following using values
a. 828
b. 830382
c. 5093

3.Expand the following using exponents
f. 3407
g. 790325
h. 6781
i. 933555

FINDING THE EXPANDED NUMBERS

What number has been expanded to give the following?

a. $(\mathbf{5 \times 100000}) + (\mathbf{7 \times 1000}) + (\mathbf{9 \times 10}) + (\mathbf{2 \times 1})$

$(5 \times 100000) + (7 \times 1000) + (9 \times 10) + (2 \times 1)$

$500000 + 7000 + 90 + 2$

$$\begin{array}{r} 500000 \\ 7000 \\ 90 \\ +\quad 2 \\ \hline 507092 \end{array}$$

b. $(\mathbf{9 \times 10^4}) + (\mathbf{3 \times 10^2}) + (\mathbf{7 \times 10^0})$

$(9 \times 10^4) + (3 \times 10^2) + (7 \times 10^0)$

$(9 \times 10000) + (3 \times 100) + (7 \times 1)$

$90000 + 300 + 7$

$$\begin{array}{r} 90000 \\ 300 \\ +\quad 7 \\ \hline 90307 \end{array}$$

Activity

a. What number has been expanded?

a.$(8x10^4)+ (6x10^3) + (2x10^1) + (5x10^{0)}$

b.$(7x10^4)+ (4x10^2) + (2+10^0)$

c.$(5x10^4)+ (4x10^3) + (7x10^2) + (2x10^0)$

d.$(9x10^2) + (8x10^0)$

WRITING NUMBERS IN WORDS

1. Write 34,782 in words.

THOUSANDS	UNITS
34	782

Thirty four thousand seven hundred eighty two.

2. Write 1,486,019 in words.

MILLIONS	THOUSANDS	UNITS
1	486	019

One million four hundred eighty-six thousand nineteen

Activity

Write the following in words.

a. 230,136

b. 5,528,671

c. 90,128

d. 92,76,949

e. 8,481,005

Writing words in figures

Examples

1. Write twenty-two thousand nine hundred ninety-two in figures

Twenty-two thousand…… 22000
Two hundred…… 900
Twenty two …….. + 92
22992

2. Write five million, four hundred thousand seven hundred sixteen in figures.

Five million……5,000,000
Four hundred thousand…… 400,000
Seven hundred sixteen…… + 716
5,400,716

Activity

a. Six thousand nine hundred fifty.
b. Seventeen thousand nine hundred fifty.
c. Three hundred fifty-three.
d. Eight million six thousand eight.
e. Half a million.
f. Fourteen thousand six hundred forty-nine
g. One million one hundred eleven thousand one hundred eleven.

DECIMALS.

PLACE VALUE OF DECIMALS

A place value is a position of a digit in a given number.

Write the place values of each digit in the numbers 7.4689

7	.	4	6	8	9

Ones
Tenths
Hundredths
Thousandths
Ten thousandths

VALUES OF DECIMALS NUMBER

A value is a product of a digit and its place value.

Write value of each digit in the number 4.8372

4 . 8 3 7 2

$\frac{2}{10000}$ $\frac{7}{10000}$

ACTIVITY 1

a. Write the place value of 3 in the number 4.132
b. State the place value of 1 in the number 3.40017
c. What is the place value of 4 in the number 2.406?
d. State the place value of each digit in the number 1.0345.
e. Find the value of 5 in the number 6.0115.
f. State the value of 4 in the number 94.7
g. Identify the values of the digits 3 and 5 in the number 3958.

ACTIVITY

Write the place value of each digit in the following numbers

a. 43.728 b. 8.2839 c. 72.821 d. 0.0129

WRITING DECIMALS IN WORDS.

1. Write 4.8 in words.

O	.	Tth
4	.	8

Four and eight tenths

2. Write 15.07 in words

T	O	.	Tths	Hths
1	5	.	0	7

Fifteen and seven hundredths

ACTIVITY

Write the following in words

a) 4. 829 b) 0. 45 c) 34.728 d) 18. 37

Writing decimals in figures

1. Thirty-six and four tenths in figures

Thirty-six …… 3 6

Four tenth…….$\frac{4}{10}$ =+ 0. 4

3 6. 4

2. Write eight and sixty-seven hundredths in figure

Eight ……**8**

Sixty-seven hundredths……$\frac{67}{100}$ = +**0.67**

8.67

Activity

Write the following in figures

a. Five tenths
b. Eighteen hundredths
c. Six and six hundredths
d. Three and forty-five thousandths
e. Ninety-four and one hundred twenty-six thousandths
f. Ninety-four and eight thousandths.

ROMAN NUMERALS

Basic roman numerals

Hindu Arabic	1	5	10	50	100	1000
Roman numerals	I	V	X	L	C	M

Numerals obtained by repeating

2 = 1+1
= II

3 = 1+ 1+1
= III

200 = 100+100
= CC

20 = 10 + 10
= XX

30 = 10+10+10
= XXX

300 = 100 + 100 +100
= CCC

Numerals obtained by addition

6 = 5 + 1
= VI

7 = 5 + 2
= VII

8 = 5 + 3
= VIII

60 = 50 + 10
= LX

70 = 50 + 20
= LXX

80 = 50 + 30
= LXXX

600 = 500 + 100
= DC

700 = 500 + 200
= DCC

800 = 500 + 300
= DCCC

Numerals obtained by subtracting

4 = (1 from 5)
= IV

9 = (1 from 10)
= IX

40 = (10 from 50)
= XV

90 = (10 from 100)
= XC

400 = (100 from 500)
= CD

900 = (100 from 1000)
= CM

Writing numerals in roman numerals

Examples.

Write 124 in roman numerals

124 = 100 + 20 + 4

= C XX IV

= CXXIV

ACTIVITY

Write the following in roman numerals

b. 49

c. 445

e.765

g.868

b. 34

d. 56

f. 999

h. 1985

WRITING IN HINDU ARABIC NUMERALS

Express MCMXCVI in Hindu Arabic numerals

MCMXCVI = M CM XC IV

= 1000 + 900 + 90 + 4

= 1994

ACTIVITY

Write the following in roman numerals

Write the following in Roman numerals

a. XIX

b. CDXLV

c. CMLXIX

d. DCXXIV

e. CCCXCIX

NUMBER SYSTEMS

TYPES OF NUMBERS

Natural numbers

These are numbers used in counting. They are also called counting numbers. They start from 1 but do not have the ending point. Eg {1,2,3,4,5,6,7,8,9,10,11,12,13…….}

Finding consecutive counting numbers

1. The sum of 3 consecutive counting numbers is 36. What are these numbers?

   Let the first number y

1st no	2nd no	3rd no	Sum
Y	y+1	y+2	36

$y + y + 1 + y + 2 = 36$

$y + y + y + 1 + 2 = 36$

$3y + 3 = 36$

$3y + 3 - 3 = 36\text{-}3$

$3y = 33$

$\frac{3y}{3} = \frac{33}{3}$

$y = 11$

1st number = y

=11

2nd number = y+1

=11+1

3rd number = y+1

= 11+2

13

The numbers are 11, 12, and 13

The sum of 3 consecutive counting numbers is 21. If the middle number is m, find the sum of the first and third number

1st no	2nd no	3rd no	Sum
m-1	M	m+1	21

$m - 1 + m + m + 1 = 21$

$m + m + m + 1 - 1 = 21$

$3m + 0 = 21$

$3m = 21$

$\frac{3m}{3} = \frac{21}{3}$

$y = 7$

1st number =m-1

=7-1

=6

2nd number =7

3rd number =m+1

=7+1

= 8

1st number = 6

3rd number=+8

sum =14

ACTIVITY

1. The sum of three consecutive counting numbers is 39. What are the numbers?
2. Find the three consecutive counting numbers whose sum is 51.
3. List the 4 consecutive counting numbers whose total is 86.
4. The three consecutive counting numbers is 93 what are the numbers?
5. Find the difference between the 1st and the 3rd counting numbers if the middle number is k and the sum of the three numbers is 72.
6. The sum of three consecutive counting numbers is 33, if the third number is x. what are the numbers?
7. The sum of three consecutive counting numbers is 126. Find the square of the middle number.

Whole numbers

These are numbers_starting from 0 and do not have the ending point.eg {0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16……}

Even numbers

These are numbers which are exactly divisible by 2

These are numbers which can completely be paired

Eg {0,2,4,6,8,10,12,14,16,18,20……..}

Prime numbers

A prime number is number which has only two factors 1 and itself.

E.g {2,3,5,7,11,13,17……..}

Composite numbers

These are numbers which have more than two factors

e.g{4,6,8,9,10,12,14,15,16,18,20…….}

Odd numbers. These are Numbers are not exactly divisible by 2.

They are not completely paired so they give 1 as a remainder

E.g {1,3,5,7,9,11,13,15,17,19,21….}

Finding consecutive even numbers or odd numbers

Even and odd numbers increase or decrease by 2

1. The sum of three consecutive even numbers is 24. List the three numbers.

   Let the first number y

1st no	2nd no	3rd no	Sum
Y	y+2	y+4	24

$y + y + 2 + y + 4 = 24$

$y + y + y + 2 + 4 = 24$

$3y + 6 = 24$

$3y + 6 - 6 = 24\text{-}6$

$3y = 18$

$\frac{3y}{3} = \frac{18}{3}$

$y = 6$

1st number = y

=6

2nd number =y+2

=6+2

=8

3rd number = y+4

= 6+4

= 10

The numbers are 6, 8, and 10

2. The sum of 5 consecutive even numbers is 150, if their median is n. What are the numbers

   Median is n

1st no	2nd no	3rd no	Sum
n-2	n	n+2	150

$(n - 2) + n + (n + 2) = 150$

$n - 2 + n + n + 2 = 150$

$n + n + n + 2 - 2 = 150$

$3n = 150$

$\frac{3n}{3} = \frac{150}{3}$

$y = 50$

1st number = n-2

=50-2

= 48

median =50

3rd number = n+2

= 50+2

= 52

The numbers are 48, 50, and 52

ACTIVITY

1. The sum of three consecutive odd numbers is 32 what are the numbers?
2. Find the three consecutive even numbers whose total is 42.
3. The sum of three consecutive odd numbers is 45. Find their range
4. The sum of 4 consecutive even numbers is 52. Find the quotient of the 2^{nd} and 4^{th} number.
5. The sum of 4 consecutive odd numbers is 88. What is the range of the numbers?
6. The sum of three consecutive odd numbers is 216. Find the numbers
7. The sum of 5consecutive odd numbers is 205. Find the product of the first and fifth number.

Square numbers

These are numbers which are perfect squares. They are obtained by squaring natural numbers eg

$1 \times 1 = 1^2 = 1$

$2 \times 2 = 2^2 = 4$

$3 \times 3 = 3^2 = 9$

$4 \times 4 = 4^2 = 16$

$5 \times 5 = 5^2 = 25$

$6 \times 6 = 6^2 = 36$

Square numbers ={1,4,9,16,25,36,49,64,81,100…….}

Square numbers are also obtained by adding consecutive odd numbers starting from 1

Example 1 =1

1+3 =4

1+3+5 =9

1+3+5+7 =16

1+3+5+7+9 =25 etc

Triangular numbers

These are number obtained by adding consecutive natural numbers starting with 1

Examples

1 =1

1+2 =3

1+2+3 =6

1+2+3+4 =10

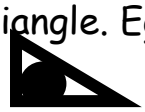
1+2+3+4+5 =15

1+2+3+4+5+6 =21

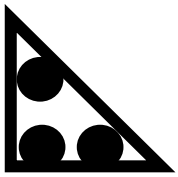
1+2+3+4+5+6+7 =28

Triangular numbers = {1, 3, 6, 10, 15, 21, 28…….}

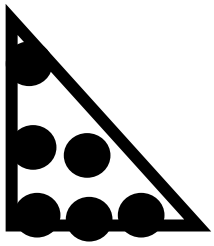
Triangular numbers are also numbers that can be arranged to form a perfect triangle. Eg



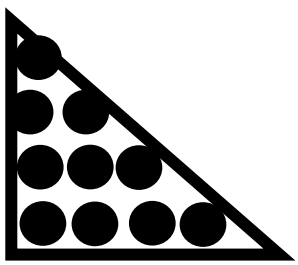
_____1



_____3



_____6



_____10

More about triangular numbers

What is the 7^{th} triangular number?

Triangular no = $n(\frac{n+1}{2})$

= $7(\frac{7+1}{2})$

= $7(\frac{8}{2})$

= 7 x 4

=28

Activity

1. What is the 4^{th} triangular number?
2. Find the 20^{th} triangular number?
3. What is the 9^{th} triangular number?
4. What is the 7^{th} triangular number?
5. What is the 30^{th} triangular number?
6. What is the difference between the 15^{th} triangular number and the 20^{th} triangular number?

Cube numbers

These are obtained by cubing natural numbers.

These are numbers obtained by multiplying counting numbers by themselves thrice.

Examples

1X1X1 =1

2X2X2 =8

3X3X3 =27

4X4X4 =64

5X5X5 =125

6X6X6 =216

Cube numbers = {1, 8, 27, 64, 64, 125, 216……}

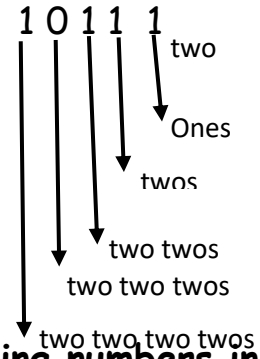
BASES

Below are some of the systems their name and digits used in each

Base	Name of base	Digits used
Base two	Binary base	0,1
Base three	Ternary base	0,1,2
Base four	Quaternary base	0,1,2,3
Base five	Quinary base	0,1,2,3,4
Base six	Senary base	0,1,2,3,4,5
Base seven	Septenary base	0,1,2,3,4,5,6
Base eight	Octal base	0,1,2,3,4,5,6,7
Base nine	Nonary base	0,1,2,3,4,5,6,7,8
Base ten	Decimal (denary base)	0,1,2,3,4,5,6,7,8,9

Place values of base two

Write the place value of each digit in the number 10111



Expanding numbers in base two

Expand 101_{two} using powers

2	1	0
1	0	1 Two

$$(1X\ 2^2) + (0X2^1) + (1X2^2)$$

Finding the base two number expanded in base two

1. What number has been expanded to give $(1X2^3)$+$(0X2^2) + (1X2^1) + (1X2^0) +$

Solution

$(1X2^3)$+$(0X2^2) + (1X2^1) + (1X2^0)$

(1X2X2X2) + (0X2X2) + (1X2) + (1X1)

8 + 0 + 2 + 1

11_{ten}

Base	no	Rem
2	11	1
2	5	1
2	2	0
	1	

1011_{two}

ACTIVITY

What base two number has been expanded to give the following?

a. $(1X2^2)+(0X2^1)+(1X2^0)$

b. $(1X2^3)+(1X2^2)+(0X2^1)+(1X2^0)$

c. $(1X2^4)+(1X2^3)+(1X2^0)$

d. $(1X2^3)+(0X2^2)+(0X2^1)+(0X2^0)$

e. $1X2^2)+(1X2^1)+(1X2^0)$

f. $(1X2^4)+(1X2^3)+(1X2^2)+(1X2^1)+(1X2^0)$

Changing from binary to base ten

1. Change 1101_{two} to base ten

$1101_{two} = (1X2^3)+(1X2^2)+(0X2^1)+(1X2^0)$

$= (1X2X2X2)+(1X2X2)+(0X2)+(1X1)$

$= 8 + 4 + 0 + 1$

$= 13_{ten}$

ACTIVITY

Change the following to base ten.

a. 11_{two}

b. 111_{two}

c. 101_{two}

d. 1111_{two}

e. 11001_{two}

f. 10101_{two}

g. 11010_{two}

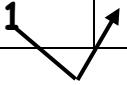
h. 10000_{two}

Change from base two to base ten

a. Change 21_{ten} to base two

21_{ten} =

Base	No	Rem
2	21	1
2	10	0
2	5	1
2	2	0
	1	



= 10101_{two}

SUBTRACTION OF NUMBERS IN BASES.

Work out $1110_{two} - 101_{two}$

$$\begin{array}{r} 1110_{two} \\ -101_{two} \\ \hline 1000_{two} \end{array}$$

ACTIVITY

i. Subtract $1101_{two} - 101_{two}$

ii. Work out: $203_{six} - 115_{six}$

iii. Work out: $1101_{two} - 110_{two}$

iv. Work out: $1010_{two} - 110two$

v. Work out: $11010_{two} - 111_{two}$

vi. Work out:

$$\begin{array}{r} 1\,0\,0\,1\,1\,0\,1_{two} \\ -\ 1\,1\,1\,1\,1\,1_{two} \\ \hline \end{array}$$

vii. Work out: $1010101_{two} - 11010_{two}$

viii. Work out:

$$\begin{array}{r} 2\ 4\ 3_{five} \\ -\ 2\ 3\ 4_{five} \\ \hline \end{array}$$

a) Multiplying the following;

Work out $10_{two} \times 11_{two}$

$$\begin{array}{r} 1\ 0_{two} \\ \times 1\ 1_{two} \\ \hline 1\ 0 \\ +1\ 0\ 0 \\ \hline 1\ 1\ 0_{two} \end{array}$$

ACTIVITY

Work out the following

a. $111_{two} \times 10_{two}$

b. $1010_{two} \times 11_{two}$

c. $111_{two} \times 11_{two}$

d. $1001_{two} \times 10_{two}$

e. $1011_{two} \times 111_{two}$

f. $100111_{two} \times 10_{two}$

g. $10101_{two} \times 11_{two}$

h. $1111t_{wo} \times 111_{two}$

i. $10011_{two} \times 11_{two}$

j. $101010_{two} \times 11_{two}$

Activity

b)Multiplying the following;

k. $111_{two} \times 10_{two}$

l. $1010_{two} \times 11_{two}$

m. $111_{two} \times 11_{two}$

n. $1001_{two} \times 10_{two}$

o. $1011_{two} \times 111_{two}$

p. $100111_{two} \times 10_{two}$

q. $10101_{two} \times 11_{two}$

r. $1111t_{wo} \times 111_{two}$

s. $10011_{two} \times 11_{two}$

t. $101010_{two} \times 11_{two}$

c)Change from any base to base ten:

a. Change 113_{five} into base ten.

b. Change 101_{two} to base ten.

c. Change 1011_{two} to base ten.

d. Change 10010_{two} to base ten.

e. Change 1010_{two} to base ten.

f. Change 110_{two} to base ten.

g. Change 11010_{two} to base ten.

h. Change 1011_{two} to base ten.

i. Change 11011_{two} to base ten.

j. Change 100011_{two} to base ten.

d)Change from base ten to any other base:

a. Change 13_{ten} to base two.

b. Change 9 base ten to base two.

c. Change 7_{ten} to base four.

d. Write 21_{ten} in binary form.

e. Express 72_{ten} as binary system.

f. Change 5_{ten} to base two.

g. Change 15_{ten} to base two.

h. Change 27_{ten} to base six.

i. Change 49_{ten} to base two.

j. Change 17_{ten} to base seven.

k. Express 9_{ten} as base five.

l. Change 94_{ten} to base three.

Divide the following:

a. Divide $204_{five} \div 14_{five}$

b. $448_{nine} \div 17_{nine}$

c. $204_{five} \div 11_{five}$

d. $213_{seven} \div 12_{seven}$

e. $124_{six} \div 21_{six}$

f. $330_{four} \div 30_{four}$

g. $52_{eight} \div 7_{eight}$

e)Find unknown base:

a. $102_{four} = 24_{p}$

$$102_{four} = 24_{p}$$

$$(1X\ 4^2) + (0X\ 4^1) + (2X\ 4^0) = (2X\ p^1) + (4X\ p^0)$$

$$(1X4X4) + (0X4) + (2X1) = (2Xp) + (4X1)$$

$$16 + 0 + 2 = 2p + 4$$

$$18 = 2p + 4$$

$$18 - 4 = 2p + 4 - 4$$

$$14 = 2p$$

$$\frac{14}{2} = \frac{2p}{2}$$

$$7 = p$$

P = 7 (seven)

b. $44_y = 35_{nine}$

c. $23_m = 19_{ten}$

d. $221_{four} = 41_x$

ACTIVITY

Find the value of the unknowns

a. $213_{six} = 100_y$

b. $106_n = 46_{nine}$

c. $42_{ten} = 46_p$

d. $24_{seven} = 102_m$

e. $x^2 = 213_{six}$

f. $102_{four} = 2X_{Seven}$

g. $2m^2 = 112_{five}$

TOPIC: OPERATIONS ON WHOLE NUMBERS

ADDITION OF WHOLE NUMBER

1. Add: 1245678 + 217238

```
      1    1 1
1 2 4 5 6 7 8
+ 2 1 7 2 3 8
 14 6 2 9 1 6
```

Add the following

a. 23847 + 3678

b. 452049 + 28329

c. 306475 + 73847

d. 3235 + 4789

e. 4782 + 68249

Word problems involving addition of whole numbers

Words used to mean addition

Sum, more, altogether, plus, increase

1. There were 246240 books in a library and 167645 more books were donated to the same library. How many books are there altogether?

Books in the library…… 246240

Books donated…… +167645

Altogether……413885

There are 413885 books in the library altogether

ACTIVITY

1. Builders laid 249,898 bricks for a building in a day a nd then laid another 1,847,304 to complete the building. How many bricks were laid altogether?
2. Add 48,685 to 89,634.
3. What is the sum of 5238262 and 26300
4. A school collected sh.8,261,827 in March and sh.7,846,700 how much money was collected in the two months.
5. A company printed 988,345 books last year and 632,625 books this year. How many books were printed altogether?

SUBTRACTION OF WHOLE NUMBERS

Subtraction of 6 digit numbers

Example I

Subtract: 623417 - 401203

HTH	TTH	TH	H	T	O
6	2	3	4	1	7
- 4	0	1	2	0	3
2	2	2	2	1	4

- Arrange numbers vertically by their place values.
- Subtract impossible numbers by borrowing.

Example 2

Workout: 379230 - 135917

HTH	TTH	TH	H	T	O
3	7	9^{8}	12	$\not{3}^{2}$	10
- 1	3	5	9	1	7
2	4	3	3	1	3

- Arrange numbers vertically in their place values.
- Subtract by borrowing.

Application of subtraction

Words related to subtraction:

difference, remain, minus, take away, reduce, decrease.

Example I

1. Find the difference between 637979 and 9459.

HTH	TTH	TH	H	T	O
6	$\not{3}^{2}$	$\not{7}^{17}$	9	7	9
	-	9	4	5	9
6	2	8	5	2	0

Example II

2. The distance between two airports is 173908km. if a plane had covered 59045km only. What distance was left?

HTH	TTH	TH	H	T	O	
	1	$\not{7}^{6}$	13	$\not{9}^{8}$	10	8 km
-	5	9	0	4		5 km
	1 1	4	8	6		3 km

ACTIVITY

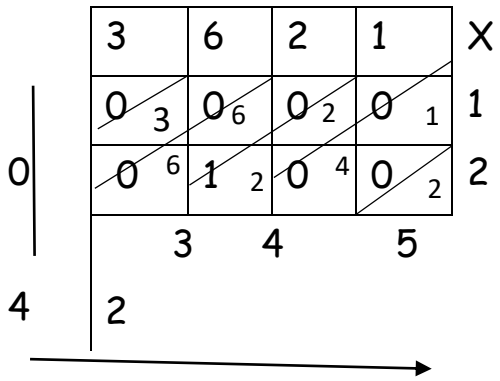
1. What is the difference between 924,568 and 295,677
2. Subtract 769,866 from 1,650,922.
3. Akellos salary was sh. 1,240,750, it was reduced by sh. 89,850. How much does she earn?
4. The number of cows in a district was 8,004,565 but 596,878 were slaughtered. How many cows remained?
5. What is six million five hundred take away three million eight hundred two?

Multiplication of 4 digit numbers by 2 digit numbers

Example I

Multiply: 3621 by 12

Using lattice method



3621 x 12 = 43452

Method II

3 6 2 1

X 1 2

7 2 4 2

+3 6 2 1

4 3 4 5 2

side work

2x1=2 1x1 = 1

2x2= 4 1x2 = 2

2x6 = 12 1x6 = 6

2x3 = 6 1x 3 = 3

Attempt the following

a. 2336 × 23

b. 143 × 14

c. 1324 × 132

d. 2847 × 24

e. 405 × 15

Application of multiplication

Words to mean multiplication:

Multiply, times, product, of

Example I

A rectangular floor is covered by 1260 tiles along its length and 15 along its width. How many tiles are there altogether?

Along length = 1260 tiles Along the width = 15 tiles

```
  1 2 6 0
    X  15
  6 3 0 0
+ 1 2 6 0
  1 8 9 0 0  tiles
```

Example I

A parade of soldiers was made up of 2367 rows. There are 50 soldiers in each row. How many soldiers were there?

```
    2 3 6 7
  X    50
    0 0 0 0
+ 11835 0
  118350 soldiers
```

Therefore, there were 118350 soldiers

ACTIVITY

1. Multiply 406 by 15
2. What is the product of 346 and 12
3. What is the product of 3494 and 32

4. A bus carries 84 passengers each trip. How many passengers will it carry if it makes 18 trips?

5. There are 24 bottles in a crate of soda. How many bottles are there in 6849 similar crates?

Division of whole numbers

$$13\overline{)1976}\quad 152$$

$1 \times 13 = -\ 13$

$5 \times 13 = \quad 67$

Mixed operation on whole numbers

Example

1. Work out; 9-3+20÷4
2. Evaluate; 6×3÷ (12-6) +7

STANDARD FORM OR SCIENTIFIC NOTATION

POINTS TO NOTE

- Multiplying and dividing values of decimals by powers of 10.
- The standard form leaves only one digit to the side of the whole numbers.
- That one digit must be a counting number
- The new decimal fraction should be multiplied by the power of 10.
- When the standard form is worked out, it should give the original number

Examples

1. Express 1489 in standard or scientific notation

   $1489\,489 \times 10^3$

2. Express 43006 in scientific notation.

   $43006 = 43.006 \times 10^4$

3. Write 0.00453 in standard form

$0.453 \quad 3 \times 10^{-3}$

4. What is 0.8945 in scientific notation?

DIVISIBILITY TESTS

Test for 2

A number is divisible by 2 when its last digit is an even number. (0, 2, 4, 6, 8)

Test for 3

A number is exactly divisible by 3 when the sum of its digits is a multiple of 3.

Example.

Without dividing, check if 1326 is divisible by 3.

Sum of its digits = 1+3+2+6

= 12

Since 12 is a multiple of 3, therefore 1326 is divisible by 3.

Test for 4

A number is exactly divisible by 4 when its last 2 digits are divisible by 4 or make a multiple of 4.

Example.

Without dividing, check if 7916 is divisible by 47916 since 16 make the last 2 digits and is divisible by 4, therefore 7916 is divisible by 4.

Test for 5

A number is exactly divisible by 5 when its last digit is either 0 or 5.

Test for 6.

A number is exactly divisible by 6 when its exactly divisible by 3 and 2.

Test for 7

When the last digit of the number is doubled and the result is subtracted from the number formed by the remaining digits, the outcome is divisible by 7

Example

Without dividing show whether 861 is divisible by 7

Double the last digit =1+1

=2

Remaining number = 86

Subtract 2 from 86 = 86-2

= 84

84 is divisible by 7. Hence 861 is divisible by 7

Test for 8

A number is divisible by 8 when the number formed by the last three digits is divisible by 8.

Examples.

Without dividing show whether 7960 is divisible by 8

Test for 9

A number is divisible by 9 when the sum of its digits is a multiple of 9

Which of these numbers is divisible by 9?

a. 9, 10, 18, 20, 21, 28, 36, 45, 46, 50, 54.

b. 63, 65, 66, 72, 73, 75, 81, 82, 90

c. 903, 459, 818, 427, 171, 651, 288, 675

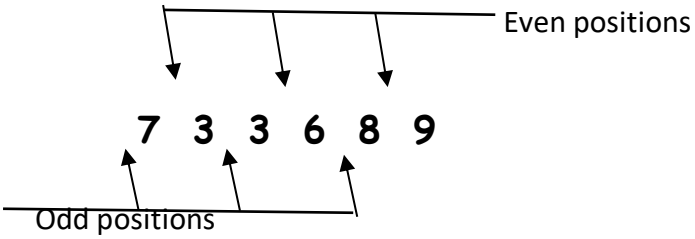
Test for 10

A number is divisible by 10 if it is a multiple of 10

Test for 11

A number is divisible by 11 if the difference between the sum of the digits in the even places and the sum of the digits in the odd places is zero or divisible by 11.

e.g



Sum of digits in even positions = 3+6+9

= 18

Sum of digits in the odd position = 7+3+8

=18

Diference =18-18

= 0

Therefore 733689

ACTIVITY

Which of the following numbers is divisible by 11 without dividing?

a. 121, 187, 128, 132, 143, 147

b. 2431, 2678, 2367, 1001, 1011, 5060

c. 6425, 4444, 6666, 521048

d. 100001, 909090, 808080, 7128, 7282, 901428

PATTERNS AND SEQUENCES

Complete the following sequences

a. 0, 2, 4, 6, 8, 10, 12, 14, 16, _____,_____

b. 1, 4, 9, 16, 25, 36, 49,_____,_____

c. 1, 8,27,64,125,_____,_____

d. 1, 3, 6, 10, 15, 21, 28, _____, _____

e. 17, 12, 8, 5, 3, _____, _____

f. 2, 8, 18, 32, 50, _____, _____

g. 2, 3, 5, 7, 11, _____, _____

h. $\frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25}$, _____, _____

i. 81, 27, 9, 3, 1, _____, _____

PRIME FACTORIZATION.

- **Prime factorizing whole numbers.**

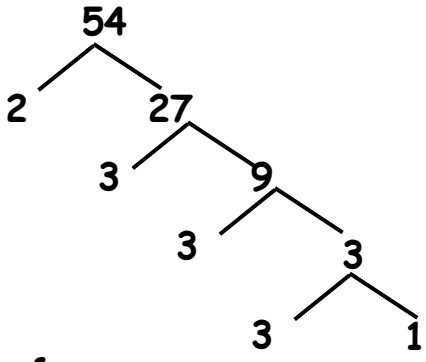
Find the prime factors of 54

Factor ladder

PF_{54} =

2	54
3	27
3	9
3	3
	1

Factor tree



PF_{54} =(2 X 3 X 3 X 3) **in multiplication form**

PF_{54} ={2_1, 3_1, 3_2, 3_3} **in set notation form (subscript form)**

PF_{54} =$(2^1 \times 3^3)$ **in power form (superscript)**

Assignment.

1. Prime factorise the following and give your prime factors in multiplication form
   a. 18
   b. 24
   c. 40
   d. 54
   e. 70
   f. 60
   g. 45
   h. 84
2. Prime factorise the following and give your prime factors in subscript form
   a. 120
   b. 150
   c. 225
   e. 320
   f. 420
   g. 100
   h. 84

3. Prime factorise the following and give your prime factors in power form.

a. 960
b. 150
c. 280
c. 32
d. 42
e. 49
f. 84

➢ **Finding the prime factorized number.**

1. Find the value of the unknowns.

a. PF_X **= (2 X 3 X 5)**

PF_X = (2 X 3 X 5)
= 30

b. $PF_M = \{2_1, 2_2, 2_3, 3_1\}$

PF_M = 2 X 2 X 2 X 3
= 24

c. $PF_K = 2^2 \times 3^3 \times 5^1$

PF_K =2 X 2 X 3 X 3 X 3 X 5
= 4 X 9 X 5
=180

Assignment.

Find the numbers whose prime factors are given below.

a. $\{2_1, 2_2, 2_3\}$
b. $\{2_1, 2_2, 3_1\}$
c. $\{2_1, 3_1, 3_2,\}$
d. $\{2_1, 2_2, 3_1, 3_2\}$

e. $2^2 \times 3^3$
f. $2^2 \times 3^2$
g. $2^5 \times 5^2$

Finding the unknown prime factor.

1. The prime factors of 60 are (2 X 2 X p X 5). Find the value of p.

Approach 1

60 = (2 X 2 X p X 5).
60 = 20 X P

$$\frac{60}{20} = \frac{20 \times p}{20}$$

$$\frac{\cancel{60}^{3}}{\cancel{20}} = \frac{\cancel{20} \times p}{\cancel{20}}$$

$$3 = p$$

$$p = 3$$

Approach 2

2	60
2	30
3	15
5	5
	1

F60 =②X②X 3 X⑤
F60 =②X②X P X⑤
P = 3

2. The prime factors of 36 are $(2^2 \times x^2)$ find the value of x

Approach 1

36 = $(2^2 \times x^2)$

36 = $2 \times 2 \times x^2)$

36 = $(4 \times x^2)$

$\frac{36}{4} = \frac{4x^2}{4}$

$\frac{\cancel{36}^{9}}{\cancel{4}} = \frac{\cancel{4}\,x^2}{\cancel{4}}$

$9 = x^2$

$\sqrt{x^2} = \sqrt{9}$

$x = 3$

Approach 2

2	36
2	18
3	9
3	3
	1

P = $2^2 \times 3^2$

= $(2^2 \times x^2)$

$x^2 = 3^2$

X = 3

REPRESENTING PRIME FACTORS ON VENN DIAGRAMS

Example I

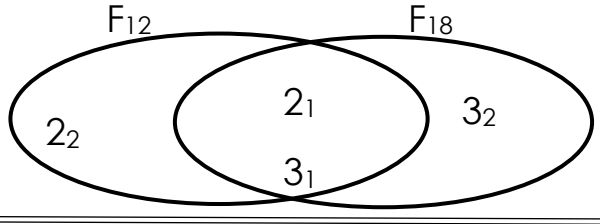
Represent the prime factors of 12 and 18 on a Venn diagram.

2	12
2	6
3	3
	1

2	18
3	9
3	3
	1

F_{12} = { 2_1, 2_2, 3_1 }

F_{18} = { 2_1, 3_1, 3_2 }



a) Find the GCF of 12 and 18.

G.C.F product of the intersection

$F_{12} \cap F_{18} = \{2_1, 3_1\}$

$\therefore$ G.C.F = 2 x 3

G.C.F = 6

L.C.M = product of the union.

$F_{12} \cup F_{18} = \{2_1, 2_2, 3_1, 3_2\}$

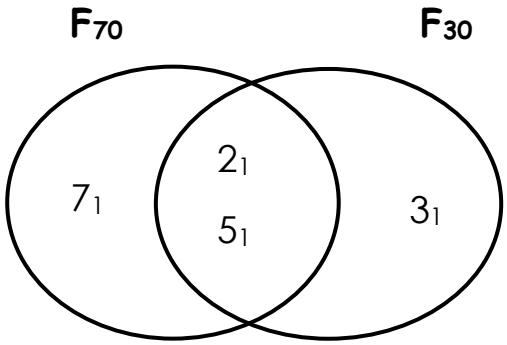
$= 2 \times 2 \times 3 \times 3$

$= 4 \times 9$

$= 36$

Example 2

Below is a Venn diagram showing factors.



a) Find the G.C.F of 70 and 30.

G.C.F = product of the intersection

$F_{70} \cap F_{30} = \{2_1, 5_1\}$

$G.C.F = 2 \times 5$

$= 10$

b) Find the L.C.M of 20 and 70.

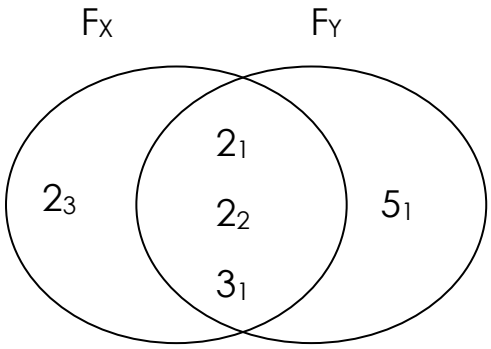
L.C.M = product of the union

$L.C.M = 2_1 \times 3_1 \times 5_1 \times 7_1$

$= 6 \times 35$

L.C.M = 210

FINDING THE UNKNOWN NUMBER GIVEN PRIME FACTORS ON A VENN DIAGRAM



a) Find the value of x.

$F_x = \{2_1 \times 2_2 \times 2_3 \times 3_1\}$

$x = 4 \times 6$

$x =$

24

b) Find the value of y.

$F_y = \{2_1, 2_2, 3_1, 5_1\}$

$y = 2_1 \times 2_2 \times 3_1 \times 5_1$

$y = 4 \times 15$

$y = 60$

c) Workout the G.C.F of F_x and F_y

$G.C.F = Fx \cap Fy$

$= 2_1 \times 2_2 \times 3_1$

$= 2 \times 2 \times 3$

$G.C.F =$

12

d) find the LCM of F_x and F_y

$LCM = Fx \cup Fy$

$= 2_1 \times 2_2 \times 2_3 \times 3_1 \times 5_1$

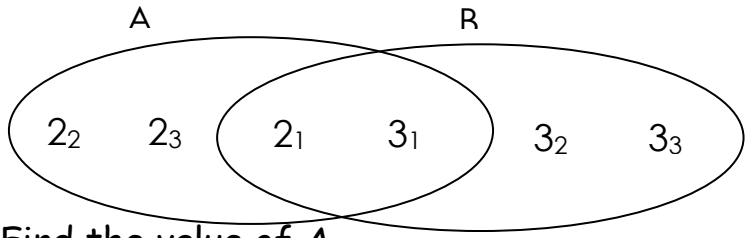
$= 2 \times 2 \times 2 \times 3 \times 5$

$LCM =$

120

ACTIVITY

1.The Venn diagram below represents factors of two numbers A and B. study it carefully and answer the questions that follow;



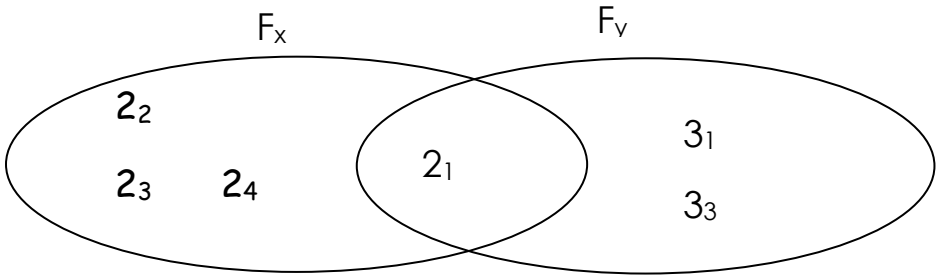
a) Find the value of A

b) Workout the value of B

c) Calculate the G.C.F of A and B.

d) Workout the L.C.M of A and B'

2. Use the Venn diagram below to answer the questions that follow

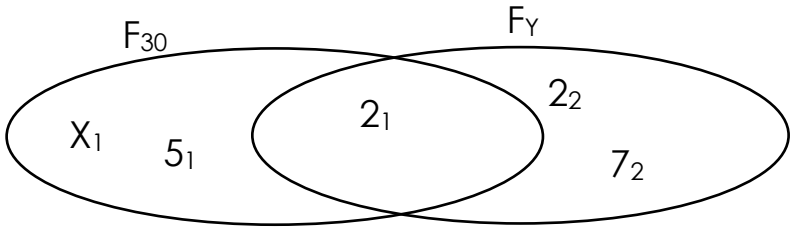


a) Find the value of x. b) Find the value of y.

a) Workout the GCF of the F_X and F_Y.

d) Find the LCM of the F_X and F_Y.

3. The Venn diagram below shows prime factors of two numbers. Use it to answer the questions that follow correctly.



a) Find value of y. **b) Workout the value of X.**

c) Find the GCF of F_{30} and F_Y. **d) Workout the LCM of the F_{30} and F_y**

Relationship between LCM and GCF and the product of the numbers

Product of the numbers =LCM x GCF

1. Given that the LCM of 16 and y is 48 and their GCF is 4. Find the value of y.

Approach 1

Product of numbers = LCM X GCF

$16 \times y = 48 \times 4$

$$\frac{16 \times y}{16} = \frac{48 \times 4}{16}$$

$$\frac{\cancel{16} \times y}{\cancel{16}} = \frac{\cancel{48}^{12} \times 4}{\cancel{16}_{\cancel{4}}}$$

$$y = 12$$

Approach 2

$$2nd\ number = \frac{LCM \times GCF}{1st\ number}$$

$$y = \frac{48 \times 4}{16}$$

$$= \frac{\cancel{48}^{12} \times 4}{\cancel{16}_{\cancel{4}}}$$

=12

1. The product of the two numbers is 60 and their GCF is 6. Find their LCM.

Approach 1

Product of numbers = LCM X GCF

$$60 = LCM \times 6$$

$$\frac{60}{6} = \frac{LCM \times 6}{6}$$

$$\frac{\cancel{60}^{10}}{\cancel{6}} = \frac{LCM \times \cancel{6}}{\cancel{6}_{1}}$$

$$10 = LCM$$

$$LCM = 10$$

ASSIGNMENT.

1. The LCM and GCF of two numbers are 120 and 8 respectively. If one of the numbers is 16. Find the other number.
2. The LCM of x and y is 216 and their GCF is 12. Find the first number if the second number is 24.
3. Find the LCM of two numbers 36 and 30 whose GCF is 6
4. The LCM of two numbers is 144 and their HCF is 12. If one of the numbers is 36. Find the second number.

Application of LCM

Examples

1. Find the smallest number of pan cakes that can be shared among 8 or 9 by leaving remainder of 5 pancakes?

L.C.M of 6 and 8

M_6 ={ 6, 12, 18, (24), 30.....}

M_8 = {8, 16, (24), 32, 40...}

Number = LCM + Remainder

=24 + 3

= 27

---

2. What is the smallest number of pancakes that can be shared among 8 or 9 boys leaving a remainder of 5 pancakes?

M_8 = {8, 16, 24, 32, 40, 48, 56, 64, (72)....}

M_9 = {9, 18, 27, 36, 45, 54, 63, (72) 81....}

NUMBER = LCM + Remainder

=72 +5

=77 pancakes

---

3. At Grand Maria Primary school, two bells are rung at intervals of 30 minutes and 40 minutes respectively to change lessons.

a) After how many hours will the bells be rung together?

LCM of 30 and 40

2	30	40
2	15	20
2	15	10
3	5	5
5	1	5
	1	1

2 X 2 X 2 X 3 X 5

120minutes

1hour = 60 minutes

120 minutes = $(\frac{120}{60})$ hours

= 2hours

The two bells will ring again after 2 hours

b). If the bells were first rung together at 8:15am. At what time will they be rung together again?

Ending time = Starting time + Duration

= 8 : 15 am + 2hours

= Hrs Mins

8 15

2 00

10 15

They will be rung at 10:15 am.

ACTIVITY 1.

1. Find the least number that can be divided by 8 and 12 getting no remainder.
2. What is the smallest number that can be divided by 9 and 6 getting no remainder?
3. Find the least number that can be divided by 6 or 8 leaving 3 as a remainder.
4. Find the least number that can be divided by 8, 12 and 16 getting 3 as a remainder.
5. Denis gave mangoes to 24 children and others to 36 adults, if he gave out the same number to all of them and got no remainder. Find how many mangoes he shared
6. Find the smallest number that can be divided by 10 and 15 getting 4 as a remainder.

Activity 2.

1. Two bells ring at intervals of 40minutes and 50minutes respectively, after how many hours will these bells ring again together?
2. Three bells ring at intervals of 20min, 30min and 45min, if the bells were rung at 10:30am, find at what time will all the bells be rung at the same time?
3. Two bells at GMS ring at intervals of 40min and 50min respectively. If they first rung them at 8:45am.
   a. After how many hours will both bells be rung at the same time?
   b. At what time will the time keeper ring both bells again?
4. Peterson, Denison and Wilson report to the hospital for medication at intervals of 40mins, 50mins and 1 hour respectively.
   a. Find after how many hours will all Denison and Wilson report to the hospital together?
   b. If the three patients were given treatment at 11:20am, at what time will all the patients get the treatment together again?

FRACTIONS

REVISION ON ADDITION OF FRACTIONS

1. Add: $\frac{2}{3} + \frac{1}{4}$

2. Find the sum of $2\ ^{2}/_{3}$ and $2\ \frac{1}{4}$

3.Work out ;

$\frac{1}{3} + \frac{1}{2}$

a. $\frac{1}{5} + \frac{7}{10} + \frac{3}{20} + \frac{1}{2}$

b. $\frac{3}{4} + 4\frac{1}{8} + 2\frac{5}{8}$

c. $1\frac{1}{2} + 3\frac{1}{4} + \frac{5}{6}$

d. $1\frac{1}{2} + 1\frac{1}{4} + 1\frac{1}{3}$

REVISION ON SUBTRACTION OF FRATIONS.

$\frac{4}{5} - \frac{1}{5}$

a. $\frac{1}{2} - \frac{1}{3}$

b. $2\frac{4}{5} - 1\frac{1}{4}$

c. $4\frac{5}{6} - 1\frac{2}{3}$

d. $7\frac{2}{3} - 3\frac{1}{2}$

e. A man used three quarters of his shamba to grow groundnuts, a half to grow potatoes and two thirds to grow water melons. Find total fraction of the whole land used.

f. Simplify: $1\frac{1}{3} + \frac{3}{4} - \frac{5}{6}$

g. $\frac{5}{6} - \frac{5}{9} + \frac{7}{18}$

h. $7\frac{1}{2} - 3\frac{1}{4} + 1\frac{3}{12}$

i. $\frac{3}{4} + \frac{1}{5} - \frac{1}{2}$

i. $1\frac{1}{2} + 2\frac{1}{3} - \frac{1}{4}$

Multiplication of fractions

Examples: Fraction with whole number.

(i) $\frac{1}{3} \times 12$ | calculate $\frac{3}{4}$ of 12

(b) Fraction by fractions

Multiply: $\frac{2}{5} \times \frac{3}{4}$

(c) Multiply: $\frac{1}{2} \times \frac{1}{3}$

Multiply the following fraction $3 \times \frac{1}{2}$

a. $3 \times \frac{1}{2}$

b. $5 \times \frac{1}{3}$

c. $6 \times \frac{5}{8}$

d. $\frac{2}{5} \times 10$

e. $\frac{1}{3} \times 15$

f. $2\frac{1}{3}$ *of* 27

g. What is $\frac{1}{4}$ of 1 hour

h. A mathematics book contains 200 pages. A pupil read $\frac{3}{5}$ of it. How many pages did the pupil read?

i. A man receives $\frac{9}{10}$ of his salary. If his salary was sh. 200,000. How much money did he receive?

Reciprocals

Product of a number by its reciprocal is 1.

1. What is the reciprocal of $\frac{3}{4}$?
2. What is the reciprocal of $2\frac{1}{4}$?
3. What is the reciprocal of the following fractions?

a. $\frac{2}{5}$
b. $\frac{7}{12}$
c. $\frac{1}{8}$
d. 9

DIVISION OF FRACTIONS

Examples:(i)Divide $\frac{2}{3} \div \frac{2}{3}$

Examples (ii)(a)Divide: $\frac{3}{4} \div \frac{1}{2}$

(b) Divide $2\frac{1}{2} \div 1\frac{1}{4}$

ACTIVITY

Work out the following

a. $\frac{2}{5} \div \frac{3}{10}$
b. $\frac{6}{7} \div \frac{3}{5}$
c. $\frac{5}{9} \div \frac{4}{15}$
d. $\frac{9}{20} \div \frac{3}{4}$
e. $\frac{2}{5} \div 10$

Work out the following

a. $\frac{1}{4} \times \frac{2}{5} + \frac{1}{3}\ of\ \frac{1}{2}$
b. $\frac{1}{2} + \frac{1}{4}\ of\ \frac{2}{3} - \frac{2}{5})$
c. $\frac{2}{3} \div \frac{2}{5} + \frac{2}{5}$ of $\frac{1}{4}$
d. $1 \div \frac{3}{5} + \frac{1}{4} \times \frac{1}{2}$

APPLICATION OF FRACTIONS GIVEN A PARTICULAR GROUP

2. In a class of 40 pupils, $\frac{2}{5}$ of them are girls and the rest boys.
   Find the fraction of boys in the class.

$\frac{5}{5} - \frac{2}{5}$

$= \frac{5-2}{5}$

$= \frac{3}{5}$

a) How many girls are in the class?

$\frac{2}{5}$ of 40 pupils

$\frac{2}{\cancel{5}_1} \times \cancel{40}^{8}$

2 x 8

16

There are 16 girls in the class

b) Find the number of boys in the class.

Number of boys = 40 – 16

= 24 boys

Method II

$\frac{3}{5}$ of 40 pupils

$\frac{3}{\cancel{5}_1} \times \cancel{40}^{8}$

3 x 8

24 boys

c) How many more boys than girls are in the class?

Method I

Difference in their fractions

$\frac{3}{5} - \frac{2}{5} = \frac{1}{\cancel{5}_1} \times \cancel{40}^{8}$

$\frac{3-2}{5}$ = 1 x 8

$\frac{1}{5}$ = 8

There are 8 more boys than girls in the class

Method II

Difference in the number of boys and girls

(24 – 16) pupils

8 boys

There are 8 more boys than girls in the class

Activity

1. In a village meeting of 90 people, $\frac{3}{9}$ of them are women and the rest are men.
   a) What is the fraction of men in the meeting?
   b) How many men were in the meeting?
   c) Find the number of women are in the meeting.
   d) How many more men than women were in the meeting?
2. On a farm of 120 animals, $\frac{5}{12}$ of the cows and the rest are bulls.
   a) Find the fraction of bulls on the farm.
   b) Workout the number of cows on the farm
   c) How many bulls are on the farm?
   d) How many more bulls than cows are on the farm?
3. $\frac{2}{7}$ of the pens in the box are blue and the rest are black pens, if there are 35 pens in the box;
   a) Find the fraction of black pens in the box.
   b) How many blue pens are in the box?
   c) Workout the number of black pens in the box.
   d) How many more black pens than blue pens are in the box?
4. $\frac{2}{3}$ of a class are girls, if there are 20 girls in that class;
   (a)Find the total number of pupils in the class.
   (b)Find the number of boys
5. $\frac{1}{4}$ of the pupils in a class are boys and the reset are girls.
   a. what is the fraction for girls?
   b. if there 120 girls in class, how many pupils are in the class
   c. How many more girls are than boys are in class?
7. In a school of 1200 pupils, $\frac{1}{3}$ of them are pupils in the lower primary and the rest are in upper primary
   a. What is the fraction for upper primary?
   b. How many more pupils are in upper primary than in lower primary?

APPLICATION OF FRACTIONS

REMAINING FRACTION AND DIFFERENCE IN FRACTIONS.

Example

1. After covering 2/3 of a journey, a motorist still had 40km to cover. How long was the whole journey?

	Covered	uncovered
fractions	$\frac{2}{3}$	$\frac{3}{3} - \frac{2}{3} = \frac{1}{3}$
distances	x	40km

Let the journey be x

$$\frac{1}{3}\ of\ the\ journey\ = 40km$$
$$\frac{1}{3}\ of\ x\ = 40km$$
$$\frac{1}{3} \times x\ = 40km$$
$$3 \times \frac{1}{3} \times x\ = 40km\ \times 3$$
$$\cancel{3} \times \frac{1}{\cancel{3}} \times x\ = 40km\ \times 3$$
$$x\ = 120km$$

The journey was 120km long.

Assignment

1. In a group, 1/6 are girls and there are 8more boys than girls.

(a)Find the total number of pupils in the group.

(b)How many girls are in the group?

2. $\frac{2}{3}$ of the class are girls. if there are 20 girls in that class, find the;

a. Total number of pupils
b. Number of boys.

3. $^1/_4$ of the pupils in the class are boys and the rest are girls,

a. What is the fraction for boys?
b. If there are 120 girls in that class, how many pupils are there?
c. How many more girls are there than boys?

4. In a school of 1200 pupils $\frac{1}{3}$ of them are pupils in the lower primary and the rest are in lower primary

a. What is the fraction of the pupils in lower primary?
b. How many more pupils are there in upper primary than the lower primary?

5. After covering $\frac{2}{3}$ of the journey, a motorist still had 40km. how long was the journey?

6. When Florence travelled $\frac{5}{12}$ of her journey, she was still left with 63km to cover the journey. How long was the journey?

7. A car got a puncture after covering $\frac{5}{7}$ of the journey, it had 140km left to complete the journey. How long was the journey?
8. Mukasa's bicycle got spoilt after he had covered a distance of 20km which was $\frac{1}{4}$ of his journey. How long was the journey?
9. Okello had 30km to cover after travelling $\frac{2}{5}$ of the journey. How long was the journey?

APPLICATION OF FRACTIONS INVOLVING TWO OR MORE FRACTIONS.

Finding remainders: - Given one fraction

Given two OR MORE fractions

1. $\frac{4}{5}$ of the class are boys and the rest are girls.

Find the fraction of girls.

$$\frac{5}{5} - \frac{4}{5} = \frac{1}{5}$$

2. If $\frac{1}{4}$ of the animals are cows, $\frac{1}{3}$ are bulls and the rest are goats, find the fraction of goats.
3. $\frac{1}{4}$ of the animals are cows, $\frac{1}{3}$ are bulls and the rest are goats. Find the fraction for goats.
4. In a village of 4000 people, $\frac{3}{10}$ of them are males and the rest are females

c. Find the number of females.

d. If $\frac{3}{4}$ of the females are below 18 years, how many female adults are there?

e. If $\frac{5}{6}$ of the males are above 18 years, how many are males in class?

5. A man spent $\frac{4}{9}$ of his salary on fees, $\frac{1}{3}$ on rent, $\frac{1}{6}$ on other expenses and saved the rest. What fraction of his salary did he save?

APPLICATION OF FRACTIONS INVOLVING PARTS OF THE REMAINDER.

1. On a farm, $\frac{2}{3}$ of the animals are black, $\frac{1}{4}$ of the remainder are brown.
   a. Find of $\frac{1}{4}$the fraction left
   b. Find 1/5 of the fraction left.
2. John spent 1/3 of his money on books and 1/6 of the remainder on transport.
   a. What fraction of his money was left?
   b. If he left with sh. 15000 how much did he have at first?

3. A man spent $\frac{4}{9}$ of his salary on fees, $\frac{1}{3}$ on rent, $\frac{1}{6}$ on other expenses and saved the rest. What fraction of his salary did he save?
4. On a farm, $\frac{2}{3}$ of the animals are black, $\frac{1}{4}$ of the remainder are brown.

a. Find $\frac{1}{3}$ of the remaining animals.

b. $\frac{1}{5}$ Of the remaining animals.

Finding the total in fractions

1. Wemba spends $\frac{1}{3}$ of his salary on rent and $\frac{1}{6}$ of the remainder on transport. If he saves sh.15,000 find his total income.

	Rent	Remainder	Transport
fraction	$\frac{1}{3}$	$\frac{3}{3}-\frac{1}{3}=\frac{2}{3}$	$\frac{1}{6}0f\ rem$ $\frac{1}{6}\times\frac{2}{3}$ $\frac{2}{18}$ $\frac{1}{9}$

Both rent and transport $=\frac{1}{3}+\frac{1}{9}$

$=\frac{\left(\frac{1}{\cancel{3}}\times\cancel{9}^{3}\right)+\left(\frac{1}{\cancel{9}}\times\cancel{9}^{1}\right)}{9}$

$=\frac{3+1}{9}$

$=\frac{4}{9}$

Saving $=\frac{9}{9}-\frac{4}{9}$

$=\frac{5}{9}$

Approach 1

$\frac{5}{9} = sh.15{,}000$

$5parts = sh.15{,}000$

$1part = \frac{sh.15{,}000}{5}$

$= \frac{sh.\cancel{15{,}000}^{3000}}{\cancel{5}}$

$= sh.3000$

$9parts = sh.3{,}000 \times 9$

$= sh.27{,}000$

His total income is sh. 27,000

Approach 2

Let the total be m

$\frac{5}{9}\ of\ m = sh.15{,}000$

$\frac{5}{9}\times m = sh.15{,}000$

$9\times\frac{5}{9}\times m = sh.15{,}000\times 9$

$\cancel{9}\times\frac{5}{\cancel{9}}\times m = sh.15{,}000\times 9$

$5\times m = sh.15{,}000\times 9$

$\frac{5m}{5} = \frac{sh.15{,}000\times 9}{\cancel{5}}$

$m = sh.3{,}000\times 9$

$= sh.27{,}000$

Activity

1. In a class, $\frac{1}{3}$ of the pupils are below 10 years, $\frac{2}{5}$ of the remainder are between 10 years and 12 years, the rest of the pupils are above 12years. How many pupils are in that class if 20 pupils are above 12 years?
2. Akimu spent $\frac{1}{3}$ of her money on books, $\frac{1}{6}$ of the remainder on transport.
   a. What fraction of her money was left?
   b. If she was left with shs. 15000, how much did she have at first?
3. A school spends 25% of its money on books $\frac{1}{3}$ on salaries and $\frac{1}{5}$ of the remainder on transport. The remaining amount was shs. 400000. How much money did the school have at first?
4. A woman spent $\frac{1}{4}$ of her salary on food and $\frac{1}{3}$ of the remainder on drinks. She was left with shs.80000. How much did she have at first?

TAPS

1. Tap A can fill a tank in 6 minutes and tap B can fill the same tank in 3 minutes. How long will both taps take to fill the tank if they are opened at the same time?

	Tap A fills in 6minutes	Tap B in 3 minutes.
One minute	$\frac{1}{6}$	$\frac{1}{3}$

Both taps open $= \frac{1}{6} + \frac{1}{3}$

$= \frac{\left(\frac{1}{6} \times 18\right) + \left(\frac{1}{3} \times 18\right)}{18}$

$= \frac{\left(\frac{1}{\cancel{6}} \times \cancel{18}^{3}\right) + \left(\frac{1}{3} \times \cancel{18}^{6}\right)}{18}$

$= \frac{3 + 6}{18}$

$= \frac{9}{18}$

$= \frac{\cancel{9}^{1}}{\cancel{18}_{2}}$

$= \frac{1}{2}$

Since 1 tank $= 1 \div \frac{1}{2}$

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

$= 2$ minutes.

2. Tap A takes 3 minutes to fill a tank and tap takes 4 minutes to draw water from the tank. How many minutes will it take to fill the tank if both taps are left running?

	Tap A fills in 3minutes	Tap B draws in 4 minutes.
One minute	$\frac{1}{3}$	$\frac{1}{4}$

Both taps open $=\frac{1}{3}-\frac{1}{4}$

$=\frac{\left(\frac{1}{3}\times 12\right)-\left(\frac{1}{4}\times 12\right)}{12}$

$=\frac{\left(\frac{1}{\cancel{3}}\times \cancel{12}^{4}\right)-\left(\frac{1}{4}\times \cancel{12}^{3}\right)}{12}$

$=\frac{4-3}{12}$

$=\frac{1}{12}$

$=\frac{1}{12}$

Since 1 tank $= 1\div\frac{1}{12}$

$=1\times\frac{12}{1}$

$=12$ minutes.

Assignment.

1. Tap A and B are connected to a tank. Tap A can fill the tank in 3 minutes. Ta\p B draws water from the tank. When both taps are running, if takes 12 minutes for the tank to be filled. How long does tap B take to draw water from the tank?
2. Tap X takes 3 minutes to fill the tank and tap Y takes 4 minutes to draw water from the tank. How many minutes will it take to fill the tank if both taps are left open?
3. Tap A takes 6 minutes to fill the tank and tap B takes 9 minutes to fill the same tank. How many minutes will it take to fill the tank if both taps are left open?
4. Tap W takes 6 minutes to fill the tank and tap Q takes 4 minutes to fill the same tank. How many minutes will it take to fill the tank if both taps are left open?
5. Tap K takes 6 minutes to fill the tank and tap P takes 8 minutes to draw water from the tank. How many minutes will it take to fill the tank if both taps are left open?
6. Tap X can fill the tank in 3 minutes and tap Y takes 4 minutes to fill the tank while tap Z can empty the tank in 8 minutes. If all taps are left open at the same time, how many minutes will it take to fill the tank?
7. Taps X, Y and Z are joined to one tank. Tap X takes 9 minutes to fill the tank and tap Y takes 12 minutes to fill the tank, but tap Z takes only 6 minutes to empty the tank. If the tank holds 7200litres of waters

a. How much water is put in the tank by tap X after one minute?
b. How much water is put in the tank by tap Y after one minute?

c. How long will it take tape X and Y to fill the tank, if all both are opened at the same time?

d. How long will it take to fill the tank, if all taps are opened?

UNIT 7. RATIOS AND PROPORTIONS

Increasing quantities in given ratios

1. Increase sh. 200 in the ratio of 5:4

Approach 1

New : old

5 : 4

? : sh. 200

4parts = sh. 200

1 part = $sh.\frac{200}{4}$

=sh. 50

New amount = 5 x sh 50

=sh 250

Approach 2

change the ratio into a common fraction

In increasing, the numerator should be bigger than the denominator.

$Fraction = \frac{5}{4}$

$= \frac{5}{4} \times sh.200$

$= \frac{5}{4} \times sh.\cancel{200}^{50}$

= 5 x sh. 50

= sh 250

Assignment

1. Increase sh.3000 in the ratio of 2:1
2. Increase 240 goats in the ratio of 3:2
3. The number of pupils at GMS in 2021 was 500 and this increased in the ratio of 5: 4. Find the new number of pupils at school.
4. Kashimbulusha's farm produced 1300litres of milk last week and this has increased in the ratio of 2:1 this week. how much milk does it produce in this week?
5. Increase 360kg of meat in the ratio of 5:4

Decreasing quantities in given ratios

1. Decrease 400 in the ration of 3:4

Approach 1

New : old

3 : 4

? : sh. 400

4parts = sh. 400

1 part = $\boldsymbol{sh.\frac{400}{4}}$

=sh. 100

New amount = 3x sh 100

=sh 300

Approach 2

change the ratio into a common fraction

In increasing, the numerator should be smaller than the denominator.

$Fraction = \frac{3}{4}$

$= \frac{3}{4} \times sh.400$

$= \frac{3}{4} \times sh.\cancel{400}^{100}$

= 3 x sh. 100

= sh 300

Assignment.

1. The price of a pair of shoes decreased in the ratio of 3:4. If the cost of shoes before decrease was sh. 20,000, find the new price of the shoes.
2. The Covid 19 positive cases was 4000 in March 2021 but this reduced in the ratio of 2:5. What is the new number of positive cases?
3. Decrease sh. 2,000 in the ratio of 3:5
4. A teacher's salary was sh.360,000 before lockdown, this was reduced in the ration of 5:9. Find how much is the teacher's salary now?
5. The price of a radio is sh.20,000. This decreased in the ratio of 3:4, find the new price of the radio.

SHARING IN RATIOS GIVEN TOTAL SHARE

1. Share 18 mangoes in the ratio of 4:5

Approach 1

Total ratio = 4 + 5
=9

1st share $= \frac{4}{9} \times 18$
$= \frac{4}{\cancel{9}} \times \cancel{18}^{2}$
= 4 x 2
= 8

$2nd\ share = \frac{5}{9} \times 18$
$= \frac{5}{\cancel{9}} \times \cancel{18}^{2}$
= 5 x 2
= 10

Approach 2

New : old
4 : 5
Total ratio = 4 + 5
= 9

9parts = 18mangoes
1 part = $\frac{18}{9}\ mangoes.$
=2mangoes.

1st share = (4X2)mangoes
=8mangoes.
2nd share = (5X2) mangoes
= 10mangoes.

Assignment.

1. Sh. 60,000 was shared among three sisters, Anne, Betty and Claire in the ratio 1:2:3 respectively. How much did each get?
2. Divide sh.120000 in the ratio of 2:3
3. Share 72 sweets in the ratio of 5:3
4. Mary had sh60000, she shared it with a friend in the ratio of 7:5. How much did each get?
5. In a class of 80 pupils, the ratio of boys to girls is 2:3. Find the number of boys and girls in the class.
6. In a bag of 24 pens, the ratio of blue pens to red pens is 3:5. How many blue and red pens are in the bag?
7. A man distributed sh. 240,000 to his three sons John, Tamale and Eden in the ratio 1:3:4 respectively, how much did each get?
8. Sh.36000 was shared in the ratio 2:7. What was each share?
9. Divide sh. 21000 in the ratio of 2:3

FINDING THE TOTAL IN RATIOS

1. Paul and James shared some money in the ratio of 3:5 respectively. If James got sh3000.

(a) Find how much money did Paul get?

Approach 1

	Paul	James	Total
Ratio	3	5	3 + 5 = 8
Amount		Sh. 3000	

5parts = sh. 3000

1part = $\frac{\text{sh } 3000}{5}$

= $\frac{\text{sh } \cancel{3000}^{600}}{\cancel{5}}$

= **sh. 600**

Paul's share

1part = sh. 600

3parts = sh. 600 X 3

= sh. 1800

Paul got sh. 1800

Approach two

Paul : James

3 : 5

:sh.3000

Total ratio = 3+5

= 8

Let the total amoint be m

$\frac{5}{8}\ of\ m = sh\ 3000$

$\frac{5}{8} \times m = sh\ 3000$

$8 \times \frac{5}{8} \times m = sh\ 3000 \times 8$

$\cancel{8} \times \frac{5}{\cancel{8}} \times m = sh\ 3000 \times 8$

$5 \times m = sh\ 3000 \times 8$

$\frac{5 \times m}{5} = \frac{sh\ 3000 \times 8}{5}$

$\frac{\cancel{5} \times m}{\cancel{5}} = \frac{sh\ \cancel{3000}^{600} \times 8}{\cancel{5}}$

$m = sh.600 \times 8$

$m = sh.4800$

$Paul's\ share = \frac{3}{8} \times sh.4800$

$= \frac{3}{\cancel{8}} \times sh.\cancel{4800}^{600}$

$= 3 \times sh.600$

$= sh.1800$

Paul got sh 1800

b. How much money was shares altogether?

Total share

1part = sh. 600

8parts = sh. 600 X 8

= sh. 4800

They both shared sh. 4800 altogether.

Activity

1. Anitah , Adiye and Temple shared a certain amount of money in the ratio of 3:4:5 respectively ; If Temple got sh.100000.
   (a) How much was shared by all the three people?
   (b) How much did Anitah and Adiye get?
   (c) How much money did Temple get than Adiye?
2. Emmy and Akram shared a sum of money in the ratio of 3:4 respectively. If Emmy got sh.12000.

(a). How much did they share altogether?

(b). How much did Akram get?

3. The angles of a triangle are in the ratio of 1:2:3 respectively. Find the size of each angle.
4. The ratio of boys to girls in the class is 1:2 respectively. If there are 28 boys, how many are in the class?
5. The ratio of male to female teachers in a school is 2:3. If there are 18 female teachers, how many male teachers are in that school?
6. P7 has three streams K, J and L. They shared books in the ratio of 5:3:4 respectively. If P7J got 36 books.
   a. Find the number of books they shared altogether.
   b. Find the number of books for stream.
   c. How many more books did stream K get than stream L.
7. Dan and Mike shared some money in the ratio of 3:5 respectively. If Mike got sh.3000
   a. How much did Dan get?
   b. How much money did was shared?
8. A, B and C started a business company. They contributed their shares for starting capital in the ratio of 2:3:5 respectively. If B contributed sh.9000

a. What was the starting capital?

b. By how much money did C contribute more than A

SHARING IN RATIOS GIVEN DIFFERENCE RATIOS

1. A and B shared money in the ratio of 3:7 respectively. If B got shs 4000 more than A,

(a) Find the share of A

	A	B	B more than A
Ratios	3	7	(7 - 3) 4more parts
Amount			Sh. 4000

Approach 1

4part = sh. 4000

1part = $\frac{sh.4000}{4}$

$= \frac{sh.\cancel{4000}^{1000}}{\cancel{4}}$

$= sh\,1000$

A got =3 X sh. 1000

= sh. 3000

Approach 2

Total ratio = 3 + 7

= 10

Let the total be k

$\frac{4}{10}\ of\ k = sh.4000$

$\frac{4}{10} \times k = sh.4000$

$\cancel{10} \times \frac{4}{\cancel{10}} \times k = sh.4000 \times 10$

$4 \times k = sh.4000 \times 10$

$\frac{4 \times k}{4} = \frac{sh.\cancel{4000}^{1000}}{4} \times 10$

$k = sh.10,000$

A got = $\frac{3}{10} \times sh.10,000$

= $\frac{3}{\cancel{10}} \times sh.10,00\cancel{0}$

= $3 \times sh.10,000$

= $sh.30.000$

(b) Find their total share.

Approach 1

Total ratio = 3 + 7

= 10

Total share =10 X sh. 1000

= sh. 10,000

Approach 2

Total ratio = 3 + 7

= 10

Let the total amount be k

$\frac{4}{10}\ of\ k = sh.4000$

$\frac{4}{10} \times k = sh.4000$

$10 \times \frac{4}{10} \times k = sh.4000 \times 10$

$\cancel{10} \times \frac{4}{\cancel{10}} \times k = sh.4000 \times 10$

$4 \times k = sh.4000 \times 10$

$\frac{4 \times k}{4} = \frac{sh.\cancel{4000}^{1000} \times 10}{4}$

$k = sh.10,000$

Therefore, they both shared sh. 10,000

Assignment

1. Lucy and Danny shared some money in the ratio of 2:5 respectively. If Lucy got 1,500/= less than Danny, how much did Danny get?
2. A and B shared money in the ratio of 2:5 respectively. If B got sh.6,000 more than A,

a. Find the share of A.

b. Find their total share.

4. X and Y shared money in the ratio of 3:7 respectively. If Y got sh. 40,000 more than X.

a. Find the share of X.

b. Find their total share.

5. A, B and C contributed money for the company in the ratio of 2:3:5 respectively. If C contributed sh 400,000 more than B,

a. How much did each contribute?

b. How much did they share altogether?

6. Tracy, Anisha and Jackie shared a certain amount of money in the ratio of 3:4:5 respectively. If Tracy got sh. 60,000 less than Jackie,

a. How much did each share?

b. How much did they share altogether?

7. Obama, Bush and Clinton contributed money to Africans in the ratio of 2:3:5 respectively. If Clinton contributed $ 30,000 more than Obama.

a. How many dollars did each contribute?

b. How many dollars were contributed altogether?

SHARING IN RATIOS, APPLICATION IN PERIMETER OF RECTANGLES AND TRIANGLES.

1. The ratio of the length to the width of a rectangle is 3:2 respectively. If the perimeter of the rectangle is 40cm.

a. Find the actual length and width of the rectangle

b. Find the area of the rectangle

2. The ratio of the length to the width of the rectangle is 3:2 respectively. If its perimeter is 40cm,

a. Find its actual length and width.

b. Find its perimeter.

PROPORTIONS

Direct proportions

1. The cost of 3kg of sugar is sh. 36,000. What is the cost of 5kg of sugar?

Approach 1

3kg = sh. 36,000

1kg = $\frac{sh.36,000}{3}$

$= \frac{sh.\cancel{36,000}^{12000}}{\cancel{3}}$

=sh.12000

5kg = sh.12,000 X 5

=sh.60,000

5kg of sugar cost sh.60,000

Approach 2

$3kg = sh\,36000$

$5kg = x \quad we\ cross\ multiply$

$\frac{3x}{3} = \frac{5 \times sh36000}{3}$

$\frac{\cancel{3}x}{\cancel{3}} = \frac{5 \times sh\cancel{36000}^{12000}}{\cancel{3}}$

$x = 5 \times sh12000$

$x = sh60,000$

The cost of 5kg of sugar cost sh. 60,000

Activity.

2. The bus fare for 6 people is sh. 42,000, what is the fare for 8 people?
3. A dozen of pencils costs sh. 1800. What is the cost 9 pencils?
4. A pupil bought a dozen of books for sh.6000.what is the cost of 5 books?
5. 2 bunches of matooke cost sh. 12,000. What is the cost of 7 similar bunches of matooke?
6. $\frac{1}{3}$ of my salary is sh.340,000. What is my salary?
7. $\frac{2}{3}$ of the pupils in P7 got aggregate 4. If 70 pupils got aggregate 4, how many pupils were in that class?
8. The cost of 4 apples is sh.32,000. What is the cost of 6 similar apples?
9. $\frac{3}{4}$ of a kg of sugar costs sh.1500. what is the cost of $2\frac{1}{2}$ kg?
10. 3 cakes cost sh. 6600. How many cakes can you buy with sh.2200?

INDIRECT (INVERSE) PROPORTIONS

1. 4 girls take 9 days to do a job. How long will 12 girls take to do the same job at the same rate?

What is required to find is put on the right for easy working out

Girls **Days**

4girls ……9days

1girl…… (4 X 9) days

= 36days

12girls…… $\frac{36}{12}\ days$

$=\frac{\cancel{36}^{3}}{\cancel{12}}\ days$

=3days

12girls will take 3days to do the job.

Activity.

1. 12 men can build a classroom in 5 days.
   a. How many men are needed to do the same job in 1 day?
   b. How long will 10 men take to do the same job at the same rate?
2. It takes 12 women 4 days to dig a shamba. How long would it take 8 women to do the same job at the same rate?
3. 9 men can build a wall in 14 days. How long will 7 men take to build the same wall?
4. 25 girls can construct a road in 8 days. How many girls will construct the same road in 10 days?
5. 6 men can paint a house in 4 days. How long will 96men take to paint the same houses at the same rate?
6. 6 porters can mow the compound in 4 days. How many porters will mow the same compound in 2 days
7. It takes 6 hours for 5 girls to peel cassava which will feed 900 pupils. How many girls will peel the same amount of cassava in 1 hour?

UNIT 8. PERCENTAGES

TOPIC; PERCENTAGES

Writing percentages to decimals.

a. 25% = $\frac{25}{100}$

= 0.25

Activity.

Write the following percentages to decimals.

a. 7%
b. 5%
c. 30%
d. 112%
e. 67%
f. 17%
g. 35%
h. 39%
i. 67%

Changing percentages to fractions.

Change $12\frac{1}{2}\%$ to fractions

$$12\frac{1}{2}\% = \frac{25}{2}\%$$
$$= \frac{25}{2} \div 100$$
$$= \frac{25}{2} \div \frac{100}{1}$$
$$= \frac{25}{2} \times \frac{1}{100}$$
$$= \frac{\cancel{25}^{1}}{2} \times \frac{1}{\cancel{100}_{4}}$$
$$= \frac{1}{8}$$

Change the following to fraction.

a. 120%
b. 4%
c. 7%
d. $33\frac{1}{3}\%$
e. 67%
f. $\frac{3}{5}\%$
g. 39%
h. $2\frac{2}{3}\%$
i. $14\frac{1}{2}\%$

Expressing fractions as percentages.

1. Express 3:10 as a percentage.

3:10 = $\frac{3}{10}\%$
$= \left(\frac{3}{10} \times 100\right)\%$
$= \left(\frac{3}{\cancel{10}} \times \cancel{100}\right)\%$
$= \mathbf{30\%}$

2. Express 4:5 as a percentage.

4:5 = $\frac{4}{5}\%$
$= \left(\frac{4}{5} \times 100\right)\%$
$= \left(\frac{4}{\cancel{5}} \times \cancel{100}^{20}\right)\%$
$= \mathbf{80\%}$

Assignment.

Express the following ratios as percentages.

a. 1:2
b. 2:5
c. 5:6
d. 1:8
e. 3:4
f. $\frac{1}{4} : \frac{1}{3}$
g. $\frac{1}{5} : \frac{1}{4}$
h. $\frac{1}{8} : \frac{1}{5}$

Finding the remaining percentage

If 15% of the people in class are absent, what percentage is present?

	Absent	**Present**	Total
%age	15%	**100% - 15% 75%**	100%

The percentage of pupils present is 75%

Assignment.

1. 80% of the cars in Uganda are white in colour. What percentage of cars are not white?
2. A man spends only 30% of the salary on rent and saves the rest. What percentage of his salary does he save?
3. 60% of the people in the village are adults. What percentage are children?
4. A Parent spends 25% on fees, 20% on clothing, 15% on transport and the rest on other family needs. What percentage is spent on others?
5. 30% of the books in the store are Mathematics books, 20% are English books, 10% are for SST. What percentage is for other books?
6. 40% of the pupils in school are girls. What percentage are boys?

Expressing quantities as percentages.

Express 20 as a percentage of 80

20 as a percentage of 80 $= \frac{20}{80} \times 100\%$

$= \frac{\cancel{20}}{\cancel{80}_{4}} \times \cancel{100}^{25}\%$

$= 25\%$

Assignment.

1. Express 20 as a percentage of 25.
2. Write 3 as a percentage 50.
3. A bag has 18 blue pens and 32 red pens. What percentage of the pens are red?
4. At GMS, there are 500 pupils of whom 290 pupils are girls and the rest are boys. What is the percentage of boys to the total number of pupils?
5. Express 20grams as a percentage of 1kg.
6. Express 30mins as a percentage of 2hours.
7. Nabiryo got 9 out of 10 in a test a math test. Express her results as a percentage.

Finding percentage parts

1.What is 40% of 150goats.

$40\%\ of\ 150 = 40\%\ of\ 150$

$= \frac{40}{100} \times 150$

$= \frac{\cancel{40}}{\cancel{100}} \times 15\cancel{0}$

$= 4 \times 15$

$= 60 goats$

2. A piece of land is 200 hectares. A farmer used 60% of it for cultivation. How much land is used for cultivation?

Cultivation = 60% of 200hectare.

$= \frac{60}{\cancel{100}} \times \cancel{200}\ \mathbf{ha}$

$= 60 \times 2$

$= 120 hectares$

Finding the original number

If 20% of a number is 40. What is the number?

Approach 1

Let the number be k

20% of k = 40

$$\frac{20}{100} \times k = 40$$

$$\cancel{100} \times \frac{20}{\cancel{100}} \times k = 40 \times 100$$

$$20 \times k = 40 \times 100$$

$$\frac{\cancel{20} \times k}{\cancel{20}} = \frac{40^2 \times 100}{\cancel{20}}$$

$$k = 200$$

The number is 200

Approach 2

20% = 40

1% = $\frac{40}{20}$

100% = $\frac{40^2}{\cancel{20}} \times 100$

= 200

The number is 200

Activity

1. If 10% of the number is 48. What is the number?
2. If 16% of the number is 900. What is the number?
3. If 120% of a number is 288. What is the number?
4. A man pays sh.12,000 for rent and saves the rest. This is 10% of his salary.
   a. How much is his salary?
   b. How much does he save?
5. 90% of the pupils at GMS attended online lessons. If the school has 2700 attended this program, how many pupils are at GMS.
6. If 20% of a number is 40. What is 60% of the same number?
7. 5% of the price of the radio is sh. 18,500. How much does it cost?

APPLICATION OF PERCENTAGES

1. Opio has 400 heads of cattle. 80% of them are cows and the rest are bulls. Find the number of bulls.

	Cows	Bulls	cattle
%ages	80%	100% - 80% 20%	100%
Number			400 cattle.

100% = 400cattle

1% = $\frac{400}{100}$

$=\frac{\cancel{400}}{\cancel{100}}$

=4 cattle

Bulls =80% X 4

=320bulls

Activity.

1. If 30% of my salary is spent on food, I save sh. 21000. What is my salary?
2. If 20% of my salary is spent on food and I save sh.20,000, what is my salary?
3. If 60% of a plot of land contains banana plantation and the remaining

80hectares are covered with coffee;

a. What is the total number of hectares?

b. How many hectares are for banana plantation?

4. After spending 40% of her income, Natukunda had sh 1800 left. How much had she originally?
5. After spending 30% of his income, a man was left with only sh. 210,000.
   a. How much is his income?
   b. How much did he spend?
6. After walking 20% of the journey, Joogo still had 60km to go. How long was the journey?

7. Three people A, B, and C shared a certain amount of money. A got sh 6000, B got sh 9000 and C got 40% of the money.
   a. How much money was shared altogether?
   b. How much money did C get?
   c. What percentage of the whole amount did A get?

PERCENTAGE INCREASE AND DECREASE

1. Increase sh.800 by 20%

	Before increase	After increase
%age	100%	100% + 20% 120%
Amount	Sh.800	

Approach 1

100% = sh 800

1% = $\frac{sh.800}{100}$

= $\frac{sh.8\cancel{00}}{1\cancel{00}}$

= sh.8

120% = sh.8 X 120

=sh. 960

Approach 2

Increment = 20% of sh. 800

= $\frac{20}{100} \times sh\ 800$

= $\frac{20}{1\cancel{00}} \times sh\ 8\cancel{00}$

= $20 \times sh.8$

= $sh.160$

New number = sh. 160 + sh.800

= sh. 960

Assignment.

1. Increase sh.2000 by 10% then by 20%
2. Increase sh.12000 by 10%.
3. Increase sh. 12000 by 5% then by 10%
6. Increase the following
   a. 200 bags of sugar by 10%
   b. 35kg of meat by 5%
   c. 50 by 20%

PERCENTAGE DECREASE

2. Decrease sh.1500 by 10%

	Before decrease	After decrease
%age	100%	100% - 20% 90%
Amount	Sh.1500	

Approach 1

100% = sh 1500

1% = $\frac{sh.1500}{100}$

= $\frac{sh.15\cancel{00}}{\cancel{100}}$

= sh.15

90% = sh.90 X 15

=sh. 1350

Approach 2

decrement = 10% of sh. 1500

= $\frac{10}{100} \times sh\ 1500$

= $\frac{10}{\cancel{100}} \times sh\ 15\cancel{00}$

$= 10 \times sh.15$

$= sh.150$

New amount = sh.1500 - sh. 150

= sh. 1350

Assignment.

1. Decrease the following.
   a. 800 guests by 35%
   b. 400football fans by $12\frac{1}{2}$%
   c. 720 dollars by $33\frac{1}{2}$%
   d. 4500litres of water by 20%
2. Decrease shs 8,000 by 10% then by 10%
3. The number of pupils decreased by 10% for the first year and then by 15% for the second year. How pupils are in the school if there were 1,600pupils?

FINDING ORIGINAL NUMBER AFTER INCREASE

1. What amount when increased by 20% becomes sh.1440?

	Old	New
%age	100%	100% + 20% 120%
Amount	M	Sh. 1440

Approach 1

120% of m = sh1440

$\frac{120}{100} \times m = sh1440$

$\cancel{100} \times \frac{120}{\cancel{100}} \times m = sh1440 \times 100$

$120m = sh1440 \times 100$

$\frac{120m}{120} = \frac{sh1440 \times 100}{120}$

$\frac{\cancel{120}m}{\cancel{120}} = \frac{sh1440^{12} \times 100}{\cancel{120}}$

$m = sh\ 1{,}200$

The amount increased was sh. 1,200

Approach 2

120% = sh1440

1% = $\frac{sh.1440}{120}$

= $\frac{sh.\cancel{1440}^{12}}{\cancel{120}}$

$= sh\ 12$

$100\% = sh.12 \times 100$

$= sh.1{,}200$

The amount increased was sh. 1,200

Assignment.

1. When the prices of a radio were increased by 30% it becomes sh.16900. What was the old price?
2. What amount of money when increased by 20% becomes 720?
3. What number when increased by 20% becomes 960?
4. When a number is increased by 30% it becomes 2600. What is the number
5. What sum of money when increased by 10% becomes sh.132000?
6. A trader sold a radio at sh. 42000 after increasing the cost price by 20%. What was the original price?
7. What number is increased by 10% then by 20% to become to become 6336
8. A man's salary was increased by 20% and become sh.720,000. Find the man's salary?

FINDING ORIGINAL NUMBER AFTER DECREASE

1. If a man's salary is decreased by 35% it becomes sh.15600. what is his salary?

	Before decrease	After decrease
Percentage	100%	100% - 35% 65%
Amount	p	Sh.15600

Approach 1

65% of p = sh15600

$$\frac{65}{100} \times p = sh15600$$

$$\cancel{100} \times \frac{65}{\cancel{100}} \times p = sh15600 \times 100$$

$$65p = sh15600 \times 100$$

$$\frac{65p}{65} = \frac{sh15600 \times 100}{65}$$

$$\frac{\cancel{65}p}{\cancel{65}} = \frac{sh\cancel{15600}^{240} \times 100}{\cancel{65}}$$

$$p = sh\ 240 \times 100$$

The amount increased was sh. 24,000

Approach 2

65% = sh15600

$$1\% = \frac{sh.15600}{65}$$

$$= \frac{sh.\cancel{15600}^{240}}{\cancel{65}}$$

$$= sh\ 240$$

$$100\% = sh.240 \times 100$$

$$= sh.24{,}000$$

The amount increased was sh. 24,000

Assignment.

1. When the price of a radio is reduced by 25% it becomes sh.67500. what was the old price of the radio?
2. What number of pupils when decreased by 20% becomes 720 pupils?
3. What sum of money when decreased by 20% becomes sh.10800?
4. The teacher's salary was decreased by 20% to 120,000. What was the salary before?
5. The price of a suit was reduced by 30% to sh. 98000. What was the price of the suit before?
6. A car was bought at sh4, 800,000 after a decrease of 20% of the original price. What was the price of the car before the decrease?

FINDING PERCENTAGE OF INCREASE OR DECREASE

1. When 400kg are increased by p% they become 440kg. Find the value of p.

	Original number	New number	Increment
%age	100%	100% + p%	P%
Number	400kg	440kg	440kg - 400kg 40kg

$$\%\text{age increase} = \frac{increase}{original\ number}$$

$$= \frac{40kg}{400kg} \times 100\%$$

$$= \frac{\cancel{40}^{10}kg}{\cancel{400}kg} \times \cancel{100}\%$$

$$p = 10\%$$

Approach 2

100% + p% of original number = New number

$$100\% + P\% \times 400kg = 440kg$$

$$\left(\frac{100}{100} + \frac{p}{100}\right) \times 400kg = 440kg$$

$$\left(\frac{100 + p}{100}\right) \times 400kg = 440kg$$

$$100 \times \left(\frac{100 + p}{100}\right) \times 400kg = 440kg \times 100$$

$$\cancel{100} \times \left(\frac{100 + p}{\cancel{100}}\right) \times 400kg = 440kg \times 100$$

$$(100 + p) \times 400kg = 440kg \times 100$$

$$40000kg + 400kg \times p = 44000kg$$

$$40000kg - 40000kg + 400kg \times p = 44000kg - 40000kg$$

$$400kg \times p = 4000kg$$

$$\frac{400kg}{400kg} \times p = \frac{4000kg}{400kg}$$

$$\frac{\cancel{400kg}}{\cancel{400kg}} \times p = \frac{\cancel{4000}^{10}\cancel{kg}}{\cancel{400kg}}$$

$$p = 10\%$$

Assignment.

1. 800 pupils were decreased by y% to 680 pupils. find the value of y.
2. By what percentage will 480 be increased to 540?
3. By what percentage will 600 be increased to 880?
4. A worker's salary was increased from sh.15000 to 18000. By what percentage was the salary increased?
5. When 1000 was decreased by x% it becomes 900. Find the value x.
6. I bought a radio at sh 60000 and sold it at sh.50000.what is the percentage decreased?
7. The number of pupils at the beginning of the year was 240, at the end of the year they were 180. By what percentage did the children decrease

PERCENTAGE PROFIT AND LOSS

The idea of increase can also give the same meaning as: gain, profit or raise.

1. An article was bought at sh. 100,000 and sold at sh.120000. calculate the percentage profit.

profit = Selling price – buying price

= sh. 120,000 – sh. 100,000

= sh. 20,000

% age profit $= \left(\frac{profit}{cost\ price} \times 100\right)\%$

$= \left(\frac{\text{sh.}20{,}000}{\text{sh.}100{,}000} \times 100\right)\%$

$= \left(\frac{\text{sh.}20{,}\cancel{000}}{\text{sh.}1\cancel{00{,}000}} \times 100\right)\%$

= 20%

2. Otim bought a shirt at sh. 4000 and sold it at sh.3000. Find his percentage loss.

Loss = Buying price – Selling price

= sh. 4,000 – sh. 3000

= sh. 1000

% age loss $= \left(\frac{loss}{cost\ price} \times 100\right)\%$

$= \left(\frac{\text{sh.}1000}{\text{sh.}4{,}000} \times 100\right)\%$

$= \left(\frac{\text{sh.}1\cancel{000}}{\text{sh.}4\cancel{,000}} \times \cancel{100}^{25}\right)\%$

= 25%

Assignment.

1. A book was bought at sh.800 and was sold at sh. 900. Calculate the percentage profit.
2. A man bought a car at 4,200,000 and sold it at profit of sh. 200000.calculate the percentage profit.
3. A lady sold a radio for sh. 85,000 making a profit of sh.5000. Calculate percentage profit.
4. A man sold a jerry can of oil at sh. 60,000 and made a loss of sh.15,000. Calculate the percentage profit.
5. By selling a school bag at sh.12000, a student made a loss of sh 2000. Calculate the percentage loss.

FINDING SELLING PRICE GIVEN PERCENTAGE PROFIT OR LOSS AND BUYING PRICE

1. Bushira bought a DVD player at sh. 300,000 and sold it at 10% profit. Find his selling price.

	Buying price	profit	Selling price
%age	**100%**	10%	100% + 10% 110%
Amount	**Sh. 300,000**	??	

100% = sh.300,000

1% = $\frac{sh.300,000}{100}$

= $\frac{sh.300,000}{100}$

= sh.3,000

110% = 110 x sh 3,000

= sh 330,000

Activity

1. A fridge bought for sh.600,000 was sold at a loss of 25%. Calculate the selling price.
2. After selling an article at sh.21000, a trader made a profit of 20%. Calculate the cost of the article?
3. By selling a pair of sugar at sh.45000 a dealer made a loss of 10%. Calculate the cost price of the pair of shoes. How much money did he lose?
4. After selling a book at sh 2200 a boy made a profit of 10%. Calculate his cost price.
5. By selling a shirt at sh 45150, a dealer made a loss of $12\frac{1}{2}$%. Calculate the cost price of the shirt.
6. Because of the wet season, the price of each bunch of matooke rose by 15%. calculate the price the rise if the new price was sh.4600.
7. A man's salary after an increase was sh.36,000. Calculate his original salary if there was a 7% increase?
8. By selling a blanket at sh. 36000, a trader made a profit of 20%. Calculate the cost price of the blanket.
9. A dealer sold a bicycle for sh. 45000 there by losing 10%

(a) Calculate the original price of the bicycle.

(b) How much did he lose?

DISCOUNT

Discount is realized when a trader sells an item at a price less than the marked price.

1. The marked price of a book is sh.4000. If a customer is offered a 10% discount:

(a) How much is the discount?

Discount = 10% of the marked price.

= 10% x sh. 4000

= $\frac{10}{100} \times sh.4000$

= $\frac{10}{\cancel{100}} \times sh.\cancel{4000}$

= sh. 400

b. How much does the customer pay?

	Marked price	discount	Buying price
%age	100%	10%	100% - 10% 90%
Amount	Sh.4000		

100% = sh.4,000

1% = $\frac{sh.4,000}{100}$

$= \frac{sh.4,\cancel{000}}{\cancel{100}}$

90% = 90 X sh. 40

= sh.3,600

The customer paid sh.3,600

Approach 2

Buying price = marked price – discount

= sh4,000 – sh. 400

= sh. 3,600

Activity

1. The marked price of a shirt was sh. 1500. After a discount a customer paid sh.1200.
   a. how much was the discount?
   b. Calculate the percentage discount.
2. The marked price of a bicycle is sh.60,000. A customer is offered a discount of 15% for cash. How much money does the customer pay?
3. A trader offered a discount of 10% for cash. Calculate the cash paid if the marked price of an article is sh. 130,000.
4. Kawuki bought a mattress whose marked price was sh.70,000. He was offered a discount of 5%. How much did he pay for the mattress?
5. Natasha bought 4 pairs of trousers and offered a discount of $12\frac{1}{2}\%$ of the total cost. If the pair of trousers cost sh. 24,000. What price did she pay?

FINDING THE MARKED PRICE (ORIGINAL PRICE)

1. Cissy paid sh. 18,000 for a hand bag after being offered a discount of 10%. Calculate the marked price of the bag.

	Marked price	Cash price
%age	100%	100% -10% 90%
Amount		Sh. 18,000

90% = sh. 18,000

1% = $\frac{sh.\ 18{,}000}{90}$

$= \frac{sh.\ \cancel{18{,}000}^{2000}}{\cancel{90}}$

= sh. 2,000

100% = sh. 2,000 x 100

= sh. 200,000

The marked price of the bag was sh.200,000

ACTIVITY.

1. Nabukenya paid sh. 8,500,000 for a car after being given a discount of 15%. What was the price of the car before the discount?
2. After being given a discount of $7\frac{1}{2}\%$ on an article, a customer paid sh. 37,000. Calculate the price of the article before.
3. The marked price of a dress is sh.11,000, a watch is sh. 15,000, apair of shoes is sh. 35,000, a customer ho paid cash was given a discount of 10% on a dress, 20% on a watch and 15% on a pair of shoes. How much did the customer pay for all the items?
4. Bumba bought a brief case after a discount of $12\frac{1}{2}\%$ which amounts to sh. 108, 000. What was the cost before the discount?
5. A wholesaler gave a retailer a discount of 25% on article whose marked price is sh. 108,000. The retailer added 8% for transport and 20% V.A.T.
   a. Calculate the marked price of article in the retailer shop.
   b. What profit does the retailer make?

SIMPLE INTEREST

Terms used

1. **Simple interest.** This is the payments after using the money.
2. **Time** This is period the money is kept or used.
3. **Principal.** This the money borrowed or kept in the bank or association.
4. **Rate.** This is the percentage charged every year.

Therefore; Simple Interest = Princinpal x Rate x Time

CALCULATING SIMPLE INTEREST

1. Calculate the simple interest on sh.8000 for 2yrs at 10% per annum.

Simple interest = Principal x Rate x Time.

S . I = P X R X T

= Sh. 8,000 X 10% X 2yrs

= $sh.8,000 \times \frac{10}{100} \times 2$

= $sh.8,0\cancel{00} \times \frac{10}{\cancel{100}} \times 2$

= **sh. 80 x 10 x 2**

= **sh. 1,600**

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2. A man deposited sh.40,000 for 5years at a simple interest rate of $2\frac{1}{2}\%$ per year.

a. Calculate his simple interest.

Simple interest = Principal x Rate x Time.

S. I = P X R X T

= Sh. 40,000 X $2\frac{1}{2}\%$ X 5yrs

= $sh.40,000 \times \frac{5}{2}\% \times 2$

= $sh.40,000 \times \frac{5}{2} \div 100 \times 2$

= $sh.40,000 \times \frac{5}{2} \times \frac{1}{100} \times 2$

= $sh.40,0\cancel{00} \times \frac{5}{\cancel{2}} \times \frac{1}{\cancel{100}} \times \cancel{2}$

=**sh. 400 x 5**

= **sh. 2,000**

---

b. Find how much did he find on his account after 5years?

Amount = Principal + Interest

= Sh. 40,000 + sh. 2,000

= sh. 42,000

---

3. Calculate the simple interest on sh.24000 for 8 months at simple interest rate of 15% per year.

Simple interest = Principal x Rate x Time.

S. I = P X R X T

= Sh. 24,000 X 15% X 8months

$= \boldsymbol{sh.24,000} \times 15\% \times \frac{8}{12}$

$= \boldsymbol{sh.24,000} \times \frac{15}{100} \times \frac{8}{12}$

$= \boldsymbol{sh.\cancel{24,000}^{80}} \times \frac{15}{\cancel{100}} \times \frac{\cancel{8}^{2}}{\cancel{12}_{\cancel{3}}}$

= sh. 80 x 15 x 2

= sh. 2400

4. Calculate the simple interest on sh. 24000 for 8 months at a simple interest rate of 2% per month.

Simple interest = Principal x Rate x Time.

S. I = P X R X T

= Sh. 24,000 X 2% X 8months

$= \boldsymbol{sh.24,000} \times \frac{2}{100} \times \boldsymbol{8}$

$= \boldsymbol{sh.24,0\cancel{00}} \times \frac{2}{\cancel{100}} \times \boldsymbol{8}$

= sh. 240 x 2 x 8

= sh. 3,840

Assignment

1. A man borrowed sh. Sh. 45,000 from in the bank. How much interest will she get after 2 years at 4% interest?
2. A lady borrowed sh. 300,000 from the bank which charges an interest rate of 1% for 9months. Find the simple interest and amount she will pay back.
3. Mukasa borrowed sh. Sh. 150,000 for 3years at a rate of 4% interest per year. What amount must he pay back?
4. What is the simple interest on sh. 10,000 borrowed for 5 years at $4\frac{1}{2}\%$ interest per interest per year?
5. Mary deposited sh. 40,000 with the post office savings Bank which offers an interest of 12% per year. How much money will Mary have in the Bank after 9 months?
6. Tr Apio deposited sh. 200,000 in the bank which gives simple interest of 5%. How much profit will she earn after 2 years?
7. Kepha banked sh. 500,000 at a simple interest of 12% per year. What did he earn after two years?

8. Assimwe deposited sh. 50,000 in the Uganda commercial Bank which offers an interest of 30% per year. How much money will Assimwe have in the Bank after 6months?
9. Opio put sh. 60,000 in the bank. If the interest rate was 8% per year. How much interest did he get after 6 months?
10. Mukasa put sh. 80,000 in the bank. If the interest rate was 10% per year. How much interest did he get after 9 months?
11. Denis banked sh. 150,000 on his account for 2 years at an interest rate of 5% per year. How much interest did he get after 6 months?

FINDING PERCENTAGE RATE

1. Nabifo deposited sh.50,000 on her saving s account. At the end of 3yrs the simple interest earned was sh.15,000. Calculate the rate of interest.

Simple interest = Principal x Rate x Time.

S. I = P X R X T

Sh.15,000 = Sh. 50,000 X R X 3yrs

Sh.15,000 = Sh. 50,000 X 3 X $\frac{R}{100}$

Sh.15,000 = Sh. 50,0~~00~~ X 3 X $\frac{R}{~~100~~}$

Sh. 15,000 = sh. 500 x 3 x R

$\frac{~~Sh.15,000~~^{10}}{~~sh.500~~ X ~~3~~} = \frac{~~Sh.500~~ X ~~3~~ X R}{~~Sh.500~~ X ~~3~~}$

10 = R

R = 10%

Assignment.

1. Calculate the rate of interest if sh.30,000 can yield a simple interest of sh.1,125 in 9months.
2. A man borrowed sh. 180,000 for 3 years. He paid back a total sum including the interest of sh. 216,000. Calculate the percentage rate.
3. Ruby borrowed 125,000 for a year. She paid back sh. 126,750. Find the rate of interest at which she was charged.
4. A woman borrowed sh. 500,000 for 6 months. At the end of that period, she repaid sh. 515,000. At what interest rate was she paying?
5. Kaijah deposited sh. 1,500, 000 for $2\frac{1}{2} years$ and earned an interest of 375,000. Calculate his percentage rate.
6. After 2 years, a lady paid an interest of 9,000 on a loan of sh. 22,500. Calculate the interest rate.
7. Calculate the interest rate if the interest on sh. 20,000 borrowed for 2 years is sh. 1000.

CALCULATING PRINCIPLE

1. What sum of money will yield an interest of sh. 6000 at 5% for 3 years.

Simple interest = Principal x Rate x Time.

S. I = P X R X T

Sh.6000 = P X 5% X 3yrs

Sh.6000 = $P \times \frac{5}{100} \times 3$

100 X Sh.6,000 = $P \times \frac{\mathbf{15}}{\mathbf{100}} \times \mathbf{100}$

100 X Sh.6,000 = $P \times \frac{\mathbf{15}}{\cancel{\mathbf{100}}} \times \cancel{\mathbf{100}}$

Sh.600,000 = 15 X P

$$\frac{Sh.600,000}{15} = \frac{15 \times p}{15}$$

$$\frac{Sh.\cancel{600,000}^{40000}}{\cancel{15}} = \frac{\cancel{15}\times p}{\cancel{15}}$$

$$sh.40,000 = p$$

$$p = sh.40,000$$

The sum of money is sh. 40,000

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2. A farmer borrowed money at a rate of $12\frac{1}{2}\%$per year. After 2 years, the interest of sh. 8,000 was paid. How much did the farmer borrow?

Simple interest = Principal x Rate x Time.

S. I = P X R X T

Sh.8000 = P X $12\frac{1}{2}\%$ X 2yrs

Sh.8,000 = $P \times \frac{25}{200} \times 2$

Sh.8,000 = $P \times \frac{25}{\cancel{200}_{100}} \times \cancel{2}$

Sh.8,000 = $P \times \frac{\cancel{25}^{1}}{\cancel{100}_{4}} \times \cancel{2}$

Sh.8,000 = $\frac{p}{4}$

4 X Sh.8,000 = $\frac{p}{4} \times 4$

4 X Sh.8,000 = $\frac{p}{\cancel{4}} \times \cancel{4}$

Sh. 32,000 = p

P = sh. 32,000

The farmer borrowed sh. 32,000

Activity.

1. What sum of money will yield an interest of sh. 3,000 at a rate of 4% for 3years?
2. What principal will yield sh.1,200 interest at 5% for 9 months?
3. Kabasa borrowed some money at 10% per annum. At the end of 2 years, she paid an interest of sh.6,000. How much was borrowed?
4. What sum of money will yield an interest of sh. 21,000 at 7% for 3 years.

5. What sum of money will yield an interest of sh. 18,000 at 20% for 3 months.
6. The interest of sh.45,000 was realised after borrowing a sum of money for 5 years at 10% per year. How much money was borrowed?
7. A company paid sh. 120,000 as interest for a 3year loan at 8% per annum. How much money was borrowed?

FINDING TIME

1. A girl borrowed sh. 50,000 at a rate of 3% and paid sh. 15,000 as interest. How long did he use the money?

Simple interest = Principal x Rate x Time.

$$\begin{aligned} \text{S. I} &= \text{P} \times \text{R} \times \text{T} \\ \text{Sh. } 15{,}000 &= \text{sh.}50{,}000 \times 3\% \times \text{T} \\ \text{Sh. } 15{,}000 &= \text{sh.}50{,}000 \times \tfrac{3}{100} \times \text{T} \\ \text{Sh. } 15{,}000 &= \text{sh.}50{,}0\cancel{00} \times \tfrac{3}{\cancel{100}} \times \text{T} \\ \text{Sh. } 15{,}000 &= \text{sh.}500 \times 3 \times \text{T} \\ \frac{sh.\,15{,}000}{sh.\,500 \times 3} &= \frac{sh.\,500 \times 3 \times T}{sh.\,500 \times 3} \\ \frac{\cancel{sh.\,15{,}000}^{10}}{\cancel{sh.\,500} \times \cancel{3}} &= \frac{\cancel{sh.\,500} \times \cancel{3} \times T}{\cancel{sh.\,500} \times \cancel{3}} \\ 10years &= T \\ Time &= 10years \end{aligned}$$

Assignment

1. At what time will sh. 12,000 yield an interest of sh. 1,800 at 5% per year.
2. How long will sh.20,000 take to yield an interest of sh.8,000 at 10%
3. What time will sh.60,000 yield an interest of sh.3,000at 5%
4. A man borrowed sh. 120,000 at a rate of 20% per annum. How long will he take to pay an interest of sh. 90,000 on the loan?
5. A company paid a loan plus the interest worth sh. 560,000 after borrowing sh.840,000 at 10% per annum. For how long did the company use the money?
6. A man paid a total of sh. 180,000 after borrowing sh. 54,000 at 10% per annum. For how long did he use the loan?
7. A lady borrowed sh. 50,000 at a rate of 3% per annum. How long will she take to pay an interest of sh. 15,000 on the loan?

For mastery of the work there should be serious practice and exposure to different questions

MORE ABOUT PERCENTAGES

c. Najjuuko sold her radio to Nakintu at sh. 63,000 making a loss of 10%. Nakintu later sold it to Nanyonga at a profit of 15%.

a. Calculate the amount of money Najjuuko paid for the radio.

Names	Najjuuko		Nakintu		Nanyonga	
	Buying price	Selling price	Buying price	Selling price	Buying price	Selling price
%age	100%	100%-10% 90%	100%	100%+15% 115%	100%	
Amount		Sh. 63,000				

$$let\ the\ Najjuuko's\ buying\ price\ be\ x$$

$$90\%\ of\ x = sh.63{,}000$$

$$\frac{90}{100} \times x = sh.63{,}000$$

$$\cancel{100} \times \frac{90}{\cancel{100}} \times x = sh.63{,}000 \times 100$$

$$90 \times x = sh.63{,}000 \times 100$$

$$\frac{90 \times x}{90} = \frac{sh.63{,}000 \times 100}{90}$$

$$\frac{\cancel{90} \times x}{\cancel{90}} = \frac{sh.\cancel{63{,}000}^{700} \times 100}{\cancel{90}}$$

$$x = sh.70{,}000$$

$$Najjuuko\ paid\ sh.70{,}000\ for\ the\ radio$$

Approach 2

Names	Najjuuko		Nakintu		Nanyonga	
	Buying price	Selling price	Buying price	Selling price	Buying price	Selling price
%age	100%	100%-10% 90%	100%	100%+15% 115%	100%	
Amount		Sh. 63,000	Sh. 63,000			

$$90\% = sh.63{,}000$$

$$1\% = \frac{sh.63{,}000}{90}$$

$$1\% = \frac{sh.\cancel{63{,}000}^{700}}{\cancel{90}}$$

$$= sh.700$$

$$100\% = sh.700 \times 100$$

$$= sh.70{,}000$$

b. For how much money Nakintu sell the radio.

$$Nakintu's\ selling\ price = 115\%\ of\ sh\ 63{,}000$$

$$= \frac{115}{100} \times sh\ 63{,}000$$

$$= \frac{115}{\cancel{100}} \times sh\ 63{,}0\cancel{00}$$

$$= 115 \times sh\ 630$$

$$= sh\ 72450$$

Assignment

1. Okia bought a car at sh. 5,000,000. He sold it to Okido making a loss of 20%. Okido sold the same car to Oketa making a loss of 5%. How much did OKata pay for the car.
2. Okello bought a car at sh. 2,500,000 and later sold it to Otim at a profit of 10%. Otim then sold it to Tumwine at a loss of 15%. How much did Tumwine pay for the car?
3. Out of 120 students who took a test, $\frac{1}{3}$ were girls.

a. How many girls took the test?

b. if 40% of the boys failed and 55% of the girls passed the test, how many students passed the test?

4. Kashimbulusha buys a cow from Kashembere and sells to Deshumburwe at sh. 40,000 making a profit of 25%. what did Kashimbulusha to Kashembere?
5. Faizal sold two plots of land, one for sh.3,500,000, making a 10% profit and another for sh.5,000,000 making a 20% profit. How much had Faizal paid for the two plots of land?
6. The district inspector of schools of a certain district registered 4000 candidates for PLE 2007. Out of these, 30% were girls below 15years and 25% were boys below 15 years of age

a. Find the number of girls who sat for PLE.

b. Find the number of boys who sat for PLE.

c. How many first grades did the district get the district get if all the candidate below 15years of age passed in division one?

7. In a P6 class $\frac{1}{3}$ of the pupils were absent on Friday and 80% of the pupils were present on Saturday, if 10more pupils were absent on Friday than on Saturday, how many pupils were in the class altogether.

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