P.5 MATH LESSON NOTES

TERM I

SET CONCEPTS

What is a set?

i) A set is a collection of clearly defined members.
ii) When you describe a set, it must be clear what that set contains.
iii) You must be able to decide whether or not an object is a member of that set.

TYPES OF SETS

1. EQUAL SETS

i) These are sets that have the same and equal number of members.
ii) The order of arrangement does not matter.

EXAMPLE I

A = {a, b, c, d}…….n(Q) = 4

B = {b,c,d,a}……n(X) = 4

Therefore, A =B

EXAMPLE II

P = {0, 2, 4, 6}……..n(A) =4

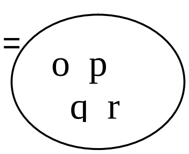
R= {6, 0, 2, 4}……..∩(B) = 4

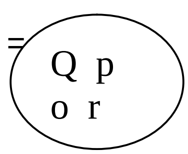
Therefore P = R

2. EQUIVALENT SETS

i) These are sets which have equal number of members which **MAY NOT** necessarily be the same.
ii) Equivalent can be written using the symbol ($\longleftrightarrow$). For example A $\longleftrightarrow$ B can be read as; A is equivalent to B.

EXAMPLE

P =


V =


Set **P** $\longleftrightarrow$ **V**

3. NON EQUIVALENT SETS

i) These are sets that have different members and different number of elements.
ii) The symbol used in non-equivalent sets is ($\not\longleftrightarrow$).

EXAMPLES OF NON EQUIVALENT SETS

i) **C** =

a b c d e f

D =

1 3 5 6

Therefore C $\nleftrightarrow$ D **Or Set C and D are non Equivalent.**

ii) **L** = {a, e, i, o, u } **J** = {1, 2, 3, 4 }

Therefore set L and J are non equivalent. Or L $\nleftrightarrow$ J

3. EMPTY SET

~~i)~~ Empty set is a set that has no member in it.

ii) It is written as **{ }** or **Ø**

EXAMPLES OF EMPTY SETS

i) A set of wild elephants that are blue.

ii) The sun rises from the North

iii) A set of boys who are pregnant etc.

4. INTERSECTION OF SETS

i) Intersection of sets means the common elements in two or more sets.

ii) The symbol for intersection is written as **'**ą**'**.

EXAMPLE I

A = {a, b, e, f, g} **B** = {b, d, f, g }

Find A∩B

A ą**B = { b, e, f, g}**

EXAMPLE II

P = { 2, 4, 6, 8 } **Q** = { 1, 3, 5, 7 }

Find P∩Q

Pą**Q = { } or P**ą**Q = Ø** Ans.

WORK TO DO

A. Write the intersection of the following sets.

1. A = {a, b, c} B = {b, d, e, f}
2. P = {a, e, i, o, u} Q = {a, b, c, d, e, f}
3. M ={1, 2, 3, 4, 5} N = {3, 4, 7}
4. X = {odd numbers less than 13}
   Y = {Even numbers less than 12}
5. **R** = (1 3 7 9) **L** = (1 2 3 4)
6. **S** = (1, 2, 3,4) **T** = (2,4,7,8,)

B. Name the type of set given

1. X = {b, c, d, e, f}   Y = {f, e, d, c, b}
2. K = {2,4,6,8,10}   M = {1,3,5,7,9}
3. A = {k, l, m, n}   B = {0, 2, 4}
4. J = {A girl with metallic fingers}
5. N = {Boys who walk on water}
6. Q = {The first four even numbers}
   R = {0, 2, 4, 6}

FINDING THE NUMBER OF ELEMENTS IN INTERSECTION.

We find the number of elements by counting the elements in the intersection of sets.

EXAMPLE I

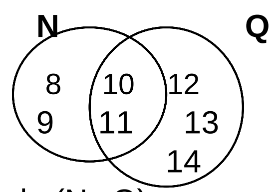
J = {a, e, i, o, u}   K = {a, b, c, d, e, f, g, h}

Find n(J∩K)

(J∩K) = {a, e, i}

n(J∩K) = 3members

EXAMPLE II



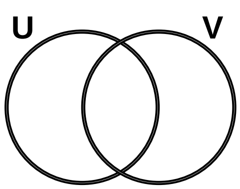
Find n(N∩Q)

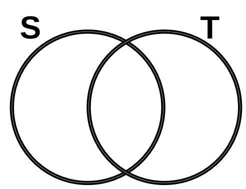
(N∩Q) = {10, 11}

n(N∩Q) = 2 members

WORK TO DO

Find the number of elements in the intersection of sets.

1. P = { a, b, c, d, e, f, g, h}   Q = {a, e, i, o, u}
2. A = {5, 10, 15, 20, 25, 30,}   B = {10, 20, 30,40}
3. R = {p, q, r, s, t}   S = {p, s, m, l}
4. X = {m, n, o, p, q}   Y = {m, a, n, g, o, e, s}
5. 

6. 

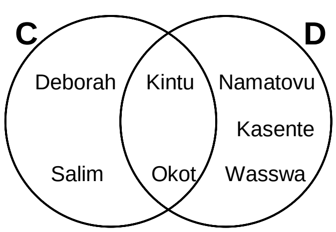
REPRESENTING INTERSECTION ON VENN DIAGRAMS

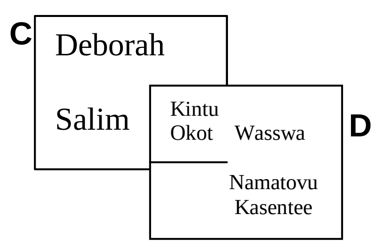
EXAMPLE I

C = {Okot, Kintu, Deborah, Salim}

D = {Namatovu, Kintu, Wasswa, Kasente, Okot}

y **C∩D = {Kintu, Okot}**





5. UNION OF SETS

i) Union of sets is a set of all members in the given sets. However, the members should not be repeated.

ii) The symbol for union is 'U'.

FINDING UNION OF SETS

EXAMPLE I

A = {father, mother}B = {sister, brother}

Find AUB

AUB = {father, mother, sister, brother}

EXAMPLE II

P = {6, 8, 10}   Q = {10, 20, 30}

PUQ = {6, 8, 10, 20, 30}

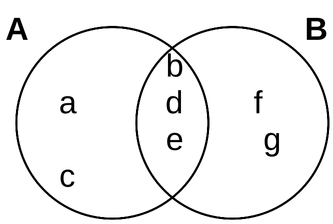
WORK TO DO

Find the union of the following sets.

1. A = {oranges, mangoes, pawpaws}   B = {tomatoes, peas, pineapples}
2. M = {2, 4, 5}   N = {1, 2, 4, 6}
3. C = {lion, elephant, dog}   D = {cat, sheep, goat}
4. R = {Masaka, Sembabule, Rakai}   S = {Mbale Palissa, Kumi}
5. K = {2, 4, 6, 8,}   L = {1, 3, 5, 7, 9}
6. X = {a, e, i, o, u}   Y = {b, i, g, e, r}

FINDING NUMBER OF ELEMENTS IN UNION OF SETS.

EXAMPLE I



AUB = {a, b, c, d, e, f, g}

n(AUB) = 7members.

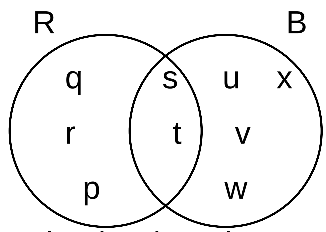
EXAMPLE II

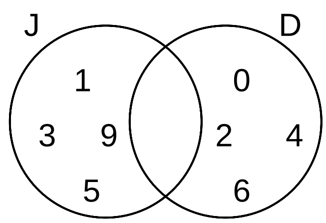
P = {Mon., Tue, Wed, Thur}
Q = {Mon., Thur, Fri, Sat}
Find n(PUQ)

PUQ = {Mon., Tue, Wed, Thu, Fri, Sat}
n(PUQ) = 6 member

WORK TO DO

Find the number of elements, which are in the union set.

1. A = {a, b}   B = {b, c.} What is n(AUB)?
2. P = {1, 2, 3}   Q = {3, 4, 5, 6} What is n(PUQ)?
3. 

   What is n(RUB)?
4. 

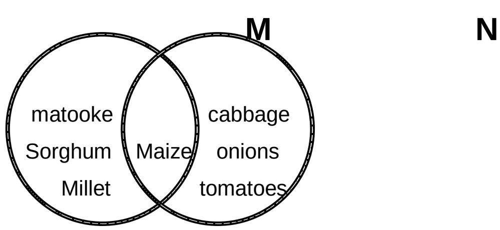
   What is n(WUV)?
5. W = {z, k, l, m}   V = {i, k, l} What is n(JUD)?
6. K = {a, b, c, d}   G = {a, e, i, o, u} What is n(KUG)?

REPRESENTING UNION ON VENN DIAGRAMS

EXAMPLE I

If **M** = {Matooke, maize, millet, sorghum,}
N = [cabbage, maize, onion, tomatoes eggplant}

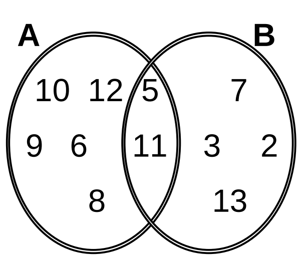
Represent MUN on a Venn diagram.



EXAMPLE II

A = {5, 6, 8, 9, 10, 11, 12}
B = {2, 3, 5, 7, 11, 13}

Represent AUB on the Venn diagram.



WORK TO DO

Draw Venn diagrams to represent union of each set.

1. A = {sweets, bread, biscuits}

   B = {sodas, biscuits, juice}

2. C = {1, 2, 3, 4, 5, 6}

   D = {1, 4, 9, 16, 25}

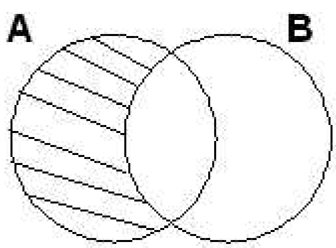
3. R = {9, 2, 4, 6, 8}

   S = {4, 3, 5, 7, 9}

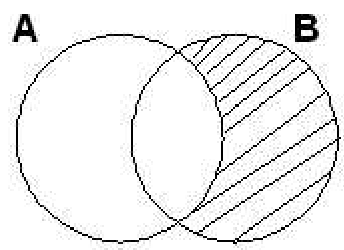
6. THE DIFFERENCE OF SETS

i) The difference of two sets, A and B is the set of elements that are in A but not in B and is written as A – B

ii) B difference of A is written as B – A
Diagrammatically they can be represented as follows.



A – B



B – A

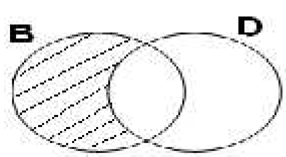
WORK TO DO

A. **Draw Venn diagrams and shade the following**

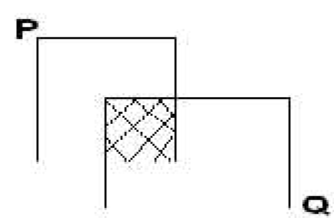
1. P – Q
2. Q – P
3. A – B
4. B – A
5. K – L
6. L – k

B**. What does the shaded part represent?**

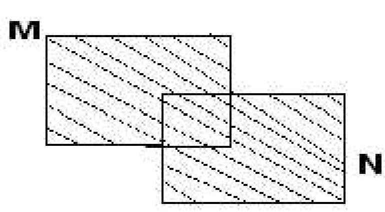
1



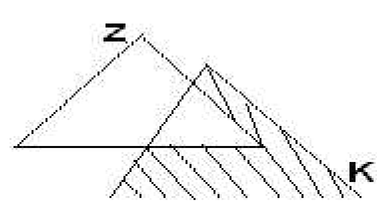
2.



3.



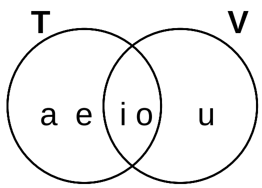
4.



LISTING MEMBERS IN THE DIFFERENCE OF SETS

EXAMPLE I

List members in T – V



T – V = {a, e}

EXAMPLE II

A = { boy, girl, pin, box}
B = { pin, box, man, coin, stone}

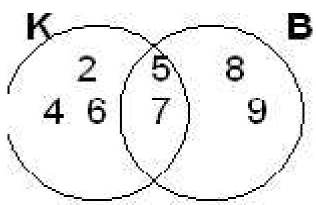
List members of B – A

B – A = {coin, stone, man}

WORK TO DO

List members in the following difference of sets.

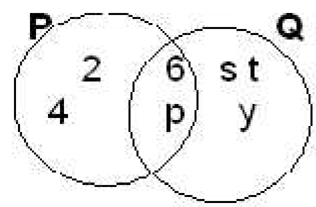
1. K – B



2. M – N
   M = {2, 4, 5, 6} N = { 5, 6, 7, 8}

   List members of K – B

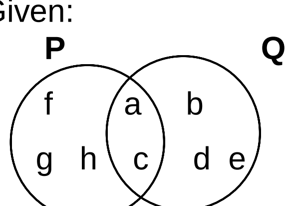
3. P – Q



FINDING THE NUMBER OF ELEMENTS IN THE DIFFERENCE OF SETS

EXAMPLE I

Given:



Find n(P – Q)

P – Q = {f, g, h}

n(P – Q) = 3 members

EXAMPLE II

Given: D = { b, d, e}
M = { a, b, e, k}

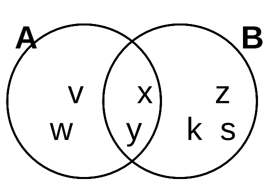
Find n(M– D)

M – D = {k}

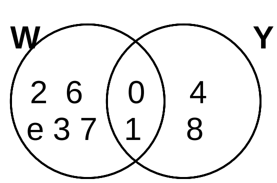
n(M – D) = 1 member

WORK TO DO

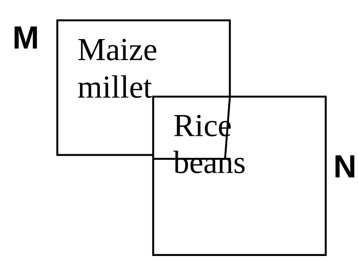
1. Find n(A – B)



2. Find n(Y – W)



3. Find n(M – N)



4. Find n(T – V)

   Given T = {e, 3, 4, 5}
   V = { e, 3, 5, 8, 9}

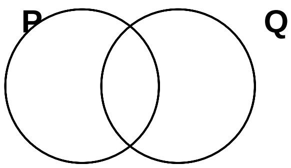
5. Find n(–)

   Given; B = {Joe, Betty, Tim}
   K = {Joe, Tim, Meddy, Halima}

THE ELEMENTS IN A SET

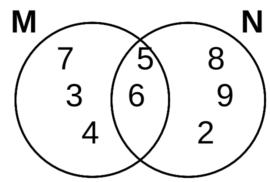
EXAMPLE I

Shade set Q



EXAMPLE II

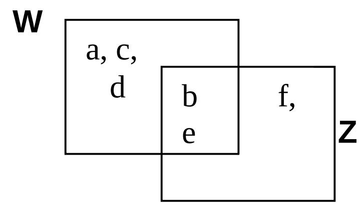
List the elements in set N



N = {2, 6, 5, 8, 9}

EXAMPLE III

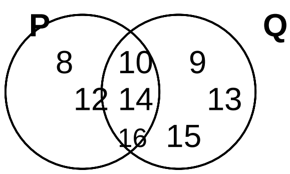
List down members of set W



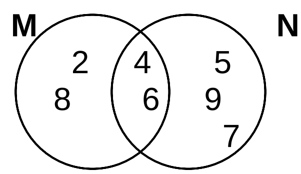
W = {a, b, c, d}

WORK TO DO

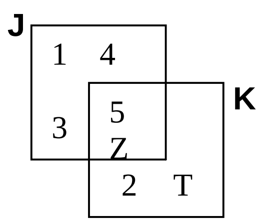
1. List members in set P



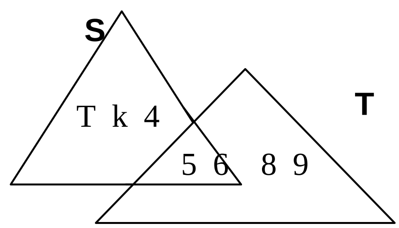
2. List down elements in set N



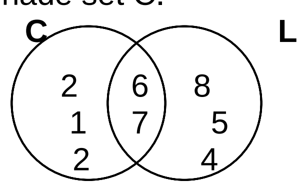
3. Write down members of set K



4. List down elements in set S



5. Shade set C.



THE NUMBER OF ELEMENTS IN A GIVEN SET

EXAMPLE I

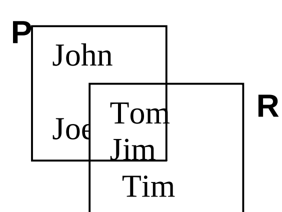
Given; K = {b, c, d, e, f}

Find n(K)

n(K) = 5 members

EXAMPLE II

Given;



Find n(R)

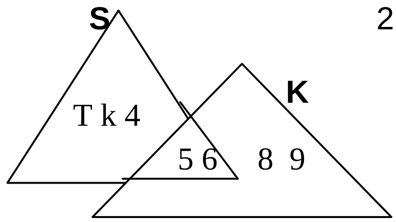
R = { Tom, Jim, Tim, Daniel}

n(R) = 4 members.

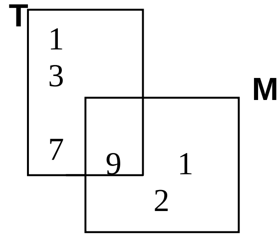
WORK TO DO

Find the number of elements in the given sets below.

1.



2.



3. Given; M = {a, b, c, d}
   Find n(M)

SUBSETS OF A SET

i) A subset of a set is made up of any member of that set.

ii) The symbol for subset is $\subset$.

iii) Any set is a sub set of itself.

iv) The empty set is also a sub set of any given set.

EXAMPLE I

If Y = {1, 2, 3} Find the subsets in set Y.

Method 1

{ }, {1, 2, 3}, {1}, {2}, {3}, {1, 2}, {2, 3}, {1, 3}

There are 8 subsets.

Method 2

We use the formula **Subsets = 2^n**, where n is the number of elements in a given set.

Subsets ($\subset$) = 2^n

= 2^3
= 2 x 2 x 2
= 8 Subsets

EXAMPLE II

If P = {a, b, c, d}, Find the number of subsets.

Method 1

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

There are 16 subsets

Method 2

Subsets = 2^n
= 2^4
= 2 x 2 x 2 x 2
= **16 Subsets**

WORK TO DO

Find the number of subsets in the following sets.

1. K = {2, 4, 6}
2. M = {a, b, c, d}
3. N = {b, c, d}
4. Z = {Peter, John}
5. P = {daddy, mummy, aunt, uncle}

REPRESENTING SUBSETS ON A VENN DIAGRAM

EXAMPLE

If W = {maize, fish, meat, bananas, cassava, millet, bread} and

X = {maize, meat, bread, fish, banana}

Express the following expressions on Venn diagrams

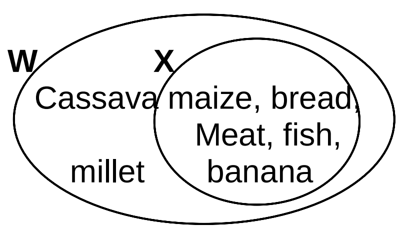
i) W⊂W

ii) X⊂X

iii) XĊW

iv) Empty set ⊂ W

v) Empty set ⊂ X



WORK TO DO

1. A = {1, 2, 3, 4, 5} B= {4,5}

   Represent B⊂ A on the Venn diagram

2. K = {Musa, Tom, John, David} L = {Tom, John, Musa}

   Represent L⊂ K on a Venn diagram.

3. M = {a, e, i. o, u} N = {e, o}

   Represent N⊂ M on a Venn diagram

4. If M = {Cotton, coffee, tea}, then which of the following are subsets to M?

i) A = {cotton}

ii) B = {rice, tea}

iii) C = {rice}

iv) D = {cotton, coffee}

v) E = {Coffee, cotton, tea}

vi) F = {tea, rice}

vii) G = {tea}

viii) H = { }

ix) I ={coffee, tea}

5. If P = {a, e, i, o, u} then write down three subsets of P.

PROBABILITY

Probability is the measure of chance.

$$\textbf{Probability} = \frac{\textbf{Event}}{\textbf{Sample space}}$$

PRACTICAL LESSON

Probability using a coin

i) A coin has two faces.

ii) The face with a court of arms is the head (H)

iii) The second face of a coin is the Tail. (T)

iv) When a coin is tossed, the Head (H) or Tail will be seen on the top but not both.

v) The sample space on tossing a coin is two

USING/TOSSING ONE COIN.

PUPILS	1ST TRY	2ND TRY	3RD TRY
Pupil A			
Pupil B			

i) Toss a coin once. One of the two faces will face up. Assuming it is the tail, there is one chance out of the two.

ii) The probability that the tail shows up is ½.

iii) The probability that the Head shows up is ½.

Probability using a Dice

i) A Dice has six faces

ii) The faces are numbered 1, 2, 3, 4, 5, and 6. Each number represents one chance.

iii) Roll a dice many times. There are six possible chances for a number to appear on top.

iv) The chance that a 5 appears on the top is $^1/_6$.

v) The chance that a 2 shows up is $^1/_6$.

Roll a Dice and fill in the possible chances.

IF	PROBABILITY	PROBABILITY
a one appears on top is	1 out of six	$^1/_6$
a two appears on top is	-- out of six	$^1/_6$
a three appears on top is	-- out of six	__
a four appears on top is	-- out of six	__
a five appears on top is	-- out of six	__
a six appears on top is	-- out of six	__

ACTIVITY

i) List all even numbers on a dice. How many are they?

The probability or chance of an even number appearing on top is ___ out of 6 or $^3/_6$.

ii) List all odd numbers on a dice. How many are they? What is the probability of an odd number appearing on top?

WORK TO DO

Roll a Dice and write the probability.

1. What is the chance of getting a two?
2. There are six possible chances on a dice.
   i) How many multiples of 3 are on the dice?
   ii) What is the probability of getting a multiple of 3?
   iii) How many chances does a dice have altogether?
   iv) How many multiples of 2 does a dice have?
   v) What is the probability of getting a multiple of 2?
3. There are 6 faces of a dice labeled out of six.
   i) How many faces have less than 6 dots.
   ii) What is the probability of getting a face with less than 6 dots?

WORK TO DO

Days of the week

1. a) What are the total chances of listing days of the week?
   b) How many days begin with letter T?
   c) What is the probability of travelling on a day that begins with letter T?

2. a) How many days begin with letter F?

   b) What is the probability of wedding on the day that begins with letter F?

3. Two teams tossed a coin to decide which side each would play. What is the probability that each team gets the side they wanted?

4. There are 10 cars of different colours. What is the probability of picking a white car at random?

THE NUMERATION SYSTEM AND PLACE VALUE

THE NUMERATION SYSTEM

i) A number is an idea of how many, how much, and how far.

ii) A numeral is a symbol used to represent a number.

iii) The Hindu – Arabic numerals are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. They are also called digits.

iv) A numeration system is a way of representing numbers or ideas.

v) The numeration system used in most parts of the world today is Hindu – Arabic.

vi) Other Hindu – Arabic numerals are formed by combining two or more digits.

EXAMPLE I

- 10 is formed by combining digits 1 and 0
- 134 is formed by combining digits 1, 3 and 4.
- 5,879 is formed by combining digits 5, 8, 7 and 9

FORMING NUMERALS FROM DIGITS

The same digits can be used to form different numbers or numerals.

EXAMPLE I

Write down any three digit number formed by the digits 3, 7, 5.

First number – 375

Second number – 753

Third number – 537

EXAMPLE II

Write the smallest number that can be formed using digits 7, 2, 3, 6

We arrange digits in ascending order

ie 2, 3, 6, 7

y **The smallest number is 2,367**

EXAMPLE III

Write the smallest number that can be formed using digits 7, 2, 0, 6

We arrange digits in ascending order

ie 2, 3, 6, 7

y **The smallest number is 2, 067**

EXAMPLE IV

What is the biggest number that can be formed using the following digits; 1, 5, 0, 8, 3?

We arrange digits from the biggest to the smallest (descending order)

ie 8, 5, 3, 0, 1.

y **The biggest number is 85,310**

WORK TO DO

Give any four numbers that can be formed using the digits below.

1. 2, 5, 3, 7
2. 9, 2, 6, 7, 8
3. 5, 0, 4
4. 3, 1, 0, 2, 5

WORK TO DO

Write down the smallest that can be formed using all the digits

1. 1, 2, 7
2. 3, 5, 2, 4
3. 1, 5, 0, 7, 2, 9
4. 8, 4, 3, 6, 0

Write down the biggest number that can be formed using all the digits

1. 1, 2, 7
2. 3, 5, 2, 4
3. 1, 5, 0, 7, 2, 9
4. 8, 4, 0, 4, 8

THE DIFFERENCE BETWEEN THE SMALLEST AND LARGEST NUMBERS

EXAMPLE

What is the difference between the smallest and largest number using the digits 1, 2, 3, 7?

$$\begin{array}{r} 7\,3\,2\,1 \\ -\underline{1\,2\,3\,7} \\ \underline{6\,0\,8\,4} \end{array}$$

PLACE VALUES OF WHOLE NUMBERS

Study this table with six digits number 124,365

H/Th	T/Th	Th	H	T	O
1	2	4	3	6	5

Ones

Tens

Hundreds

Thousands

Ten Thousands

Hundred Thousands.

EXAMPLE

What is the place value of each digit in the figure below?

H/Th	T/Th	Th	H	T	O
1	6	7	4	2	3

Ones

Tens

Hundreds

Thousands

Ten Thousands

Hundred Thousand

WORK TO DO

Write the place value of each digit in the numbers below

1. 3,501
2. 4,774
3. 445,005
4. 50,430

PLACE VALUE OF UNDERLINED DIGIT

EXAMPLE I

What is the place value of the underlined digit 16870?

1 6 **8** 0

Tens

y **The place value of 8 is Tens.**

EXAMPLE II

What is the place value of the underlined digit? 56,430

4 6 4 3 0

Tens of Thousands.

y **The place value of 4 is Tens of Thousands**.

WORK TO DO

Write the place values of the underlined digits

1. 18956**1**
2. 6891**0**5
3. **3**08975
4. 390**6**00
5. 3870**8**8
6. 4685**3**3

VALUES OF WHOLE NUMBERS

EXAMPLE I

Write the value of each digit in the number 123,768

2 4 5 9 7 6

Ones	=	6 x 1	=	**6**
Tens	=	7 x 10	=	**70**
Hundreds	=	9 x 100	=	**900**
Thousands	=	5x 1000	=	**5,000**
Ten Thousands	=	4 x 10,000	=	**40,000**
Hundred Thousands	=	2 x 100,000	=	**200,000**

WORK TO DO

Write the value of each digit

1. 3,450
2. 17,045
3. 19,645

THE VALUE OF THE UNDERLINED DIGIT

EXAMPLE I

Work out the value of the underlined digit

1 3 **6** 0

Tens

Value of 6 = 6tens
= 6 x 10
= **60**

EXAMPLE II

Work out the value of the underlined digit

3 **4** 0 1 2

Thousands

Value of 4 = 4Thousands
= 4 x 1000
= **4,000**

EXAMPLE III

Underline the value of the underlined digit

607,788

Hundreds of thousands

Value of 6 = 6Hundreds of thousands
= 6 x 100,000
= **600,000**

WORK TO DO

Work out the value of the underlined digit

1. 1,2**<u>5</u>**0
2. 4**<u>1</u>**3,783
3. 3**<u>4</u>**,012
4. **<u>6</u>**03,788
5. 172,**<u>6</u>**00
6. 42,4**<u>0</u>**6

WRITING FIGURES IN WORDS

NOTE:

i) Use Three zeros to write a thousand.

ii) The place value table can help us to write figures in words.

THOUSANDS			**UNITS**		
H	***T***	***O***	***H***	***T***	***O***

EXAMPLE I

Write Six thousand in figure.

THOUSANDS			**UNITS**		
H	***T***	***O***	***H***	***T***	***O***
		6	0	0	0

6,000 in Words is Six thousand in figures

EXAMPLE II

Write 10,000 in words

THOUSANDS			**UNITS**		
H	***T***	***O***	***H***	***T***	***O***
	1	0	0	0	0

10,000 in words is **<u>Ten thousand</u>**

EXAMPLE III

Write 156,036 in words

THOUSANDS			**UNITS**		
H	***T***	***O***	***H***	***T***	***O***
1	5	6	0	3	6

156,000 - One hundred fifty six thousand

036 - thirty six

156,036 One hundred fifty six thousand, thirty six.

WORK TO DO

Write the following figures in words

1. 5,317
2. 25,000
3. 22,222
4. 482,029
5. 111,111
6. 999,000
7. 888,015

WRITING NUMBERS WORDS IN FIGURES

EXAMPLE I

Write sixty two thousand eight in figures

Sixty two thousand	-	62,000
Eight	-	+ 8
		62,008

EXAMPLE II

Write fifty six thousand three hundred in figures.

Fifty six thousand	-	56,000
Three hundred	-	+ 300
		56,300

EXAMPLE III

Write Three hundred fifty four thousand, one hundred sixty one in figures

Three hundred fifty four thousand	-	354,000
One hundred sixty one	-	+ 161
	-	**354,161**

EXAMPLE IV

Write One hundred nine thousand , thirty four in figures.

One hundred nine thousand	-	109, 000
Thirty four	-	+ 34
	-	**109,034**

WORK TO DO

Write the following in figures;

1. Four thousand, sixty five
2. Ten thousand one
3. Five hundred thousand eighty three
4. One hundred thousand one
5. Eighty seven thousand ninety nine
6. Nine thousand ninety nine
7. Eight hundred eight thousand, eight hundred eight.

COMPARING NUMBERS

EXAMPLE I

Arrange from the smallest to the highest

256043, 260435, 264530, 206543

= **206543, 256,043, 260435, 264530**

EXAMPLE II

Arrange from the biggest to the smallest

809761, 910876, 798670, 987610

= **<u>987610, 910876, 809761, 978670</u>**

<u>WORK TO DO</u>

Arrange from the smallest to the biggest

1. 563427, 536427, 367425, 573624
2. 498603, 489630, 630498, 684930
3. 731829, 789321, 879123, 731982

<u>WORK TO DO</u>

Arrange from the biggest to the smallest

1. 731829, 789321, 879123, 731982
2. 498603, 489630, 630498, 684930
3. 563427, 536427, 367425, 573624

<u>EXPANDING WHOLE NUMBERS USING VALUES</u>

<u>EXAMPLE I</u>

Expand 78,023

T/Th Th H T O

7 8 0 2 3

3 x 1 = 3

2 x 10 = 20

0 x 100 = 0

8 x 1000 = 8000

7 x 10,000 = 70,000

y **<u>78,023 = 70,000 + 8,000 + 20 + 3</u>**

<u>EXAMPLE II</u>

Expand 1873

Th H T O

1 8 7 3

3 x 1 = 3

7 x 10 = 70

8 x 100 = 800

1 x 1000 = 1,000

y **<u>1,873 = 1,000 + 800 + 70 + 3</u>**

<u>WORK TO DO</u>

Expand the following using values;

1. 89
2. 972
3. 15,301
4. 2,873
5. 19,972
6. 77,742
7. 82,61

EXPANDING WHOLE NUMBERS AS MULTIPLES OF TEN

EXAMPLE I

Expand 13,456

13456 = 10,000 + 3,000 + 400 + 50 + 6
= **(1 x 10 x 10 x 10 x 10) + (3 x 10 x 10 x 10) + (4 x 10 x 10) + (5 x 10) + (6 x 1)**

EXAMPLE II

Expand 789

789 = 700 + 80 + 9
= **(7 x 10 x 10) + (8 x 10) + (9 x 1)**

WORK TO DO

Expand the following as multiples of ten.

1. 123	3. 1268	5. 2492	7. 2465
2. 493	4. 6471	6. 346	

EXPANDING NUMBERS USING POWERS/EXPONENTS

EXAMPLE I

Expand 12,689

$1^4 2^3 6^2 8^1 9^0$ = **$(1 \times 10^4) + (2 \times 10^3) + (6 \times 10^2) + (8 \times 10^1) + (9 \times 10^0)$**

EXAMPLE II

Expand 9381

$9^3 3^2 8^1 1^0$ = **$(9 \times 10^3) + (3 \times 10^2) + (8 \times 10^1) + (1 \times 10^0)$**

WORK TO DO

Expand the following using powers/exponents

1. 6,785	3. 9,381	5. 493	7. 36,045
2. 7,236	4. 1,268	6. 3,819	8. 12,468

FINDING EXPANDED NUMBERS

EXAMPLE I

Write (4 x 100) + (5 x 10) + (8 x 1) as a single number.

(4 x 100) = 400
(5 x 10) = 50
(8 x 1) = + 8

= **458**

EXAMPLE II

Write 3000 + 200 + 60 + 4 as a single number

3000
200
+ 4
3204

EXAMPLE III

Write $(4 \times 10^3) + (1 \times 10^2) + (7 \times 10^1) + (8 \times 10^0)$ as single number.

(4×10^3)	$= (4 \times 10 \times 10 \times 10)$	=	**4000**
(1×10^2)	$= (1 \times 10 \times 10)$	=	**100**
(7×10^1)	$= (7 \times 10)$	=	**70**
(8×10^0)	$= (8 \times 1)$	=	+ **8**
			4178

WORK TO DO

Write the following as one number

1. $(8 \times 100) + (6 \times 10) + (3 \times 1)$
2. $(5 \times 10) + (9 \times 10) + (0 \times 10)$
3. 7,000 + 300 + 70 + 7
4. $(8 \times 10^4) + (7 \times 10^3) + (4 \times 10^2) + (3 \times 10^1) + (4 \times 10^0)$
5. $(2 \times 10000) + (4 \times 1000) + (8 \times 100) + 6 \times 10) + (5 \times 1)$
6. 9,000 + 30 + 7
7. $(3 \times 10^4) + (4 \times 10^2) + (5 \times 10^1)$

PLACE VALUES OF DECIMALS

EXAMPLE 1

What is the place value of each digit in 0.75?

0.75 = 0 . 7 5

Hundredth

Tenth

Ones

EXAMPLE II

What is the place value of each digit in 64.746

6 4 . 7 4 6

Thousandth

Hundredth

Tenth

Ones

Tens

WORK TO DO

Write the place value of each digit

1. 0.5
2. 0.12
3. 0.6
4. 0.09
5. 4.61
6. 24.312
7. 0.67

PLACE VALUE OF UNDERLINED DIGIT

EXAMPLE I

Write the place value of the underlined digit in 0.34

0.**3**4

Tenth

y **Place value of 3 is Tenth**

EXAMPLE II

Write the place value of the underlined digit in 0.24

0.2**4**

Hundredth

y **The place value of 4 is Hundredth**

EXAMPLE III

Write the place value of the underlined digit 64.13

6 4 . 1 3 — Tens

y The place value of 6 is Ten

WORK TO DO

Write the place value of the underlined digits

1. 0.**8**7
2. 0.6**8**
3. 0.45**7**
4. **9**.46
5. 3.4**5**
6. **1**2.35
7. 1**2**5.0

VALUES OF DIGITS IN DECIMALS

EXAMPLE I

Find the value of each digit in 0.87

0 . 8 7

7 x $^1/_{100}$ = $^7/_{100}$

8 x $^1/_{10}$ = $^8/_{10}$

0 x 1 = **0**

Value of 0 is 0

Value of 8 is $^1/_{10}$

Value of 7 is $^7/_{100}$.

EXAMPLE II

Find the value of each digit in 37.62

3 7 . 6 2

2 x $^1/_{10}$ = $^2/_{100}$

6 x $^1/_{10}$ = $^6/_{10}$

7 x 1 = **7**

3 x 10 = **30**

The value of 3 is 30

The value of 7 is 7

The value of 6 is $^6/_{10}$

The value of 2 is $^2/_{100}$

WORK TO DO

Find the value of each digit in the numbers below

1. 0.75
2. 0.125
3. 9.5
4. 0.39
5. 12.6
6. 34.81468.57
7. 468.57

VALUE OF UNDERLINED DIGITS

EXAMPLE I **EXAMPLE II**

VALUE OF UNDERLINED DIGITS

EXAMPLE I **EXAMPLE II**

EXAMPLE I

Work out the value of the underlined digit

0.46 = 0 . **4** 6

Tenth

∴ Value of 4 = 4 tenth

$= 4 \times {}^{1}/_{10}$

$= {}^{4}/_{10}$

EXAMPLE II

Work out the value of the underlined digit 12.3**5**

1 2 . 3 5

Hundredth

∴ The value of 5 = 5 Hundredth

$= 5 \times {}^{1}/_{100}$

$= \mathbf{{}^{5}/_{100}}$

EXAMPLE III

Work out the value of the underlined digit **6**2.12

62.12 = **6** 2 . 1 2

Tens

∴ The value of 6 = 6 Tens

= 6 x 10

= 60

WORK TO DO

Work out the value of the underlined digit.

1. 0.7**5**
2. 0.1**2**5
3. 9.**5**
4. 3**4**.81
5. 3**1**5.9
6. 0.0**6**

WRITING DECIMAL FRACTIONS IN WORDS

EXAMPLE I

Write 0.5 in words

UNITS			Point	DECIMALS		
H	***T***	***O***	**.**	***Tth***	***Hth***	***THth***
		0		5		

$= {}^{5}/_{10}$

= **Five tenths**

EXAMPLE II

Write 0.75 in words

UNITS			Point	DECIMALS		
H	***T***	***O***		***T^{th}***	***H^{th}***	***TH^{th}***
		0	**.**	7	5	

0.75 = $^{75}/_{100}$

= **Seventy five hundredths**

EXAMPLE III

Write 450.9 in words

UNITS			Point	DECIMALS		
H	***T***	***O***		***T^{th}***	***H^{th}***	***TH^{th}***
4	5	0	**.**	9		

450.9 = 450 and $^{9}/_{10}$

= **Four hundred fifty and nine tenth**

EXAMPLE IV

Write 40.65 in words

UNITS			Point	DECIMALS		
H	***T***	***O***		***T^{th}***	***H^{th}***	***TH^{th}***
	4	0	**.**	6	5	

40.65 = 40 and $^{6}/_{100}$

=Forty and sixty five hundredth

WORK TO DO

Write the following decimal fractions in words

1. 0.2
2. 0.75
3. 0.48
4. 4.01
5. 4.18
6. 12.8
7. 0.62

WRITING DECIMAL FRACTIONS IN FIGURES

EXAMPLE I

Write sixty-three and twenty five hundredth in figures

63 and $^{25}/_{100}$ = $63^{25}/_{100}$

= **63.25**

EXAMPLE II

Write six tenth in figures

$^{6}/_{10}$ = $^{6}/_{10}$

=**0.6**

EXAMPLE III

Write seven hundredth in figures.

= $^{7}/_{100}$

= **0.07**

EXAMPLE IV

Write twenty five hundredth in figures

=$^{25}/_{100}$

= 0.25

WORK TO DO

Write the following in figures

1. Three tenth.
2. Four hundredth
3. Five tenth
4. Six and twenty four hundredth
5. Thirteen and seventy nine hundredth

EXPANDING DECIMAL NUMBERS

EXAMPLE I

Expand 0.56
0.56 = **0.5 + 0.06**

EXAMPLE II

Expand 0.72
0.72 = **0.7 + 0.02**

WORK TO DO

Expand the following

1. 0.22
2. 0.45
3. 0.9
4. 0.12
5. 0.62
6. 0.95

EXPANDING WHOLES AND DECIMALS

EXAMPLE I

Expand 78.65
78.65 = **70 + 8 + 0.6 + 0.05**

EXAMPLE II

Expand 364.27
364.27=**300 + 60 + 4 + 0.2 + 0.07**

WORK TO DO

Expand the following

1. 8.25
2. 13.84
3. 98.75
4. 68.03
5. 1305.28
6. 350.53
7. 60.78

ROMAN NUMERALS AND HINDU ARABIC NUMERALS

i) The numerals we commonly use are called Hindu Arabic numerals.
ii) These are 0,1,2,3,4,5,6,7,8,9
iii) Sometimes we use another system called Roman Numerals.

HINDU ARABIC NUMERALS AND THEIR EQUIVALENT IN ROMAN NUMERALS

HINDU ARABIC	ROMAN NUMERAL		HINDU ARABIC	ROMAN NUMERAL
1	I		30	XXX
2	II		40	XL
3	III		50	L
4	IV		60	LX
5	V		70	LXX
6	VI		80	LXXX
7	VII		90	XC
8	VIII		100	C
9	IX		200	CC
10	X		300	CCC
11	XI		400	CD
12	XII		500	D
13	XIII			
14	XIV			
15	XV			
16	XVI			
17	XVII			
18	XVIII			
19	XIX			
20	XX			

NOTE THE FOLLOWING:

HINDU ARABIC	ROMAN NUMERAL
4	IV
6	VI
9	IX
11	XI

40	XL
60	LX
90	XC
400	CD
500	D

EXPRESSING HINDU ARABIC NUMERALS AS ROMAN NUMERALS

EXAMPLE I

25 = 20 + 5
= XX + V

EXAMPLE II

55 = 50 + 5
= L + V

EXAMPLE III

89 = 80 + 9
= LXXX + IX

=XXV **= LV** **= LXXXIX**

WORK TO DO

Express the following as Roman numerals

1. 19	4. 242	7. 44	10. 547
2. 99	5. 31	8. 189	
3. 325	6. 49	9. 483	

EXPRESSING ROMAN NUMERALS AS HINDU ARABIC NUMERALS

RULES:

1. -The following Roman Numerals can be repeated: I, X, C, (Maximum 3 times)
   -The following Numerals can't be repeated: V, L,
2. -When a smaller numeral appears before a bigger numeral, it refers to subtraction
   e.g. IV = 5 – 1 = 4, XL = 50 – 10 = 40, XC = 100 – 10 = 90
   - When a bigger numeral appears before a smaller numeral, it means addition.
   e.g. VI = 5 + 1 = 6, LX = 50 + 10 = 60, LXX = 50 + 20 = 70, LXX X = 50 + 30 = 80.

EXAMPLE I

Express XIX in Hindu Arabic

XIX = X + IX
= 10 + 9
= **19**

EXAMPLE II

Express XLIV in Hindu Arabic

XLIV = XL + IV
= 40 + 4
= **44**

EXAMPLE III

Express LIV in Hindu Arabic

LIV = L + IV
= 50 + 4
= **54**

EXAMPLE IV

Express LXXV in Hindu Arabic

LXXV = LXX + V
= 70 + 5
= **75**

WORK TO DO

Change the following to Hindu Arabic

1. VI	4. XXIV	7. XLIV	
2. IX	5. XXVII	8. LX	10. CCXXV
3. XIX	6. LXX	9. CIX	

WORD PROBLEMS

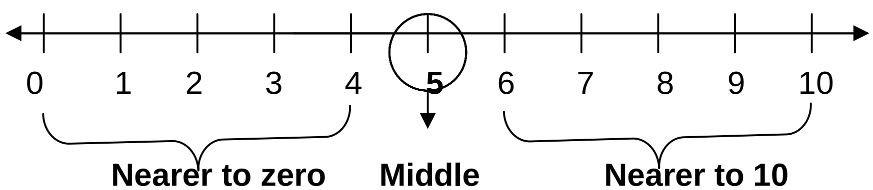
1. Express 29 as a Roman numeral.
2. Express LXXII in Arabic numeral.
3. Change 64 to Roman Numeral.
4. Convert XLVII to Hindu Arabic Numeral.

5. There are 74 pupils in Adeke primary 5.Write the numbers of pupils in Roman Numerals.
6. Nantume had 45 goats. Write the number of goats she has in Roman numerals.
7. Ladu has XXIX chicken. Write this number in Hindu Arabic numerals.
8. Kiiza planted 34 trees last year. Write the number of trees he planted in Roman numeral.

INTRODUCTION TO ROUNDING OFF NUMBERS

i) When rounding off numbers for example to the nearest tens, the number of tens is decided by the number in ones place.

ii) A number line can be used to decide which way to round off



i) 1,2,3 and 4 are nearer to zero. We will therefore round down to zero.

ii) 5 being in the middle proceeds to the nearest ten.

iii) 6,7,8 and 9 are nearer to ten. We will therefore round up to ten.

For example:

1. 21 will be rounded to 20
2. 22 will be rounded to 20
3. 24 will be rounded to 20
4. 26 will be rounded to 30
5. 27 will be rounded to 30
6. 29 will be rounded to 30

ROUNDING OFF TO THE NEAREST TENS

EXAMPLE I

Round off to the nearest tens

T O i) **74** = **7** ~~4~~ = +0 7 0 = 74 is nearer to 70 74 ≈ **70**	T O ii) **72** = **7** ~~2~~ = +0 = 7 0 72 is nearer to 70 72 ≈ **70**
T O iii) **88** = **8** ~~8~~ = + 1 = 9 0 = 88 is nearer to 90 88≈ **90**	H T O iv) **948** = 9 **4** ~~8~~ = + 1 **9 5 0** 948 is nearer to 950 948≈ **950**

WORK TO DO

Round off to the nearest tens.

1. 24	4. 75	7. 156	10. 361
2. 36	5. 67	8. 178	
3. 42	6. 134	9. 245	

ROUNDING OFF TO THE NEAREST HUNDREDS

When rounding off to the nearest hundred's, the number of hundreds is decided by the number in the tens place.

EXAMPLES

Round off to the nearest hundred

i) 530 =

$$\begin{array}{rccc} & H & T & O \\ & \mathbf{5} & \cancel{3} & \cancel{0} \\ + & & 0 & \\ \hline & \mathbf{5} & \mathbf{0} & \mathbf{0} \end{array}$$

= 530 is nearer to 500

= **500.**

ii) 3872 =

$$\begin{array}{rcccc} & T & H & T & O \\ & 3 & \mathbf{8} & \cancel{7} & \cancel{2} \\ = + & & 1 & 0 & 0 \\ \hline & \mathbf{3} & \mathbf{9} & \mathbf{0} & \mathbf{0} \end{array}$$

= 3872 is nearer to **3900**

WORK TO DO

Round off to the nearest hundreds.

1. 136	3. 363	5. 1534	7. 2372
2. 249	4. 421	6. 1247	8. 3613

ROUNDING OFF TO THE NEAREST THOUSANDS

EXAMPLES

i) Round off 4340 to the nearest thousands.

$$\begin{array}{rlccccc} & & T & H & T & O \\ 4340 & = & 4 & \cancel{3} & \cancel{4} & \cancel{0} \\ & = + & 0 & & & \\ & \approx & \mathbf{4} & \mathbf{0} & \mathbf{0} & \mathbf{0} \end{array}$$

ii) Round off 7694 to the nearest thousands

$$\begin{array}{rlccccc} & & T & H & T & O \\ 7694 & = & \mathbf{7} & \cancel{6} & \cancel{9} & \cancel{4} \\ & = + & 1 & 0 & 0 & 0 \\ & \approx & \mathbf{8} & \mathbf{0} & \mathbf{0} & \mathbf{0} \end{array}$$

WORK TO DO

1. 1240	3. 3408	5. 5631	7. 2789
2. 1381	4. 3941	6. 6815	8. 4013

ROUNDING OFF DECIMAL NUMBERS

ROUNDING OFF TO THE NEAREST TENTH

EXAMPLE I

Round off to the nearest tenth

i) 6.25 =

$$\begin{array}{rcccc} & O & & T^{th} & H^{th} \\ & 6 & . & \mathbf{2} & \cancel{5} \\ = + & & & 1 & 0 \\ \hline = & 6 & . & 3 & 0 \\ \hline \approx & \mathbf{6} & . & \mathbf{3} & \end{array}$$

ii) 0.478 =

$$\begin{array}{rccccc} & O & & T^{th} & H^{th} & Th^{th} \\ & 0 & . & \mathbf{4} & \cancel{7} & \cancel{8} \\ = + & & & 1 & 0 & 0 \\ = & 0 & . & 5 & 0 & 0 \end{array}$$

= 0.500 $\approx$ **0.5**

WORK TO DO

Round off to the nearest tenth

1. 14.47	3. 0.716	5. 10.174	7. 4.83
2. 2.274	4. 5.3260	6. 9.254	

ROUNDING OFF TO THE NEAREST HUNDREDTH

EXAMPLE I

Round off 0.478 to the nearest hundredth.

		O		T^{th}	H^{th}	Th^{th}
0.478	=	0	.	4	**7**	~~8~~
	=	+			1	
	=	**0**	**.**	**4**	**8**	

$\approx$ **0.48**

EXAMPLE II

Round off 14.462 to the nearest hundredth

		T	O		T^{th}	H^{th}	Th^{th}
14.462	=	1	4	.	4	**6**	~~2~~
	=	+					0
	=	**1**	**4**	**.**	**4**	**6**	**0**

$\approx$ **14.46**

WORK TO DO

Round off to the nearest Hundredth.

1. 2.756	3. 4.012	5. 15.423	7. 0.113
2. 1.467	4. 0.007	6. 16.279	

ROUNDING OFF TO THE NEAREST THOUSANDTHS

EXAMPLE I

Round off 0.6257 to the nearest thousandth.

		O		T^{th}	H^{th}	Th^{th}	T/Th^{th}
0.6257	=	0	.	6	2	**5**	~~7~~
	=	+				1	
	$\approx$	**0**	**.**	**6**	**2**	**6**	

EXAMPLE II

Round off 7.1462 to the nearest thousandth

	O		T^{th}	H^{th}	Th^{th}	T/Th^{th}
	7	.	1	4	**6**	~~2~~
	+				0	
$\approx$	**7**	**.**	**1**	**4**	**6**	

WORK TO DO

Round off to the nearest thousandth

1. 7.4566	3. 0.5672	5. 1.2672
2. 0.4678	4. 9.1463	6. 8.1477

OPERATIONS ON NUMBERS

ADDITION UP TO SIX DIGITS

EXAMPLE I

Add:
```
  368,479
+ 234,567
  603,046
```

EXAMPLE II

Add:
```
  473,442
+ 369,215
  842,657
```

WORK TO DO

Add the following

```
1.   112,230        4.   345,164
   + 112,230           + 132,248
   _________           _________

2.   123,674        5.   433,185
   + 112,230           + 164,182
   _________           _________

3.   176,571        6.   453,245
   + 112,230           + 132,248
   _________           _________
```

ADDITION IN WORD PROBLEMS

EXAMPLE I

Oundo harvested some maize. His lorry carried the maize in two trips. In the first trip, it carried sixty thousand, two hundred fifty kilograms. In the second trip, it carried fifty thousand, six hundred seventy one kilograms. How many kilograms of maize did Oundo harvest altogether?

```
   60,250
 + 50,671
  110,921
```

He harvested one hundred ten thousand nine hundred twenty one kilograms of maize.

WORK TO DO

1. A factory produced four hundred thousand five hundred bottles of soda in one month. In the following month, it produces one hundred thousand more bottles. How many bottles of soda were produced in the two months?
2. Mr. Osiru bought two plots of land in Tororo. One plot cost five hundred thirty thousand shillings while the other cost three hundred seventy thousand shillings. How much did Mr. Osiru spend on the two plots?

3. Mugaino earns a monthly salary of fifty six thousand four hundred shillings and his wife earns forty thousand seven hundred fifty. How much money do both of them bring home at the end of the month altogether?

WORK TO DO

1. Kamya went to the market and bought 10 goats at sh. 135,000 and 12 sheep at sh. 107,900. How much did he spend altogether?
2. A steel rolling factory made 384,721 iron sheets in May. And 297,345 iron sheets in June. How many sheets were made in the two months?
3. Dairy Corporation processes 456,995 litres of milk. Jesa farm processes 213,143 litres of milk while Ammatte processes 150,000 litres of milk daily. How much milk do they process altogether each day?

SUBTRACTION OF NATURAL NUMBERS.

EXAMPLE

$$\begin{array}{r} 123,643 \\ -\ 36,749 \\ \hline \mathbf{86894} \\ \hline \end{array}$$

WORK TO DO

1. $\begin{array}{r} 123645 \\ -12348 \\ \hline \end{array}$
2. $\begin{array}{r} 124567 \\ -\ 12540 \\ \hline \end{array}$
3. $\begin{array}{r} 134567 \\ -\ 45325 \\ \hline \end{array}$
4. $\begin{array}{r} 145,567 \\ -\ 12540 \\ \hline \end{array}$
5. $\begin{array}{r} 345648 \\ -48769 \\ \hline \end{array}$
6. $\begin{array}{r} 234863 \\ -\ 52684 \\ \hline \end{array}$
7. $\begin{array}{r} 257389 \\ -\ 58784 \\ \hline \end{array}$
8. $\begin{array}{r} 263654 \\ -43995 \\ \hline \end{array}$
9. $\begin{array}{r} 274963 \\ -\ 42674 \\ \hline \end{array}$

WORD PROBLEMS INVOLVING SUBTRACTION (Mk Book 5 Page 51)

MULTIPLICATION BY A TWO DIGIT NATURAL NUMBER

EXAMPLE

1. 3 5 x 1 2

$$\begin{array}{r} 35 \\ \times 12 \\ \hline +\ 70 \\ 350 \\ \hline \mathbf{420} \\ \hline \end{array}$$

WORK TO DO

1. 2 8 x 11 2. 3 4 x 12 3. 5 6 x 2 3 4. 4 5 x 2 5

5. 122 x 1 5 6. 13 6 x 22

WORD PROBLEMS INVOLVING MULTIPLICATION

1. A rectangular field measures 120m by 48m. Calculate its area.
2. A parade of soldiers was made up of 233 rows. There are 50 soldiers in each row. How many soldiers were there altogether?
3. A printery produces 495 boxes of books each day. Each box has 24 books. How many books does it produce each day?
4. A lorry can carry 600 crates of soda. Each crate contains 24 bottles. How many bottles does the lorry carry?
5. Kampala chalk factory produces 90 cartons of chalk in a day. Each carton contains 36 boxes of chalk. How many boxes of chalk does the factory produce in a day?

DIVISIBILITY TEST

1. Any number is divisible by 2 if its last digit is an even number. e.g.
2. Any number is divisible by 3 if the sum of the digits is a multiple of 3 e.g.
3. Any number is divisible by 4 if its last two digits form a number which is a multiple of 4.
4. Any number is divisible by 5 if its last digit is 5 or 0.
5. Any number is divisible by 9 if the sum of its digits is a multiple of 9.

DIVISION OF THREE DIGIT NUMBERS WITH AND WITHOUT REMAINDERS.

1. 8 6 4 ÷ 6 (Example)	4. 5106 ÷ 6	7. 3648 ÷ 8
2. 5664 ÷ 6	5. 5523 ÷ 7	
3. 4077 ÷ 9	6. 6538 ÷ 7	

Note: Emphasize long division.

COMPARING MULTIPLICATION WITH DIVISION

EXAMPLE

1. 4 6 x 1 0 = 4 6 0 so ___ ÷ 1 0 = 46
2. 763 x 10 = 7630 so 7630 ÷ 10 = 763

WORK TO DO

1. 9 x 1 0 = 90	So	---- ÷ 10 = ----	4. 2 5 x 1 0 = 250	So	---- ÷ 10 = ----
2. 1 2 x 1 0 = 120	So	---- ÷ 10 = ----	5. 4 2 x 1 0 =420	So	---- ÷ 10 = ----
3. 2 7 x 1 0 = 270	So	---- ÷ 10 = ----	6. 5 7 x 1 0 = 570	So	---- ÷ 10 = ----

WORD PROBLEMS (Mk Book 5 page 58)

COMBINED OPERATION OF NUMBERS

We use **"BODMAS"**

1st	**B**rackets	**B**
2nd	**O**f	**O**
3rd	**D**ivision	**D**
4th	**M**ultiplication	**M**
5th	**A**ddition	**A**
6th	**S**ubtraction	**S**

EXAMPLE I

5 + (3 x 10)

5 + 30 remove the brackets then, add

5 + 30 = 35

EXAMPLE II

1(8 + 7) x 10

15 x 10 remove the brackets

15 x 10 then multiply

15 x 10 = 150

EXAMPLE III

2 – 8 + 9 rearrange

2 + 9 – 8 add first

11 – 8 then subtract

= 3

EXAMPLE IV

5 x **12** ö **4** divide first

5 x 3 then multiply

5 x 3 = 15

WORK TO DO

1. ½ of 10 + 15 ÷ 5
2. 28 – (4 x 5)
3. 8 + 4 x 5
4. 9 x (9 + 3)
5. (9 x 9) + 3
6. 6 – 10 + 7
7. 32 – 40 + 18
8. 8 ÷ 4 x 2
9. 8 ÷ (4 x 2)
10. 2(8 + 7)

FINDING AVERAGE (MEAN) OF NUMBERS

$$\textbf{Average} = \frac{\textbf{Total (Sum)}}{\textbf{Number of items}}$$

EXAMPLE

Find the average of 0,2 and 4

$$\text{Average} = \frac{\text{Total (Sum)}}{\text{Number of items}}$$

$$= \frac{0 + 2 + 4}{3}$$

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

$$\text{Average} = \mathbf{2}$$

WORK TO DO

1. What is the average of the first five even numbers?
2. Find the average of 20,15,35,30
3. Musa scored the following marks in the math weekly tests; 80,72,68,70 and 60
4. Find the average of all even numbers between 10 and 20.

COMPARING AVERAGES AND TOTAL

1. Total = **Number x Average**
2. Number = $\dfrac{\textbf{Total}}{\textbf{Average}}$

WORK TO DO (Mk book 5 page 66)

USING THE SYMBOLS [I Y I AND =

1. [means greater than
2. Y means less than
3. = means equal to

REPLACE THE STAR WITH THE CORRECT SYMBOL

EXAMPLE

2 + 3 * 2 x 3
5 6
y **2 + 3** Y **2 x 3**

WORK TO DO

1. 10 x 10 * 10 x 2
2. 3 x 3 * 3 + 3
3. 2 x 2 * 2 + 2
4. 2 x 3 * 2 + 4
5. ½ of 36 * ¼ of 36
6. 750gms * 1kg

BASES FIVE AND TEN

NON- DECIMAL SYSTEM

i) Decimal system means grouping numbers in tens.

ii) Non-decimal system means grouping numbers in other groups which are not tens.

iii) To group numbers in fives, is the base five system of counting

iv) The base five system is called **Quinary system.**

(**Learners will be guided to study the table on page 68 Mk**)

COUNTING IN BASE FIVE

In any system of counting, we count the number of groups made and the number of objects left.

EXAMPLE I

- In base ten, ***///////*** **means 7**.
- If the same number is in base five we group ***///////*** as ***/////*** // which means 1 group of fives and 2 ones. This is written as 12_{five}

EXAMPLE II

Group the following sticks in fives and write down their number in base five.

i) 3
= ///
= 3 ones
= **3_{five}**

ii) = 6
= //////
= ///// /
= 1 group of fives, 1 ones
= **11_{five}**

iii) = 14
= //////////////
= ***/////*** ***/////*** ////
= 2 groups of fives, 4 ones
= **24_{five}**

iv) = 23
= ///////////////////////
= ***/////*** ***/////*** ***/////*** ***/////*** ***///***
= 4 groups of fives, 3 ones
= **43_{five}**

NB. The basic digits for base five are 0,1,2,3 and 4.

WORK TO DO

EXERCISE 3 : 21 Mk Pupils Bk 5 Page 69

PLACE VALUES OF EACH DIGIT IN BASE FIVE

NUMBERS	PLACE VALUES	WE READ AS
12_{five}	1 group of fives, 2 ones	One two base five
231_{five}	2 groups of five fives, 3 groups of fives, 1ones	Two three one base five

EXAMPLE I

$3\ 2_{five}$

$3\ 2_{five}$
- 2 — **Ones**
- 3 — **Fives**

EXAMPLE II

1 2 4
- 4 — **Ones**
- 2 — **Fives**
- 1 — **Five fives**

WORK TO DO

1. 4_{five}
2. 13_{five}
3. 314_{five}
4. 300_{five}
5. 22_{five}
6. 234

WRITING BASE FIVE NUMBERS IN WORDS

EXAMPLE S

i) 43_{five} = 4, 3 base five
= **Four three base five**

ii) 213_{five} = 2, 1, 3 base five
= **Two one three base five**

EXERCISE

1. 11_{five}
2. 123_{five}
3. 41_{five}
4. 33_{five}
5. 241_{five}

EXPANDING IN BASE FIVE

EXAMPLE I

Expand 13_{five}

Place value = 1 3

3 — Ones

1 — Fives

= (1 group of fives) (3 Ones)
= (1 x Fives) + (3 x Ones)
= **(1 x 5) + (3 x 1)**

EXAMPLE II

Expand 213_{five}

Place value = 2 1 3

3 — Ones

1 — Fives

2 — Five Fives

= (2 groups of five fives, 1 group of fives, 3 ones

= (2 x five fives + 1 x five) + (3 x ones)

= **(2 x 5 x 5) + (1 x 5) + (3 x 1)**

WORK TO DO

Expand the following

1. 11_{five}
2. 12_{five}
3. 43_{five}
4. 232_{five}
5. 31_{five}
6. 114_{five}

CHANGING BASE FIVE TO BASE TEN

EXAMPLE I

Change 14_{five} to base ten.

14_{five} = (1 x five) + (4 x ones)
= (1 x 5) + (4 x 1)
= 5 + 4
= 9 base ten
= **9_{ten}**

EXAMPLE II

Change 213_{five} to base ten

213_{five} = (2 x five fives) + (1 x fives) + (3 x ones)
= (2 x 5 x 5) + (1 x 5) + (3 x 1)
= (50 + 5 + 3)
= **58_{ten}**

WORK TO DO

Change the following to base ten.

1. 13_{five}
2. 21_{five}
3. 123_{five}
4. 40_{five}
5. 104_{five}
6. 313_{five}

CHANGING BASE TEN TO BASE FIVE

EXAMPLE I

Change 9_{ten} to base five

	No.	Rem.
5	9	
5	**1**	**4**

9_{ten} = 14_{five}

EXAMPLE II

Change 58_{ten} to base five

	No	Rem.
5	58	
5	11	**3**
5	2	**1**

58_{ten} = 213_{five}

WORK TO DO

Change the following to base five.

1. 8_{ten}
2. 11_{ten}
3. 42_{ten}
4. 55_{ten}
5. 74_{ten}
6. 33_{ten}

ADDITION IN BASE FIVE

EXAMPLE I

$$\begin{array}{r} 2_{five} \\ +\underline{1}_{five} \\ \mathbf{3}_{five} \end{array}$$

EXAMPLE II

$$\begin{array}{r} 1\ 2_{five} \\ +\ \underline{3\ 2_{five}} \\ \mathbf{4\ 4}_{five} \end{array}$$

EXAMPLE III **Side work**

$$\begin{array}{r} 3\,4_{five} \\ +\ \underline{4\,2}_{five} \\ \underline{\mathbf{1\,3\,1}}_{\mathbf{five}} \end{array}$$

4 + 2 = 6
5 ÷ 6 = 1 r 1

4 + 4 = (7 + 1) = 8
8 ÷ 5 = 1 r 3

WORK TO DO

1. $32_{five} + 11_{five}$
2. $211_{five} + 113_{five}$
3. $44_{five} + 32_{five}$
4. $234_{five} + 231_{five}$
5. $330_{five} + 242_{five}$
6. $34_{five} + 43_{five}$

MULTIPLICATION IN BASE FIVE

EXAMPLE I

2_{five} x 3
= 6
6 ÷ 5 = 1 r 1
1 group of five, 1 ones

EXAMPLE II

421_{five} x 2

$$\begin{array}{r} 4\,2\,1_{five} \\ \underline{x \quad 2} \\ \underline{\mathbf{1\,3}\,4\,3} \end{array}$$

1 x 2 = 2 (a base five digit)
2 x 2 = 4 (a base five digit)
4 x 2 = 8 (not a base five digit)
= 8 ÷ 5 = 1 r 3
= **1 3** $_{five}$

WORK TO DO

Multiply in base five

1. 3_{five} x 3
2. 42_{five} x 2
3. 10_{five} x 3
4. 44_{five} x 4
5. 321_{five} x 2
6. 113_{five} x 3

CLOCK ARITHMETIC

i) Clock arithmetic refers to the finite system or modular system.
ii) Finite refers to having a definite limit or fixed.
iii) In finite system, the remainder is considered the answer.

EXPRESSING NUMBERS IN FINITE 5 AND 7

The digits used in finite system of 5 are 0, 1, 2, 3 and 4 and in finite 7 are 0, 1, 2, 3, 4, 5 and 6.

(**Class discussion on page 204 – 7 Mk pupils book 5**)

EXAMPLE I

Write 3 in finite 5

3 is less than 5 so it can not be grouped

/// = 0 group of fives remainder 3

So 3 = 3(finite 5)

EXAMPLE II

Express 12 in finite 5

12 ÷ 5 = 2 r 2

So 12 = 2(finite 5)

EXAMPLE III

Write 6 in finite 7

6 ÷ 7 = 0 r 6

So 6 = 6(finite 7)

EXAMPLE IV

Change 25 to finite 7

25 ÷ 7 = 3 r 4

So 25 = 4(finite 7)

NOTE: In finite system, we consider remainders.

WORK TO DO

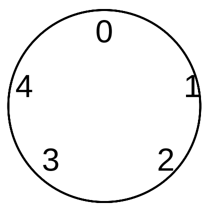
Express in finite 5 or finite 7

1. 2 finite 5
2. 11 finite 5
3. 18 finite 5
4. 4 finite 5
5. 24 finite 5
6. 5 finite 7
7. 10 finite 7
8. 12 finite 7
9. 20 finite 7
10. 14 finite 7

ADDITION IN FINITE 5 AND 7 USING A DIAL

EXAMPLE I

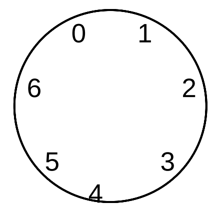
Add: 4 + 3 =---- (finite 5) using a dial



4 + 3 = 2 finite 5

EXAMPLE II

Add: 4 + 6 = ---(finite 7) using a dial



4 + 6 = 3 finite 7

WORK TO DO

1. 4 + 1 = ---(finite 5)
2. 1 + 3 + 2 =---(finite 5)
3. 4 + 2 =---(finite 5)
4. 2 + 2 + 3 =---(finite 5)
5. 4 + 4 = ---(finite 7)
6. 2 + 6 =---(finite 7)
7. 3 + 5 =---(finite 7)
8. 3 + 1 + 3 =---(finite 7)

ADDITION IN FINITE WITHOUT USING A DIAL

EXAMPLE I

2 + 2 = ---(finite 5)

2 + 2 = **4 (finite 5)** [4 is less than the finite)

EXAMPLE II

4 + 3 = (finite 5)

4 + 3 = 7 [7 is more than the finite]

7 ÷ 5 = 1 remainder 2

So 4 + 3 = 2 (finite 5)

EXAMPLE III

4 + 2 = --- (finite 7)

4 + 2 = 6 [6 is not more than the finite]

So 4 + 2 = 6 (finite 7)

EXAMPLE IV

5 + 5 = --- (finite 7)

5 + 5 = 10 [10 is more than the finite)

10 ÷ 7 = 1 remainder 3

So 5 + 5 = 3(finite 7)

WORK TO DO

Work out the following

1. 2 + 3 =---(finite 5)
2. 2 + 2 =---(finite 5)
3. 3 + 3 + 2 =---(finite 5)
4. 3 + 5 =---(finite 5)
5. 3 + 4 =---(finite 7)
6. 6 + 6 =---(finite 7)
7. 6 + 4 + 5 =---(finite 7)
8. 3 + 3 =---(finite 7)

<u>INTEGERS</u>

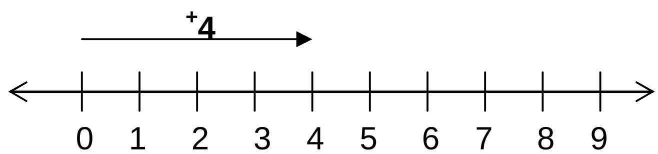
A study of positive, zero and negative numbers.

(**Discussion 1 of diagram on page 95, Mk Bk 5**)

<u>SHOWING POSITIVE INTEGERS ON A NUMBER LINE</u>

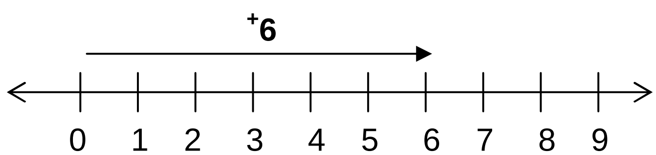
<u>EXAMPLE I</u>

Show +4 on a number line.



<u>EXAMPLE II</u>

Show $^{+}6$ on a number line.



<u>WORK TO DO</u>

Draw number lines to show

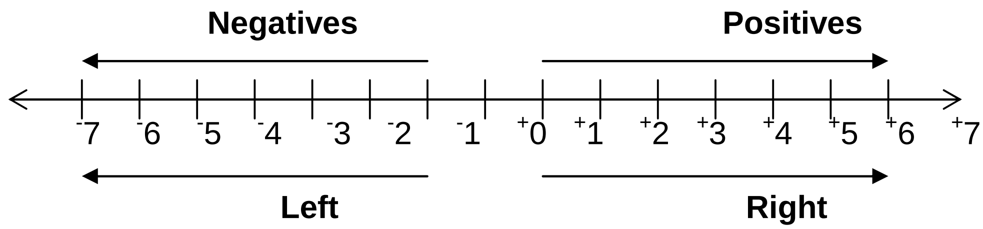
1. $^{+}4$	3. $^{+}7$	5. $^{+}9$
2. $^{+}5$	4. $^{+}8$	6. $^{+}10$

(**Discussion II and III on page 96 Mk 5**)

<u>THE NUMBER LINE</u>

i) Integers can be represented on a number line.
ii) Integers are made up of **<u>Negatives</u>**, **<u>Zero</u>** and **<u>Positives</u>**.
iii) Zero is neither negative nor positive.
Eg Given a set of integers; … $^{-}4$, $^{-}3$, $^{-}2$, $^{-}1$, 0, 1, 2, 3, 4, …
iv) Positive integers are written with a plus (+) sign or without a plus sign.
v) Negative integers are written with a subtraction sign (-)

<u>EXAMPLE OF A NUMBER LINE</u>



i) Numbers to the right of zero are called positive numbers.
ii) Numbers to the left of zero are negative integers.

ORDERING INTEGERS

i) On a number line, integers are always in order from the smallest to the biggest.
ii) If you choose any two integers at a time, the one to the left is always smaller while the one to the right is bigger.

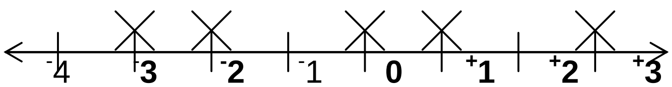
EXAMPLE I

Which is smaller $^{-}5$ or $^{+}2$

$^{-}5$ appears on the left of $^{+}2$, so
$^{-}5$ is smaller than $^{+}2$
$^{-}5 \quad < \quad ^{+}2$

EXAMPLE II

Arrange 1, 3, 0, 2, 3 in order of size starting with the smallest.



= **$^{-}3$, $^{-}2$, 0, $^{+}1$, $^{+}3$**

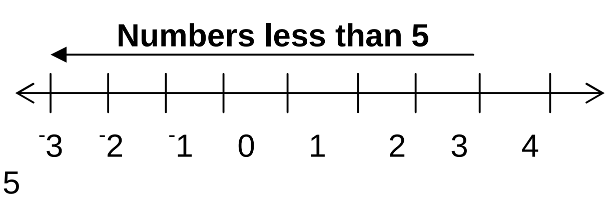
WORK TO DO

1. Which is bigger 2 or 0?
2. Which is smaller 10 or 3?
3. Which is bigger 5 or 8?
4. Which is smaller 13 or 13?
5. Arrange $^{-}1$, $^{+}2$, $^{-}3$, $^{+}4$ from the smallest.
6. Arrange 1, $^{-}2$, $^{+}3$, $^{-}4$, $^{+}5$ from the biggest.
7. Arrange $^{-}3$, $^{+}3$, $^{-}4$, $^{+}4$ from the smallest.
8. Arrange $^{-}6$, $^{+}5$, $^{+}3$, $^{-}4$ from the biggest.

ORDERING INTEGERS USING SYMBOLS <, >.

EXAMPLE I

x < 5 (Means x are numbers less than 5)

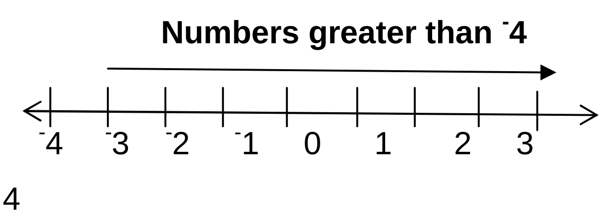


So **numbers less than 5 are;**

x = (4, 3, 2, 1, 0, $^{-}1$, $^{-}2$, $^{-}3$…)

EXAMPLE II

n > $^{-}4$ (Means n are numbers greater than $^{-}4$)

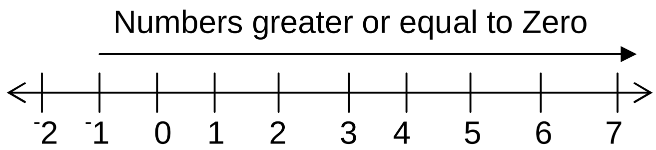


So **numbers greater than $^{-}4$ are;**

n = ($^{-}3$, $^{-}2$, $^{-}1$, 0, 1, 2, 3, 4, …)

EXAMPLE III

$x \geq 0$ (Means x are numbers greater or equal to zero)



So **numbers greater or less than 0 are; x = (0, 1, 2, 3, 4, 5, 6, 7…)**

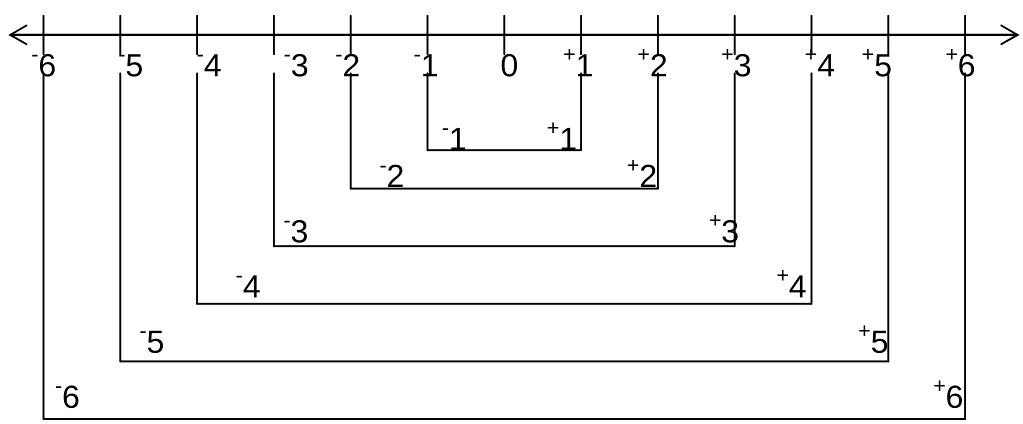
WORK TO DO

List the set of members in each mathematical sentences below and show them on a number line

1. $x > 2$
2. $m < {}^{-}4$
3. $x < 2$
4. $p > 5$
5. $p = 5$
6. $m < {}^{-}4$
7. $m > {}^{-}4$
8. $p < 5$

INVERSE OF NUMBERS

Inverse of integers refers to the opposite of an integer.



WORK TO DO

Name the inverse or the opposite of the following integers.

1. ${}^{+}1$
2. ${}^{+}5$
3. ${}^{-}9$
4. ${}^{+}10$
5. ${}^{-}7$
6. ${}^{+}17$
7. ${}^{+}31$
8. ${}^{+}70$
9. ${}^{-}51$
10. ${}^{+}36$
11. ${}^{+}100$
12. ${}^{-}500$

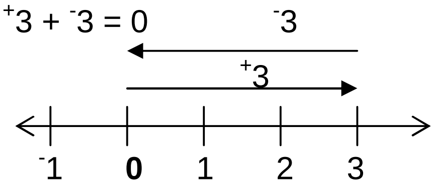
ADDITIVE INVERSE

i) Additive inverse is a number which gives 0 when added to a number.

ii) The inverse property states that "any number added to its inverse or opposite gives 0"

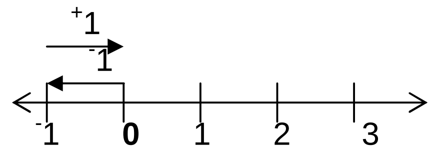
EXAMPLE I

$^{+}3 + {}^{-}3 = 0$



EXAMPLE II

$^{-}1 + {}^{+}1 = 0$



WORK TO DO

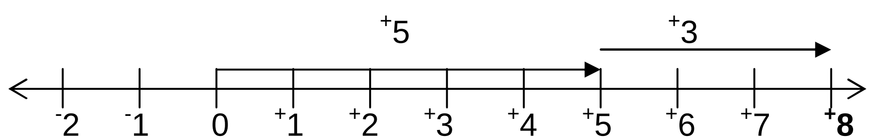
Work out the following additive inverses on a number line.

1. $^{+}4 + {}^{-}4$
2. $^{-}8 + {}^{+}8$
3. $^{+}5 + {}^{-}5$
4. $^{-}7 + {}^{+}7$
5. $^{+}6 + {}^{-}6$

ADDITION OF INTEGERS

EXAMPLE I

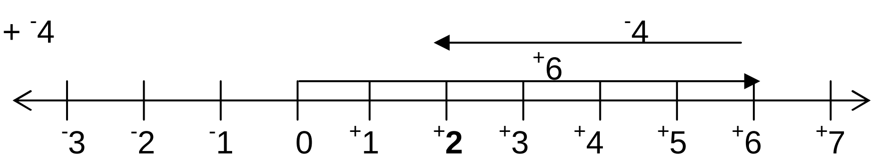
$^{+}5 + {}^{+}3$



$^{+}5 + {}^{+}3 = {}^{+}8$

EXAMPLE II

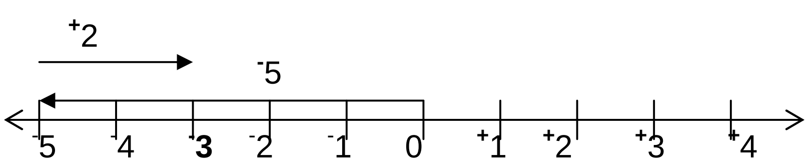
$^{+}6 + {}^{-}4$



$^{+}6 + {}^{-}4 = {}^{+}2$

EXAMPLE III

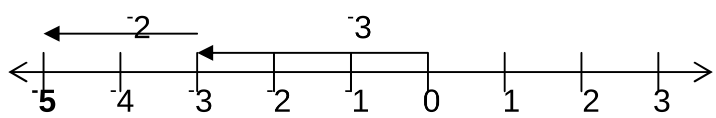
$^{-}5 + {}^{+}2 =$



$^{-}5 + {}^{+}2 = {}^{-}3$

EXAMPLE IV

$^{-}3 + {}^{-}2 =$



$^{-}3 + {}^{-}2 = {}^{-}5$

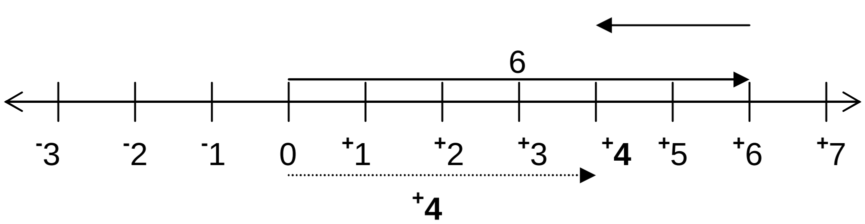
WORK TO DO

1. $^{-}4 + {}^{-}2$
2. $^{-}8 + {}^{+}3$
3. $^{-}6 + {}^{+}2$
4. $^{-}6 + {}^{+}3$
5. $^{-}3 + {}^{+}4$
6. $^{-}4 + {}^{-}6$
7. $^{-}2 + {}^{-}1$
8. $5 + {}^{-}2$

SUBTRACTION OF INTEGERS

EXAMPLE I

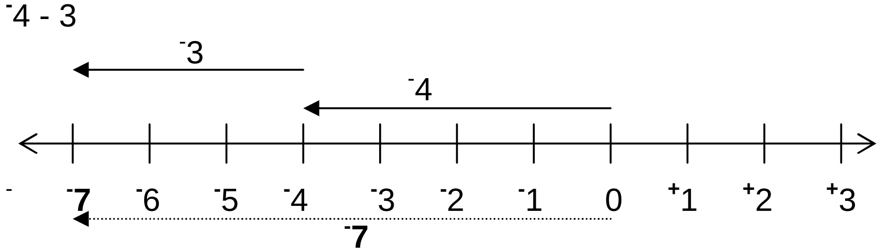
Subtract $^{+}6 - {}^{+}2$



$6 - {}^{+}2 = {}^{+}4$

EXAMPLE II

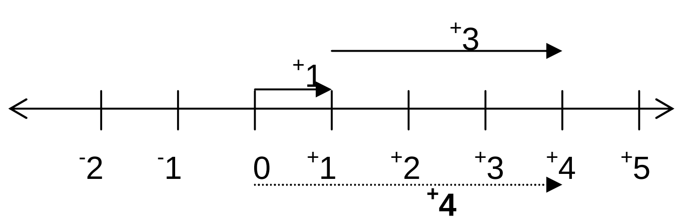
$^{-}4 - 3$



$^{-}4 - 3 = {}^{-}7$

EXAMPLE III

Subtract $^{+}1[^{-}]\ 3 = 1 + 3$



$1 - {}^{-}3 = {}^{+}4$

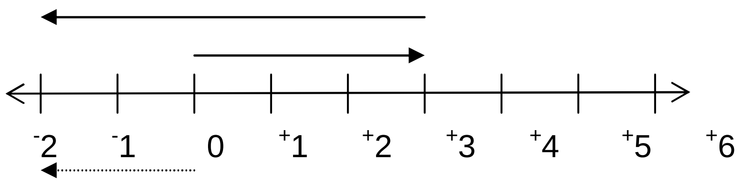
WORK TO DO

1. $^+7 - 2$
2. $^-6 - 3$
3. $^+6 - 2$
4. $^-5 - 3$
5. $^+3 - {}^-3$
6. $^+3 - {}^-2$

FORMING MATHEMATICAL STATEMENTS FROM NUMBER LINES

EXAMPLE I

Write a mathematical statement shown on the number line.



The mathematical sentence is $^+3 + {}^-5 = {}^-2$

WORK TO DO

Exercise 5: 13 No. 1 – 7. Page 109 – 10 Mk Bk. 5

ADDITION OF INTEGERS WITHOUT USING NUMBER LINE

Points to note:

a) If both integers are positive, the result is positive. Eg. $^+3 + {}^+2 = \mathbf{^+5}$

WORK TO DO

1. $^+8 + {}^+3 =$
2. $^+12 + {}^+8 =$
3. $^+10 + {}^+15 =$
4. $^+9 + {}^+4 =$

b) If both integers are negative, the result is negative. E.g. $^-2 + {}^-3 = \mathbf{^-5}$

WORK TO DO

1. $^-8 + {}^-3 =$
2. $^-9 + {}^-4 =$
3. $^-12 + {}^-8 =$
4. $^-20 + {}^-25 =$

c) If the positive numeral is bigger, the result is positive. E.g. I) $^-2 + {}^+3 = \mathbf{^+1}$ ii) $^+7 + {}^-3 = \mathbf{^+4}$

WORK TO DO

1. $^+8 + {}^-3 =$
2. $^+9 + {}^-4 =$
3. $^-20 + {}^+25 =$
4. $^-10 + {}^+15 =$

d) If the negative numeral is bigger, the result is negative. E.g.
i) $^+2 + {}^-3 = \mathbf{^-1}$ ii) $^-7 + {}^+4 = \mathbf{^-3}$

WORK TO DO

1 $^-8 + {}^+3 =$
2 $^-9 + {}^+4 =$
3 $^+20 + {}^-25 =$
4 $^-8 + {}^+5 =$

e) Additive inverse property eg i) $^{-}2 + ^{+}2 =$ **0** ii) $^{+}7 + ^{-}7 =$ **0**

WORK TO DO

1. $^{-}8 + ^{+}8 =$
2. $^{+}12 + ^{-}12 =$
3. $^{-}20 + ^{+}20 =$
4. $^{+}18 + ^{-}18 =$

SUBTRACTION OF INTEGERS WITHOUT USING A NUMBER LINE

EXAMPLE I

1. Simplify $^{+}7 - ^{+}3$

   $= 7 - 3$

   $= 4$

WORK TO DO

1. $^{+}8 - ^{+}4$
2. $^{+}13 - ^{+}8$
3. $^{+}5 - ^{+}3$
4. $^{+}7 - ^{+}4$

EXAMPLE II

Simplify $^{+}7$ [– $^{-}$]3

$= 7 + 3$

$= 10$

WORK TO DO

1. $^{+}7 - ^{-}7$
2. $^{+}10 - ^{-}10$
3. $^{+}8 - ^{-}2$
4. $^{+}11 - ^{-}9$

EXAMPLE III

Simplify $^{-}8 - {}^{+}7$

$- {}^{+}2 =$

$= {}^{-}8 - 7$

$\underline{\mathbf{= {}^{-}15}}$

WORK TO DO

1. $^{-}4 - {}^{+}11 =$ 4. $^{-}28$

2. $^{-}15 - {}^{+}42 =$

3. $^{-}14 - {}^{+}10 =$

EXAMPLE IV

Simplify $^{-}7\ [-\ ^{-}]3$

$= {}^{-}7 + 3$

$\underline{\mathbf{= {}^{-}4}}$

WORK TO DO

1. $^{-}11 - {}^{-}9$ 4. $^{-}9 - 7$

2. $^{-}2 - {}^{-}11$

3. $^{-}14 - {}^{-}10$

THE END

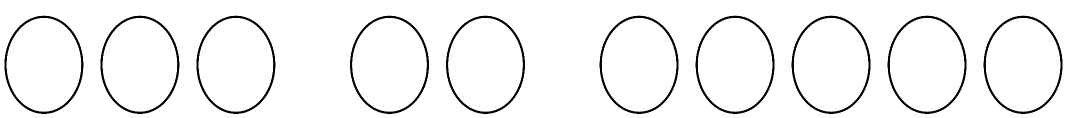
TERM TWO

ALGEBRA

COLLECTING LIKE TERMS

Discussion

A

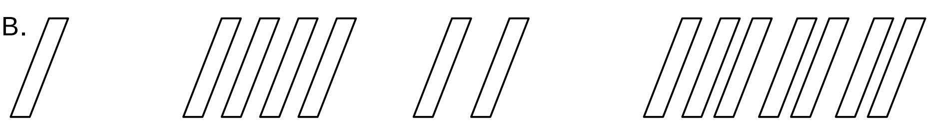


3 balls + 2 balls = 5 balls

Symbolically the above expression can be represented as follows;

$3b + 2b = 5b$

B.



1stick + 4 sticks + 2 sticks = 7 sticks

Algebraically, the above expression in short is written as;

$s + 4s + 2s = 7s$

NB. We use letters that will help you to name the item you are collecting.

EXAMPLE I
Write the following in short.
1pen + 1pen + 1pen + 1pen
Let each pen be p
p + p + p + p
EXAMPLE II
= 4 p
= 4pens

How many altogether?
4boys + 3 boys – 5 boys
Let each boy be b
4b + 3b – 5b

= 7b – 5b
= 2b
= 2 boys

EXERCISE A 1

Work out algebraically by choosing the most suitable alphabetical letters.

1. 2 bananas + 2 bananas
2. 4 cows + 10 cows – 9 cows
3. 2 dogs + 3 dogs + 4 dogs
4. 12 pots + 8 pots – 10 pots
5. 1apple + 2 apples + 3 apples
6. 5 eggs + 5 eggs – 3 eggs
7. 3 boys have 3 books, 5 books and 6 books respectively. How many books do they have altogether?
8. A poultry keeper collected 20 eggs on Monday and 30 eggs on Tuesday but sold off 17 eggs. How many eggs remained?

SIMPLIFYING ALGEBRAIC EXPRESSION

EXAMPLE I
Write in short form.
q + 7q + 4q
=12q

EXAMPLE II
Simplify
5d + 9d – 4d
=14d – 4d
=10d

1. EXERCISE A 2
2. p + p + p + p
3. 5t + 7t - 9t
4. 5e + 5t - 3e
5. 9c - 5c + c
6. 15f - 5f + 6f
7. 6x + 9x - 11x

COLLECTING AND SIMPLIFYING LIKE TERMS

Example I
Write in short
2 balls + 2 pens + 1 ball + 2 pens
Let balls be b and pens be p
= 2b + 2p + b + 2p
= 2b + b + 2p + 2p
= 3b + 4p

Example II
9 apples + 4 eggs – 5apples
collect like terms together.
= 9 apples – 5 apples + 4 eggs
Let apples be a and eggs be e
= 9a - 5a + 4e
= 4a + 4e

Example III
Collect like terms
2b + 3t + 3b + t
= 2b +3b +3t + t
= 5b + 4t

Example IV
Collect like terms
7y - 8m + y + 10m - 6
= 7y + y + 10m – 8m - 6
= 8y + 2m - 6

EXERCISE A 3

Collect like terms and simplify where necessary.

1. 5cats + 2dogs + 3cats + 4dogs
2. a + 2b +3a

3. 8d – 4e – 12d + 7d + 9e
4. 5e +5e –3e
5. 3n + 7 +n – 4
6. 6y – 4 + 3x +13
7. 8t + 12k – 10t – 4k + 5t + 2k
8. 9spades + 4hoes – 8spades
9. 12ducks + 18hens – 4ducks + 16hens + 2ducks

FORMING ALGEBRAIC EXPRESSIONS

Discussion

i) 4 more than a = a + 4
ii) x less than 12 = 12 – x
iii) A number added to 10 = 10 + n
iv) Three more than x is equal to seven is x + 3 = 7
v) 2 books weigh 10kg is 2b = 10
vi) Perimeter of a square is 40cm is 4x = 40
vii) A number subtracted from three is 3 – n
viii) A number divided by 2 is $^{n}/_{2}$
ix) A number multiplied by 6 is y x 6 = 6y
x) Three subtracted from a number is x - 3
xi) Two divide by a number is $^{2}/_{x}$
xii) (2 + 4) multiplied by six is 5(2 + 4)
xiii) Peter is 4 years older than x is x + 4

WRITING SENTENCES IN ALGEBRAIC EXPRESSIONS

Examples
1. 3 more than x equals 7
2. 2 books weigh 10g is 2b = 10
3. Perimeter of a square is P = 4x or P = x + x + x + x

EXERCISE A 4

Write Algebraic expressions for the following:
1. A number multiplied by 3 gives 18
2. 10 less than a number is three
3. A number divided by 12 equals 4
4. Ali is 5 years older than Namuwenge
5. The sum of 2x, x and 12 1s 30
6. When a number is divided by 3, and 4 is added to the result, the answer is 10
8. 5 boys shared sh 2500 equally
9. When p is multiplied by 2 the result is 6
10. Add 9 to a number, the result is 14
11. 5 boys weigh 90 kg

SUBSTITUTION

To substitute means to replace

Example

If a = 3, b = 4. Find the value of:

a) a + b	b) 2a + 5b	c) a + 2b	d) ½ b	e) 2a + b - b
= 3 + 4	= 2 x a + 5 x b	= a + 2 x b	= ½ x 4	= 2 x a + b - b
= <u>7</u>	= 2 x 3 + 5 x 4	= 3 + 2 x 4	= <u>2</u>	= 2 x 3 + 4 - 4

= 6 + 20 = 3 + 8 = 6 + 4 – 4
= <u>26</u> = <u>11</u> (add first) = 10 – 4
= <u>6</u>

EXERCISE A 5

1. Given that z = 3, y = 4, k = 1, p = 0 and h = 6; Find:

a) 4z + z + 3z
b) 7h + 2p + 8h
c) 6y – 2z
d) 8z – 4y
e) 10k + 4p – 2z
f) 5y – p

2. Given that a = 12, b = 20 and c = 24. Find;

a) $\frac{a + b}{4}$ b) ½a + ¼ b c) $^{2}/_{3}$c + ½ b d) $^{4}/_{5}$b + $^{4}/_{6}$c

3. Given that f = 8, g = 3, h = 6 and I = 10; Find:

a) 2f + g b) $^{h}/_{I}$ c) g + hi d) hf – 3i e) 2y + 3h = 28 (find y)

SOLVING EQUATIONS

1. An equation is an algebraic expression with an equal sign in between.
2. In the equation like y + 7 = 10, the letter y is called the unknown value.
3. Equations must always balance.
4. Finding the value of the unknown is known as solving the equation.
5. We can balance the equation by using the inverse operation to eliminate the unwanted from either sides of the equation.
   E.g. y + 7 = 10 (subtract 7 from both sides – to eliminate 7 from the left side of the equation)
   y + 7 – 7 = 10 – 7 (+7 – 7 are additive inverse whose result is 0)

   <u>y = 3</u>

SOLVING EQUATIONS BY SUBTRACTION

Example I

Solve: n + 7 = 13

Subtract 7 from both sides

n + 7 – 7 = 13 – 7
n = 13 – 7
<u>n = 6</u>

Example II

Solve 16 + a = 20

Subtract 16 from both sides

16 + a = 20
16 – 16 + a = 20 – 16
a = 20 – 16
<u>a = 4</u>

EXERCISE A 6

1. n + 6 = 13
2. x + 9 = 17
3. 17 + y = 27
4. 12 + a = 33
5. 32 = 5 + n
6. 13 = y + 6

FORMING AND SOLVING EQUATIONS BY SUBTRACTION

Example I

What number when added to 5 gives 11?

Let the number be x
$x + 5 = 11$
$x + 5 - 5 = 11 - 5$
$\underline{x = 6}$

Example II

There are 50 pupils in a class, 30 are boys. How many are girls?

Let the no. of girls be g
Boys + girls = 50
$30 + g = 50$
$30 - 30 + g = 50 - 30$
$g = 20$
<u>There are 20 girls.</u>

EXERCISE A7

1. A box had 12 pens, 5 are red and the rest are blue. How many pens are blue?
2. Apio picked 59 mangoes. 24 of them were raw. How many were ripe?
3. The sum of 2 numbers is 17, one of the numbers is 9. Find the other number.
4. 10 plus a number is 32. Find the number.
5. A school received 80 books. 46 of them were English. The rest were math. Find the number of math books.
6. What number when added to 19 gives 30.

SOLVING EQUATIONS BY ADDITION

<u>Example I</u>

Find the value of n. $n - 5 = 3$

$n - 5 = 3$
$n - 5 + 5 = 3 + 5$
$n = 3 + 5$
$\underline{n = 8}$

<u>Example II</u>

Solve for the unknown; $g - 50 = 73$

$g - 50 = 73$
$g - 50 + 50 = 73 + 50$
$g = 73 + 50$
$\underline{g = 123}$

EXERCISE A 8

Solve the following equations:

1. $n - 8 = 3$
2. $y - 17 = 6$
3. $z - 78 = 65$
4. $b - 38 = 75$
5. $60 = y - 39$
6. $10 = x - 28$

FORMING AND SOLVING EQUATIONS BY SUBTRACTION

Example I

A boy used 3 of his exercise books and remained with 4 books. How many books did he have first?

Let the number of books he had first be x
$x - 3 = 4$
$x - 3 + 3 = 4 + 3$

$x = 7$

He had 7 books at first.

Example II

In a class, 12 pupils were absent and 48 present. How many pupils were in the class?
Let the number of pupils in the class be p

$P - 12 = 48$

$P - 12 + 12 = 48 + 12$

$P = 60$

There are 60 pupils in the class

EXERCISE A 9

1. A girl had shillings 500 and bought a book for sh. 150. How much was left?
2. Chebrot had x shillings and Mugisha had Sh 250. They had sh 650 altogether. How much money did Chebrot have?
3. A woman sold 5 of her hens and remained with 6. How many hens did she have first?
4. A teacher marked 15 pupils absent and 35 present. How many pupils are in the class?
5. When 7 is subtracted from a number, the answer is 13. What is the number?
6. A car used 12 litres of fuel and remained with 28 litres. How much fuel did the car have at first?

SOLVING MIXED EQUATIONS.

Example I

$5a - 2a - 3 - 12 = 0$

$3a - 15 = 0$

$3a - 15 + 15 = 0 + 15$

${}^{3a}/_{3} = {}^{15}/_{3}$

$a = 5$

Example II

$3x - 8 = x$

$3x - x - 8 = x - x$

$2x - 8 = 0$

$2x - 8 + 8 = 0 + 8$

$\frac{2x}{2} = \frac{8}{2}$

$x = 4$

Example III

$8a + 4 = 3a + 14$

$8a - 3a + 4 = 3a - 3a + 14$

$5a + 4 = 14$

$5a + 4 - = 14 - 4$

$\frac{5a}{5} = \frac{10}{5}$

$a = 2$

EXERCISE A 10

Solve the equations

1. $4k + 8 - 2k = 16$
2. $6x - 5 = x + 3$
3. $10a - 5 = 5a$
5. $3x - 5 = x + 3$
6. $6x - 12 = 3x$
7. $3x - 2 - 2x = 10$

SOLVING EQUATIONS BY DIVIDING

Example I

Solve: $5a = 20$

Example II

The length of a rectangle is 9cm and

$\underline{5a} = \underline{20}$
$5 \quad\quad 5$
$\underline{a = 4}$

the width is wcm. If its area is 72cm2.
Find its width.
Area = L x W
$72 = 9 \times w$
$72 = \underline{9w}$
$9 \quad\quad 9$
$\underline{w = 8cm}$

Example II

$x + x + x = 24$
$3x = 24$
$\frac{{}^1\cancel{3}x}{\cancel{3}_1} = \frac{\cancel{24}^8}{\cancel{3}_1}$
$\underline{x = 8}$

Example III

$2x + 5 = 17$
$2x + 5 – 5 = 17 – 5$
$\frac{{}^1\cancel{2}x}{\cancel{2}_1} = \frac{\cancel{12}^6}{\cancel{2}_1}$
$\underline{x = 6}$

EXERCISE A 11

Solve:

1. $4x = 16$
2. $7x = 42$
3. $10t = 50$
4. $6r = 24$
5. $b + b + b = 18$
6. $4n + n = 45$
7. $7x + 7 = 14$
7. What number when multiplied by 12 gives 60?
8. One side of a rectangle is60cm, its area is48cm2. Find the other side.
9. A pen costs sh. 2p and a book costs sh. P. If the total cost of a book and a pen is sh. 300, find the cost of the book.
10. I think of a number, multiply it by 2, the answer is 30. What is the number?

SOLVING EQUATIONS WITH FRACTIONS

Example I

Solve: ${}^x/_3 = 4$
Lcm of 3 and 1 is 3
$3 \times {}^x/_3 = {}^4/_1 \times 3$
$\underline{x = 12}$

OR

${}^x/_3 = {}^4/_1$
$x \times 1 = 3 \times 4$
$\underline{x = 12}$

Example II

A man divided his money among his 3 children and each got sh 450.How much money did he give out?

Each child gets[${}^m/_3$]
$3 \times {}^m/_3 = {}^{450}/_3 \times 3$
$M = 1350$
<u>He divided sh. 1350</u>

EXERCISE A 12

Find the value of the unknown

1. ${}^n/_7 = 18$
2. ${}^z/_6 = {}^4/_{12}$
3. ${}^1/_7 j = 49$
4. ${}^{4b}/_4 = {}^{10}/_2$
5. $½ z = 7$
6. ${}^1/_8 f - 5 = 10$

7. When a number is divided by 7 the result is 8. Find the number.
8. What number when divided by 9 gives 21?
9. A teacher gave out exercise books to 25 pupils and each got 10 books. How many books did the teacher have?

APPLICATION OF ALGEBRA TO AREA, PERIMETER AND VOLUME.

PERIMETER

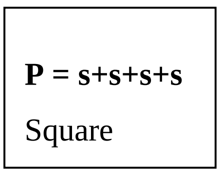
i) Perimeter is total distance round a figure.

ii) To find perimeter, we add the measurements of all the sides of a given figure. Eg.

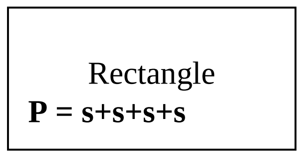
a) Any four sided figure: P = s + s + s + s
b) A three sided figure: P = s + s + s
c) A five sided figure: s + s + s + s + s etc.

FINDING THE UNKNOWN SIDE WHEN PERIMETER IS GIVEN

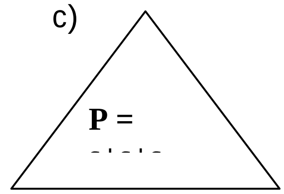
a)



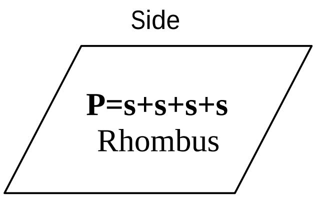
b)



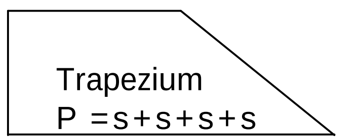
c)



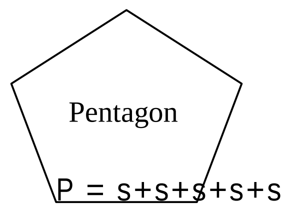
d)



e)



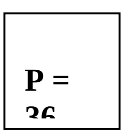
f)



Example I

The perimeter of a square is 36cm. Find its side in cm.

Sketch



Let the side be s

s + s + s + s = 36

4s = 36

$\frac{4s}{4} = \frac{36}{4}$

S = 9cm

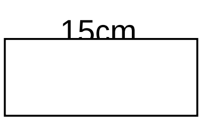
<u>One side = 9cm</u>

<u>Example II</u>

The perimeter of a rectangle is 40 cm. Its length is 15cm. Find the width.

Let the width be w

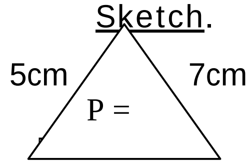
<u>Sketch</u>



<u>Example III</u>

The perimeter of a triangle is 24 cm. If the two sides are 7cm and 5cm, find the other side.

<u>Sketch</u>.



w w

15cm 2a

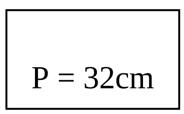
P = L + W + L + W
L + W + L + W = P
2L + 2 W = P
15 + 15 + 2W = 40
30 – 30 + 2W = 40 – 30
$\frac{2W}{2} = \frac{10}{2}$
W = 5cm

P = S + S + S
24 = 2a + 7 + 5
2a + 12 = 24
2a + 12 – 12 = 24 - 12
$\frac{2a}{2} = \frac{12}{2}$
a = 6cm

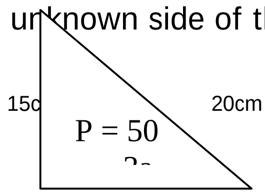
EXERCISE A 13

Form an equation and solve the unknown side (NB: Draw sketch diagrams).

1. The perimeter of a regular pentagon is 20cm. Find the other side in cm.
2. The perimeter of a rectangle is 28 cm. Find the width if the length is 8cm.
3. The perimeter of the square below is 32cm. Find its side in centimeters.
4. The perimeter of a rectangle is 46cm. Find its length in centimeters if its width is 42cm.



5. The perimeter of an equilateral triangle is 42cm. Find the size of one side.
6. Find the unknown side of the triangle below.

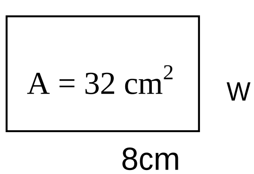


FINDING UNKNOWN SIDE WHEN AREA IS GIVEN

Example I

The area of the rectangle below is $32cm^2$; its length is 8cm. Find its width.

Sketch

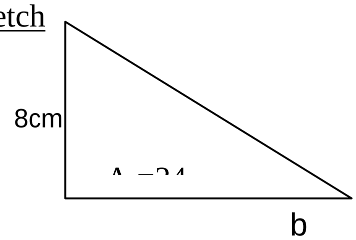


Area = L x W
32 = 8 x W
$\frac{8W}{8} = \frac{32}{8}$
W = 4cm

Example II

The area of the triangle below is 24 cm^2 If its height is 8cm, find its base.

Sketch



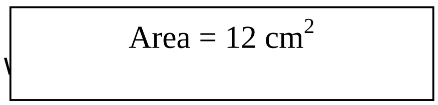
Area = ½ x base x height
24 = ½ x b x 8
2 x $\frac{24}{1} = \frac{8b}{2}$ x 2
$\frac{48}{8} = \frac{8b}{8}$

b = 6

EXERCISE A 14

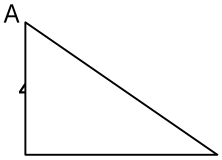
1.The area of a rectangle is 12 cm^2. Its length is 4cm. Find the width.

4cm



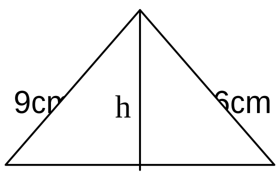
2. Find the length of a rectangle whose area is 105 cm^2. and width 7cm.
3. The area of a rectangle I 96 cm^2. Its width is 6cm. Find its length.
4. The length of a rectangle is 12cm. Its area is 48 cm^2. Find its width.
5. The area of the triangle below is 6 cm^2. Find the base if its height is 4cm.

A



B x C

6. Find the value of h in the triangle below if its area is 35 cm^2.



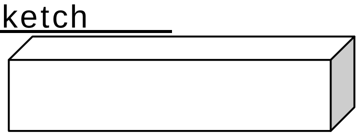
10cm

FINDING THE MISSING SIDE WHEN VOLUME IS GIVEN

Example I

The volume of a box is 60 cm^2. Its length is 5cm and width 4cm. Find its height.

Sketch



L=5cm W = 4cm

Volume = L x W x H

60 = 5 x 4 x h

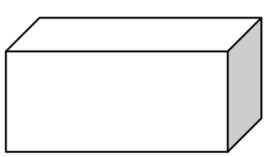
20h = 60

$\frac{20h}{20} = \frac{60}{20}$

H = 3cm

Example II

The volume of a cuboid is 80 cm^2. Its length is 8cm and height 2cm. What is its width?



H = 2cm

w

Volume = L x W x H

80 = 8 x w x 2

80 = 16w

$\frac{\cancel{16}w}{\cancel{16}} = \frac{\cancel{80}}{\cancel{16}}$

w = 5cm

L = 8cm

EXERCISE A 15

Form equations and solve for the unknown

1. The volume of a box is 24 cm^3. Its length is 4cm and width 3cm. Find its height.
2. The volume of a set is 12 cm^3. Its length is 3cm and width is 2cm. Find its height
3. The volume of a cuboid is 100 cm^3. Its length is 5cm, height 5cm. What is the width?
4. Find the width of a box with length of 6cm, height of 5cm and a volume of 120 cm^3.
5. The volume of a box is 48 cm^3. Its length and width are 4cm and 3cm respectively. Find its height.

NUMBER PATTERNS AND SEQUENCES

EASY COMPUTING SKILLS IN ADDITION

Example I

47 + 29
29 is nearer 30
so 47 + 30 = 77
but 30 was added instead of 29
so take away 1
= 77 – 1
= 76

Example II

48 + 23
23 = 20 + 3
so 3 + 48 = 51
dd he 20
20 + 51
= 71

EXERCISE B 1

Quickly add the following

1. 54 + 44
2. 49 + 35
3. 63 + 33
4. 78 + 21
5. 57 + 45

EASY COMPUTATION SKILLS IN SUBTRACTION

Example I

57 – 38
38 is nearer to 40
so 57 – 40 = 17
but 40 was subtracted instead of 38
so add 2
= 17 + 2
= 19

Example II

74 – 26
26 = 20 + 6
take away 6
74 – 6 = 68
then take away 20
= 68 - 20
= 48

EXERCISE B 2

1. 51 – 39
2. 94 – 22
3. 78 – 38
4. 91 – 53
5. 77 – 32

MULTIPLES OF WHOLE NUMBERS

Example I

Multiples of 5 =(1 x 5) (2 x 5) (3 x 5) (4 x 5) (5 x 5) (6 x 5)
5 10 15 20 25 30...

M_5 = {5, 10, 15, 20, 25, 30...}

Example II

Write the first six multiples of 9

Multiples of 9 =	(1 x 9)	(2 x 9)	(3 x 9)	(4 x 9)	(5 x 9)	(6 x 9)
	9	18	27	36	45	54

M_9 = {9, 18, 27, 36, 45, 54}

Example III

Find the multiples of 8 between 20 and 40

Multiples of 8 = {8, 16, 24, 32, 40, 48, 56}

M_8 between 20 and 40 = {24, 32}

EXERCISE B 3

A. Write the first 12 multiples of the following

1. Multiples of 3
2. Multiples of 4
3. Multiples of 5
4. Multiples of 6
5. Multiples of 7
6. Multiples of 8
7. Multiples of 9
8. Multiples of 10
9. Multiples of 11
10. Multiples of 12

B. List the multiples of;

1. 2 between 10 and 20
2. 3 between 20 and 30
3. 4 less than 24
4. 6 between 1 and 20
5. 8 less than 90

FINDING FACTORS OFNUMBERS

A factor is a number that divides another in an exact number of times.

Example I

Find the factors of 12. How many are they?

F_{12} = 1 x 12 = 12
= 2 x 6 = 12
= 3 x 4 = 12

F_{12} = {1, 2, 3, 4, 6, 12}

There are 6 factors.

EXERCISE B 4

1. Find the factors of the following numbers:

a) 4
b) 916
c) 13
d) 49
e) 121
f) 144
g) 41
h) 14
i) 37

2. What have you discovered about the factors of 13, 41 and 37?
3. What do we call such numbers?

ABBREVIATIONS COMMONLY USED

a) LCF - Lowest Common Factors
b) HCF - Highest Common Factors
c) GCF - Greatest Common Factors
d) CF - Common Factors
e) LCM - Lowest Common Factors

GCF and HCF mean the same; and refer to the biggest common factor

COMMON FACTORS AND GREATEST COMMON FACTORS

Example I

Find the factors of 12 and 15 and state the LCF and the GCF

F_{12}	F_{15}
1 x 12	1 x 15
2 x 6	3 x 5
3 x 4	

F_{12} = {1, 2, 3, 4, 6, 12} F_{15} = {1, 3, 5, 15}

CF = { 1, 3}

GCF = 3

LCF = 1

NOTE: The LCF of two or more numbers is always 1

EXERCISE B 5

Find the GCF and the LCF of the following pairs of numbers.

1. 6 and 9
2. 12 and 18
3. 18 and 24
4. 30 and 15
5. 16 and 18
6. 14 and 21

TYPES OF NUMBERS

1. Whole numbers
   These are numbers with no fraction and begin with zero. Eg 0, 1, 2, 3, 4, 5, ...
2. Counting numbers

These are numbers we use when counting. Sometimes they are called natural numbers. Eg 1, 2, 3, 4, 5…

3. Even numbers
   a) These are numbers that are exactly divisible by 2 and give no remainder. eg. 0, 2, 4, 6, 8, ...
   b) The first even number is 0.
4. Odd numbers

These are numbers that are not exactly divisible by 2. When divided by 2, it gives 1 as a remainder. Eg. 1, 3, 5, 7, 9, …

5. Prime numbers
   a) These are numbers with only two factors; these are 1 and the number itself eg. 2, 3, 5, 7, 11, ...
   b) The smallest prime number is 2.
   c) 2 is both a prime and even number.
6. Composite numbers
   a) These are numbers with more than two factors eg. 4, 6, 8, 9, 10, ...
   b) The smallest composite number is 4.

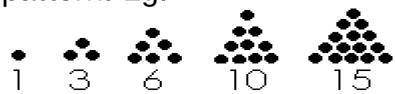
7. Square numbers

These are numbers got by multiplying two equal numbers. Eg 1 x 1 = 1, 2 x 2 = 4, 3 x 3 = 9, 4 x 4 = 16…

1, 4, 9, 16, ... are square numbers.

8. Triangular numbers

a) These are numbers when whose dots are arranged, form a triangular pattern. Eg.



The first triangular number is 1

PRIME NUMBERS AND COMPOSITE NUMBERS

CLASS DISCUSSION

Study the factors of the given numbers below

NUMBER	FACTORS	NUMBER	FACTORS
1	{1}	7	{1, 7}
2	{1, 2}	8	{1, 2, 4, 8}
3	{1, 3}	9	{1, 3, 9}
4	{1, 2, 4}	10	{1, 2, 5, 10}
5	{1,5}	11	{1, 11}
6	{1, 2, 3, 6}	12	{1, 2, 3, 4, 6, 12}

a) Some numbers have only two factors and others have more than two factors.

b) Those numbers with two factors are called <u>Prime numbers</u> and those with more than two factors are called <u>Composite numbers.</u>

<u>Example I</u>

Given {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

Write:

a) A set of prime numbers.
   Prime numbers are: {2 ,3, 5, 7, 11, 13, 17, 19}

b) A set of composite numbers.
   Composite numbers are: {4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20}

DETERMINING WHETHER A NUMBER IS PRIME OR COMPOSITE

Example I

Is 23 prime or composite?

23 = 1 x 3

= <u>{1, 3}</u>

23 has only two factors so it is a prime number.

Example II

Is 24 prime or composite?

24 = 1 x 24

2 x 12

3 x 8

4 x 6

F_{24} = {1, 2, 3, 4, 6, 8, 12, 24}

EXERCISE B 6

Factorise and write prime or composite number.

1. 25
2. 28
3. 29
4. 13
5. 32
6. 40
7. 37
8. 41

PRIME FACTORISATION OF NUMBERS

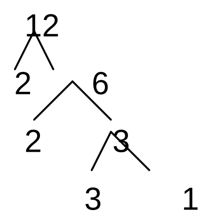
1. When prime factorising a given number, prime numbers are used.
2. The prime numbers include; 2, 3, 5, 7, 11, 13, 17, ...

3. The prime number chosen must divide the number exactly without giving a remainder.
4. There are two main ways of carrying out prime factorisation of numbers. These are:
   a) Prime factorising using a factor tree.
   b) Prime factorising using a ladder.
5. The answer is presented in two different ways;
   a) Multiplication form,
   b) Set notation (Subscript form)
6. In set notation form we write subscripts (small numbers) below prime factors when listing them.
7. Prime factorisation can be used to find the; LCM and Square roots of numbers.

PRIME FACTORISING USING A FACTOR TREE

Example I

Prime Factorise 12.

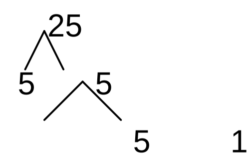


In multiplication form: $PF_{12} = \{2 \times 2 \times 3\}$

In set notation form: $PF_{12} = \{2_1, 2_2, 3_1\}$

Example II

Prime factorise 25.



In multiplication form: $PF_{25} = \{ 5 \times 5\}$

In subscript form: $PF_{25} = \{5_1, 5_2\}$

EXERCISE B 7

Prime factorise the numbers and answer as instructed in the brackets.

1. 4 (set notation)
2. 10 (multiplication)
3. 72 (subscript)
4. 27 (set notation)
5. 50 (multiplication)
6. 14 (subscript)
7. 56 (multiplication)

PRIME FACTORISATION USING A LADDER

Example I

Prime factorise 216

PF	NO.
2	216
2	108
2	54
3	27
3	9
3	3
	1

In multiplication form:

216 = 2 x 2 x 2 x 3 x 3 x 3

$\{2_1, 3_1\}$

Example II

Prime factorise 6 using a ladder

PF	NO.
2	6
3	3
	1

In multiplication form 6 = 2 x 3

In subscript form 6 =

In subscript form 216 = {2_1, 2_2, 2_3, 3_1, 3_2, 3_3}

EXERCISE B 8

Use a ladder to prime factorise and present your answer as instructed in the brackets.

1. 60 (Subscript)
2. 64 (multiplication)
3. 80 (subscript)
4. 128 (multiplication)
5. 58 (subscript)
6. 180 (multiplication)

FINDING LCM USING PRIME FACTORISATION

1. To find the LCM of a given pair of numbers, prime factorisation is applied.
2. To prime factorise, remember always to use prime numbers eg. 2, 3, 5, 7, 11, 13, ...
3. A ladder can be used to find the LCM of a pair of given numbers.
4. Prime factorise the given numbers together and multiply the prime factors to get the LCM.

Example I

Find the LCM of 12 and 18.

Prime factorise 12 and 18 together.

PF	Number	Number
2	12	18
2	6	9
3	3	9
3	1	3
	1	1

LCM = (2 x 2) x (3 x 3)
= 4 x 9
LCM = 36

LCM of 12 and 18 = 36

Example II

Find the LCM of 4 and 3.

Prime factorise 4 and 3 together.

PF	Number	Number
2	4	3
2	2	3
3	1	3
	1	1

LCM = (2 x 2) x 3
= 4 x 3
LCM = 12

LCM of 4 and 3 = 12

EXERCISE B 9

Prime factorise to find the LCM of the following pairs of numbers.

1. 4 and 12
2. 8 and 16
3. 12 and 15
4. 14 and 28
5. 15 and 30
6. 30 and 40

SQUARE NUMBERS

1. Square numbers are numbers got by multiplying two equal numbers. E.g. 2 x 2 = 4
4 is a square number.
2. Square of a number can be written by raising the number by power 2.

Eg. Square of 3 = 3^2, Square of a = a^2

Example I

What is the square of 5?

$5^2 = 5 \times 5$

$= 25$

The square of 5 is 25

Example II

What is the square of 12?

$12^2 = 12 \times 12$

$= 144$

The square of 12 is 144

EXERCISE B 10

Find the squares of the following numbers.

1. The square of 6
2. The square of 8
3. The square of 7
4. The square of 11
5. The square of 13
6. If P = 12, what is the value of P^2?
7. Find the area of a square whose side is 9cm.

SQUARE ROOTS OF NUMBERS

1. A square root is a number that is multiplied by itself to get a square number.
   Eg. 3 x 3 = 9
   Square
   Square root.
2. The symbol for square root is √
3. We can get the square root of a number by prime factorisation.

Example I

Find the square root of 25

5	25
5	5
	1

$\sqrt{25} = (5 \times \cancel{5})$

$= 5$

The square root of 25 is 5

Example II

Find the square root of 100.

2	100
2	50
5	25
5	5
	1

$\sqrt{100} = (2 \times \cancel{2}) \times (5 \times \cancel{5})$

$= 2 \times 5$

$= 10$

The square root of 100 is 10

EXERCISE B 11

Find the square root of the following numbers;

1. 16
2. 36
3. 49
4. 81
5. 64
6. 144

FINDING ONE SIDE OF A SQUARE USING SQUARE ROOT

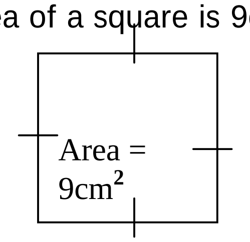
<u>Note:</u> The formula for finding area of a square is; Area = s x s

$$A = s^2.$$

Example I

The area of a square is $9cm^2$. Find the side of the square.

<u>Sketch</u>



Side x Side gives Area.

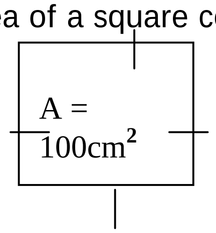
S x S = 9 (Show working of finding square root of 9 in side work)

$S^2 = 9$
$\sqrt{S^2}. = \sqrt{9}$
<u>S = 3cm</u>

Example II

The area of a square compound is $100m^2$. Find the sides in metres.

Sketch



S x S = Area
$\sqrt{S^2}. = \sqrt{100}$ (Show working of finding square root of 100 in side work)
<u>S = 10m</u> <u>One side of a square is 10cm</u>

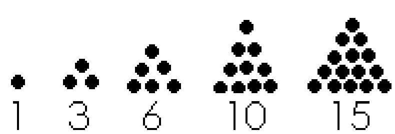
EXERCISE B 12

1. What is the side of a square whose area is $16cm^2$?
2. Find one side of a square whose area is $81\ cm^2$.
3. A square room has an area of $64m^2$. How long are its sides?
4. A square garden has an area of $36m^2$. Find the length of each side of the garden.
5. Find the side and the perimeter of a square whose area is $225cm^2$.

TRIANGULAR NUMBERS

Discussion

Given 1, 3, 6, 10, 15, ...; when represented as dot, will look like as below.



1. When the dots of the above numbers are arranged as above, they form triangles. This is why they are called <u>triangular numbers</u>.
2. The first triangular number is 1
3. Triangular numbers can be got by adding consecutive numbers starting from 1.

Eg. 1 = 1
1 + 2 = 4
1 + 2 + 3 = 6
1 + 2 + 3 + 4 = 10
1 + 2 + 3 + 4 + 5 = 15

EXERCISE B 13

1. a) Find the next five triangular numbers .
   b) Find how many triangular numbers will form a sum of 36.

OPERATION ON PATTERNS AND SEQUENCES

Note:

1. Sum is a result after adding numbers.
   Eg. 2 + 4 = 6
   The sum of 2 and 4 is 6
2. A difference is a result after subtracting a smaller number from a bigger one.
   Eg. The difference between 90 and 30 is 90 – 30 = 60.
3. A product is a result of multiplying 2 or more numbers.
   Eg. The product of 3 and 5 is 3 x 5 = 15
4. A quotient is a result after dividing one number by another.
   Eg. The quotient of 20 and 5 is 20 ÷ 5 = 4
5. Average is a result after dividing the sum by the number of items added.

EXERCISE B 14

Work out the following numbers as required.

1. Find the sum of the missing numbers.
   1, 4, 9, __25, 36, __, 64.
2. Find the difference between 2 missing numbers in the sequence.
   1, 3, 5, 7, 9, 11, 13, 15, __, 19, __.
3. Find the product of the first two odd numbers.
4. Find the quotient after dividing the missing number by 5 in the sequence.
   5, 10, 15, 20, 25, 30, __, 40, 45, 50.

FRACTIONS

1. A fraction is part of a whole.
2. A fraction is written with two main parts.
   a) The numerator
   b) The denominator.
3. the top part of a fraction is the numerator and the bottom part is the denominator.

   Eg ½ 1 is the numerator and 2 is the denominator.

TYPES OF FRACTIONS

There are three main types of fractions.

a) Proper fractions

   These are fractions whose numerator is smaller than the denominator.

   e.g ½ , ¾ , $^5/_6$

b) Improper fractions

   These are fractions whose numerator is bigger than the denominator.

   e.g. $^5/_4$, $^3/_2$, $^{19}/_5$

c) Mixed fractions

   These are fractions that have both whole numbers and fractions.

   e.g. $1^5/_6$, $3^5/_6$, $12^1/_2$

EXPRESSING IMPROPER FRACTIONS AS MIXED FRACTIONS

Example I

Express $^9/_5$ as a mixed fraction.

$9 \div 5 = 1$ remainder 4

$= \underline{1^4/_5}$

Example II

Express $^{30}/_7$ as a mixed fraction.

$30 \div 7 = 4$ remainder 2

$= \underline{4^2/_7}$

EXERCISE C 1

Express the following as mixed fractions.

1. $^3/_2$
2. $^{11}/_3$
3. $^{17}/_4$
4. $^{15}/_7$
5. $^{50}/_8$
6. $^2/_7$

EXPRESSING MIXED FRACTIONS IMPROPER FRACTIONS.

Example I

Express $4^2/_3$ as an improper fraction

$4^2/_3 = \frac{W \times D + N}{D}$

$= \underline{4 \times 3 + 2}$

Example II

Express $5^1/_4$ as an improper fraction.

$5^1/_4 = \frac{W \times D + N}{D}$

$= \underline{5 \times 4 + 1}$

3   4

$= \frac{12 + 2}{3}$ $= \frac{20 + 1}{4}$

$= {}^{14}/_{3}$ $= {}^{21}/_{4}$

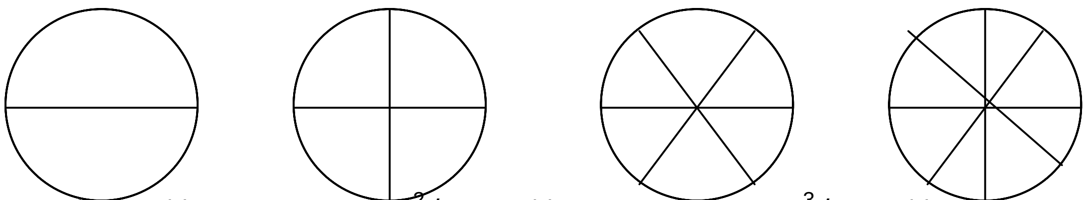
EXERCISEC 2

Express each of these fractions as improper fractions.

1. $1\frac{1}{2}$
2. $3\,{}^{1}/_{10}$
3. $10^{3}/_{5}$
4. $2^{7}/_{8}$
5. $5^{1}/_{6}$
6. $4^{3}/_{7}$

EQUIVALENT FRACTIONS

The diagrams below represent half



$\frac{1}{2} = \frac{1}{2}$ ${}^{2}/_{4} = \frac{1}{2}$ ${}^{3}/_{6} = \frac{1}{2}$

${}^{4}/_{8} = \frac{1}{2}$

Example I

Write four fractions equivalent to ½.

$\frac{1}{2} = \frac{1 \times 2}{2 \times 2}, \frac{1 \times 3}{2 \times 3}, \frac{1 \times 4}{2 \times 4}, \frac{1 \times 5}{2 \times 5}$

$\frac{1}{2} = {}^{2}/_{4}, {}^{3}/_{6}, {}^{4}/_{8}, {}^{5}/_{10}$

Example II

Write four fractions equivalent to ${}^{2}/_{7}$.

${}^{2}/_{7} = \frac{2 \times 2}{7 \times 2}, \frac{2 \times 3}{7 \times 3}, \frac{2 \times 4}{7 \times 4}, \frac{2 \times 5}{7 \times 5}$

${}^{2}/_{7} = {}^{4}/_{14}, {}^{6}/_{21}, {}^{8}/_{28}, {}^{10}/_{35}$

EXERCISE C 3

A. Write five equivalent fractions to each of these.

1. ${}^{2}/_{3}$
2. ${}^{9}/_{10}$
3. ${}^{4}/_{5}$
4. ${}^{4}/_{9}$
5. ${}^{8}/_{10}$

B. Complete the equivalent fraction below.

1. ${}^{2}/_{11} = {}^{4}/_{c}, {}^{a}/_{33}, {}^{8}/_{d}, {}^{b}/_{55}, {}^{12}/_{e}$
2. ${}^{2}/_{12} = {}^{4}/_{g}, {}^{d}/_{36}, {}^{e}/_{48}, {}^{10}/_{h}, {}^{f}/_{72}$
3. ${}^{2}/_{11} = {}^{a}/_{16}, {}^{9}/_{d}, {}^{b}/_{32}, {}^{15}/_{e}, {}^{c}/_{48}$

REDUCING FRACTIONS

i) To reduce a fraction is to simplify it to its simplest terms.

ii) This is done by dividing the numerator and denominator by their GCF.

Example I

Reduce $^{12}/_{24}$ to its simplest terms.

F12 = {1, 2, 3, 4, 6, 12}

F24 = {1, 2, 3, 4, 6, 8, 12, 24}

CF = {1, 2, 3, 4, 6, 12}

GCF = 12

$\frac{12 \div 12}{24 \div 12}$

$= \frac{1}{2}$

Example II

Reduce $^{18}/_{20}$ to its simplest terms.

F18 = {1, 2, 3, 6, 9, 18}

F20 = {1, 2, 4, 5, 10,20}}

CF = {1,2}

GCF = 2

$\frac{18 \div 2}{20 \div 2}$

$= ^{9}/_{10}$

EXERCISE C 4

1. $^{2}/_{4}$
2. $^{9}/_{10}$
3. $^{20}/_{30}$
4. $^{30}/_{90}$
5. $^{8}/_{12}$
6. $^{5}/_{10}$
7. $^{12}/_{18}$

ORDERING FRACTIONS

1. To order fractions is to arrange fractions in ascending or descending order.
2. Ascending order means from smallest to highest.
3. Descending means from biggest to smallest.
4. We can use the LCM to determine the size of the fraction in natural numbers.

Example I

Arrange $^{1}/_{3}$, ½, ¼ in ascending order.

LCM of 3, 2 and 4 = 12 (Find LCM by prime factorisation using the ladder)

$^{1}/_{\cancel{3}}$ x $\cancel{12}^{2}$ $^{1}/_{\cancel{2}}$, x $\cancel{12}^{6}$ $^{1}/_{\cancel{4}}$ x $\cancel{12}^{3}$

1 x 2 = 2   1 x 6 = 6   1 x 3 = 3

<u>Ascending order = ¼, $^{1}/_{3}$, ½.</u>

Example II

Arrange $^{7}/_{12,}$ $^{3}/_{8,}$ $^{5}/_{8}$ in descending order.

LCM of 12 and 8 = 24 (Find LCM by prime factorisation using the ladder)

$^{7}/_{\cancel{12}}$ x $\cancel{24}^{2}$ $^{3}/_{\cancel{8}}$, x $\cancel{24}^{3}$ $^{5}/_{\cancel{8}}$ x $\cancel{24}^{3}$

7 x 2 = 14 3 x 3 = 9 5 x 3 = 15

Descending order = $^5/_8$, $^7/_{12}$, $^3/_8$

EXERCISE C 5

Arrange the following fractions as instructed in brackets

1. $^3/_4$, $^2/_3$, $^1/_2$. (ascending)
2. $^5/_6$, $^5/_8$, $^5/_{12}$. (ascending)
3. $^1/_2$, $^1/_3$, $^1/_4$, $^1/_6$. (descending)
4. $^5/_6$, $^4/_5$, $^7/_{10}$, $^2/_3$. (descending)
5. $^3/_4$, $^2/_3$, $^5/_6$. (ascending)
6. $^5/_6$, $^4/_5$, $^7/_{10}$, $^2/_3$. (descending)
7. Which is smaller $^5/_6$ or $^5/_8$?
8. Which is bigger $^1/_2$ or $^2/_{12}$?

ADDITION OF FRACTIONS

To add fractions, find the LCM of the denominators of the fractions.

Example I

Add: ¼ + ½ (Find LCM of 2 and 4 by prime factorisation using the ladder)

= (4 ÷4 x 1) + (4 ÷2 x 1)

$= \frac{1 \times 1 + 2 \times 1}{4}$

$= \frac{3}{4}$

Example II

Add: $^5/_6 + {}^3/_8$ (Find LCM of 6 and 8 by prime factorisation using the ladder)

$\frac{20 + 9}{24} = \frac{29}{24}$ (Change to a mixed fraction)

$= 1\,^5/_{24}$

Example III

EXERCISE C 6

Add the following:

1. $^1/_3 + {}^1/_2$
2. $^4/_3 + {}^1/_2$
3. $^7/_{10} + {}^1/_{20}$
4. $^1/_5 + {}^1/_2$
5. $^2/_7 + {}^3/_4$
6. $^2/_9 + {}^1/_6$

ADDITION OF WHOLES TO FRACTIONS

Example I

Add: $\frac{3}{4} + 5$

$= 5 + \frac{3}{4}$

$= \underline{5\frac{3}{4}}$

Example II

Add: $3\,{}^{2}/_{5} + 7$

$= 3 + 7 + {}^{2}/_{5}$ (First add the wholes alone)

$= 10 + {}^{2}/_{5}$

$= \underline{10\,{}^{2}/_{5}}$

Example III

Add: $5\,{}^{3}/_{7} + 12$

$= 5 + 12 + {}^{3}/_{7}$ (First add the wholes alone)

$= 17 + {}^{3}/_{7}$

$= \underline{17{}^{3}/_{7}}$

EXERCISE C 7

Add the following

1. ${}^{1}/_{5} + 3$
2. $10 + 1{}^{5}/_{7}$
3. $4\,{}^{1}/_{5} + 6$
4. $22\,{}^{1}/_{5} + 13$
5. $2\,{}^{3}/_{7} + 8$
6. $1\,{}^{1}/_{4} + 9$

MORE ON ADDITION

Example I

Add: $6{}^{2}/_{3} + {}^{5}/_{6}$

$= \frac{6 \times 3 + 2}{3}$ (mixed to improper)

$= {}^{20}/_{3} + {}^{5}/_{6}$ LCM of 3 and 6 = 6

$= \frac{40 + 5}{6}$

$= {}^{45}/_{6}$ Change to mixed fraction

$= \underline{7{}^{3}/_{6}}$

Example II

${}^{1}/_{15} + 1{}^{1}/_{3} + {}^{3}/_{5}$ (mixed to fractions)

$= {}^{1}/_{15} + {}^{4}/_{3} + {}^{3}/_{5}$ (LCM of 15, 3 and 5 = 15)

$= \frac{1 + 20 + 9}{15}$

$= {}^{30}/_{15}$ (reduce by the HCF)

$= \underline{2}$

EXERCISE C 8

1. $5 + 4{}^{2}/_{3}$
2. $3{}^{3}/_{7} + 4$

3. $2^1/_5 + ^2/_3$

4. $^1/_{15} + 3^1/_2$

5. $^3/_4 + 4^1/_8 + 2^5/_8$

6. $^1/_6 + ^5/_9 + 1^1/_3$

WORD PROBLEMS INVOLVING ADDITION OF FRACTIONS

Example I

John filled ½ of a tank with water in the morning and $^2/_5$ in the afternoon. Hat fraction o he tank was full with water?

Morning + Afternoon

½ + $^2/_5$ LCM of 2 and 5 = 10

$= \frac{5 + 4}{10}$

$= \underline{^9/_{10}}$

<u>The tank was filled with $^9/_{10}$</u>

Example II

Abdel had 1½ cakes. Jane had $2^3/_4$ cakes and Rose had ¾ of a cake. How many cakes did they have altogether?

Abdel + Rose + Jane

$1^1/_2 + ^3/_4 + +2^3/_4$ (Change to improper)

$= ^3/_2 + ^3/_4 + ^{11}/_4$ (LCM of 2 and 4 = 4)

$= \frac{6 + 3 + 11}{4}$

$= ^{20}/_4$ (reduce the fraction to its simplest terms)

= <u>5 cakes.</u>

EXERCISE C 9

1. $^2/_3$ of the seats in a bus is filled by adults and ¼ by children. What fraction of the seats in the bus is occupied?
2. A worker painted 3 $^1/_9$ wall on Monday and $^4/_9$ on Tuesday. What fraction of the house was painted on Monday?
3. In a school library, $^5/_{15}$ of the books are mathematics, $^1/_6$ of the books are English and $^1/_3$ are Science. What fraction do the three books represent altogether?

4. A mother gave sugar canes to her children. The daughter got $1\frac{1}{2}$ and the sun got $2\frac{1}{4}$

   How many sugarcanes are these altogether?

5. At Mullisa P. S. $^{2}/_{3}$ of the day is spent on classroom activities, $^{3}/_{12}$ on music and $^{1}/_{8}$ on games. Express these as one fraction.

SUBTRACTION OF FRACTIONS

<u>Example I</u>

$\frac{1}{2} - {}^{1}/_{3}$. LCM of 2 and 3 = 6

$= \frac{3-2}{6}$

$= \underline{{}^{1}/_{6}}$

<u>Example II</u>

$5 - 2^{5}/_{12}$. Change mixed to improper fraction.

$= {}^{5}/_{1} - {}^{29}/_{12}$ LCM of 1 and 12 = 12

$= \frac{60-29}{12}$

$= {}^{31}/_{12}$

Change to mixed fraction.

$= \underline{2^{7}/_{12}}$

Example III

$2^{2}/_{5} - 1^{1}/_{4}$ Change mixed to improper fraction

$= {}^{14}/_{5} - {}^{5}/_{4}$ LCM of 5 and 4 = 20

$= \frac{56-25}{20}$

$= {}^{31}/_{20}$ Change to mixed fraction.

$= \underline{1^{11}/_{20}}$

<u>EXERCISE C 10</u>

1. $^{4}/_{5} - {}^{1}/_{5}$
2. $1^{1}/_{10} - {}^{1}/_{2}$
3. $3 - {}^{1}/_{2}$
4. $3^{1}/_{5} - 1^{1}/_{10}$
5. $3^{3}/_{4} - 1^{1}/_{4}$
6. $2^{3}/_{8} - 1^{1}/_{8}$

WORD PROBLEMS INVOLVING SUBTRACTION OF FRACTIONS

Example I

A baby was given $^{5}/_{6}$ litres of milk and drunk $^{7}/_{12}$ litres. How much milk remained?

Given – drunk

$= {}^{5}/_{6} - {}^{7}/_{12}$ LCM of 6 and 12 = 12

$= \frac{10 - 7}{12}$

$= {}^{3}/_{12}$.   Reduce to simplest term.

= <u>¼ litres</u>

Example II

2 ½ litres of water were removed from a container of 5 ¼ litres. How much water remained?

Water remaining = 5 ¼ – 2 ½

$= {}^{21}/_{4} - {}^{5}/_{2}$ LCM of 4 and 2 = 4

$= \frac{21 - 10}{4}$

$= {}^{11}/_{4}$.   Change to mixed fraction.

= <u>2 ¾ litres of water remained</u>.

ADDITON AND SUBTRACTION OF FRACTIONS

<u>Example I</u>

$½ + {}^{1}/_{3} - ¼$ LCM of 2, 3 and 4 = 12

$= \frac{6 + 4 - 3}{12}$ Add first first

$= \frac{10 - 3}{12}$

$= {}^{7}/_{12}$.

<u>Example II</u>

Work out:

${}^{5}/_{6} - {}^{5}/_{9} + {}^{7}/_{18}$ Collect positive integers

$= {}^{5}/_{6} + {}^{7}/_{18} - {}^{5}/$ LCM of 6, 18 and 9 = 18

$= \frac{15 + 7 - 10}{18}$ Add first

$= \frac{22 - 10}{18}$ Then subtract

$= {}^{12}/_{18}$ Reduce to simplest term

$= \frac{12 \div 6}{18 \div 6} \; \frac{= 2}{= 3}$

$= {}^{2}/_{3}$

Example III

Work out: $7^{1}/_{2} - 3^{1}/_{4} + 1^{3}/_{12}$

$7^{1}/_{2} - 3^{1}/_{4} + 1^{3}/_{12}$ Change to improper fraction first.

$= {}^{15}/_{2} - {}^{13}/_{4} + {}^{15}/_{12}$ Collect positive terms

$= {}^{15}/_{2} + {}^{15}/_{12} - {}^{13}/_{4}$ LCM of 2, 12 and 4 = 12

$= \frac{90 + 15 - 39}{12}$ Add first

$= \frac{105 - 39}{12}$

$= \frac{66 \div 6}{12 \div 6} = \frac{11}{2}$

$= {}^{11}/_{2}$ Change to mixed fraction.

$= \underline{5\ ½}$

EXERCISE C 11

1. $^{5}/_{4} + {}^{1}/_{5} - {}^{1}/_{2}$
2. $^{2}/_{3} - {}^{5}/_{6} + ¾$
3. $1^{1}/_{2} + 2^{1}/_{3} - ¼$
4. $2^{1}/_{6} - 3^{1}/_{2} + 5$
5. $5^{1}/_{5} + 1^{4}/_{5} - 3$
6. $^{2}/_{3} + {}^{3}/_{5} - {}^{7}/_{15}$

MULTIPLICATION OF FRACTIONS

Example I

¼ x 3 Make 3 a fraction.

$= ¼ \times {}^{3}/_{1}$

$= \frac{1 \times 3}{4 \times 1}$

$= \underline{¾}$

Example II

$^{2}/_{3} \times 21$ Make 21 a fraction

$= {}^{2}/_{3} \times {}^{21}/_{1}$

$= \frac{2 \times \cancel{21}^{7}}{{}_{1}\cancel{3} \times 1}$

$= \frac{2 \times 7}{1 \times 1}$

$= \underline{14}$

Example III

½ of 16 'of' means multiplication

$= ½ \times 16$ make 16 a fraction

$= ½ \times {}^{16}/_{1}$

$= \frac{1 \times \cancel{16}^{8}}{{}_{1}\cancel{2} \times 1}$

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

$= \underline{8}$

Example IV

$2^{1}/_{3}$ of 27of means multiplication.

$= 2^{1}/_{3} \times 27$ make 27 a fraction

$= 2^{1}/_{3} \times {}^{27}/_{1}$ mixed to improper fraction

$= {}^{7}/_{3} \times {}^{27}/_{1}$

$= \frac{7 \times \cancel{27}^{9}}{{}_{1}\cancel{3} \times 1}$

$= \frac{7 \times 9}{1 \times 1}$

$= \underline{63}$

EXERCISE C 12

Multiply:

1. $^{1}/_{3}$ x 3
2. $^{2}/_{3}$ of 15
3. $2^{2}/_{5}$ of 20
4. $^{1}/_{10}$ x $^{2}/_{9}$
5. $^{2}/_{5}$ x 10
6. $1^{5}/_{7}$ of 21
7. $^{1}/_{2}$ x ¼
8. $^{1}/_{8}$ x $^{1}/_{5}$

WORD PROBLEMS INVOLVING MULTIPLICATION OF FRACTIONS

Example I

What is ¼ of 1 hour?

= ¼ of 1 hour

= ¼ of 60 minutes

= ¼ x 60

= ¼ x $^{60}/_{1}$.

$= \dfrac{1 \times \cancel{60}^{15}}{{}_{1}\cancel{4} \times 1}$

= 1 x 15

= 15 minutes.

Example II

A mathematics book contains 200 pages. A pupil reads $^{3}/_{5}$ of the book. How many pages did the pupil read?

A pupil read $^{3}/_{5}$ of 200 pages.

= $^{3}/_{5}$ of 200 pages

= $^{3}/_{5}$ x $^{200}/_{1}$

$= \dfrac{3 \times \cancel{200}^{40}}{{}_{1}\cancel{5} \times 1}$ pages

$= \dfrac{3 \times 40}{1 \times 1}$ pages

= 120 pages.

EXERCISE C 13

1. What is $^{1}/_{6}$ of 24 kilograms?

2. What is $^1/_5$ of 30 litres?
3. A man received of his salary. If his salary was sh. 20,000, how much money did he receive?
4. Sempa wants to visit his uncle who lives near Kabale town. The journey to Kabale is 40 kilometres away. If his uncle's home is at $^7/_8$ of the journey, how far is it in km?
5. A man had sh. 1,000. He gave away $^2/_5$ of it to his wife. How much money did he give to his wife?
6. Find the area of the rectangle below.

12 cm

$6^1/_2$ cm

RECIPROCALS OF FRACTIONS

1. Reciprocal of a fraction is the opposite of a given fraction.
2. The numerator of the fraction becomes the denominator and the denominator becomes the numerator.

   Eg. a) The reciprocal of ¼ = $^4/_1$

   b) The reciprocal of $^2/_3$ = $^3/_2$

   c) The reciprocal of $^5/_8$ = $^8/_5$ etc.
3. If a whole number is given, make it a fraction by putting it over 1 and give its reciprocal

   Eg. a) The reciprocal of 6 = $^6/_1$ = $^1/_6$

   b) The reciprocal of 10 = $^{10}/_1$ = $^1/_{10}$.
4. If a mixed fraction is given, change it to an improper fraction and then give the reciprocal of the improper fraction.

   Eg. a) The reciprocal of 1½ = $^3/_2$ = $^2/_3$.

   b) The reciprocal of $33^1/_3$.= $^{100}/_3$ = $^3/_{100}$.

RECIPROCALS OF FRACTIONS BY CALCULATION

We should take note that a number multiplied by its reciprocal gives 1.

Example I

What is the reciprocal of $^3/_5$?

Let the reciprocal of $^3/_5$ be y

$^3/_5$ x y = 1

$^3/_5$ x $^y/_1$ = 1

$^{3y}/_5$ = 1 Make 1 a fraction.

$^{3y}/_5$ = $^1/_1$. Cross-multiply

3y x 1 = 5 x 1

3y = 5

3y = 5 divide both sides by 3

$^{3y}/_3$ = $^5/_3$

y = $^5/_3$.

y The reciprocal of $^3/_5$ is $^5/_3$.

EXERCISE C 14

A. Calculate the reciprocal of each of the following.

1. ½
2. $^5/_3$.
3. $^5/_3$.
4. 7
5. 23
6. 14
7. $3^1/_8$.
8. $4^7/_{12}$

B. Find the product of the given number and its reciprocal.

1. 5
2. $^3/_8$.
3. 3 ½
4. 10
5. $^4/_9$.

DIVISION OF FRACTIONS

Example I

Divide $^1/_5 \div 4$ Make 4 a fraction

= $^1/_5 \div {}^4/_1$. Change (ö) to (x) then reciprocal of $^4/_1$ = $^1/_4$.

= $^1/_5$ x ¼

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

= $\underline{^1/_{20}}$.

Example II

½ ÷ ¼ Change (ö) to (x) then reciprocal of $^1/_4$ = $^4/_1$.

= ½ x $^4/_1$.

$= \frac{1 \times \cancel{4}^{2}}{_{1}\cancel{2} \times 1}$

$= 1 \times 2$

$= \underline{2}$

EXERCISE C 15

1. $^1/_6 \div 4$
2. $^1/_3 \div 2$
3. $^2/_3 \div 4$
4. $^3/_7 \div 3$
5. $^4/_{20} \div ^1/_4$
6. $^5/_8$ of the bread was shared among 16 children. How much bread was given out?

EXPRESSING FRACTIONS AS FRACTIONS DECIMAL.

NOTE:

a) $^1/_1$. = 1 (The denominator has no zero, so gives no decimal place)

b) $^1/_{10}$. = 0.1 (The denominator has 1 zero, so gives 1 decimal place)

c) $^1/_{100}$. = 0.01 (The denominator has 2 zeros, so gives 2 decimal places)

Example I

a) Write 25 as a decimal number.

$= ^{25}/_1$. = $\underline{25.}$ (No zero, no decimal place)

b) Write $^{25}/_{10}$.as a decimal fraction.

$= ^{25}/_{10}$. = $\underline{2.5}$ (1 zero, 1 decimal place)

c) Write $^{25}/_{100}$. as a decimal fraction.

$= ^{25}/_{100}$. = $\underline{0.25}$ (2 zeros, 2 decimal places)

NB: The zero before the decimal point is used to keep the place of whole numbers.

Example II

Express $3^1/_{10}$. as a decimal number.

First change to improper fraction.

$3^1/_{10}. = \frac{(10 \times 3) + 1}{10}$

$= ^{31}/_{10}$.

$= \underline{3.1}$ (1 zero, 1 decimal place)

Example III

Express $7^5/_{100}$. as a decimal fraction

First change to improper fraction.

$7^5/_{100}. = \frac{100 \times 7 + 5}{100}$

$= ^{705}/_{100}$.

$= \underline{7.05}$ (2 zeros,2 de. places.)

EXERCISE C 16

Express these fractions as decimals

1. $^{15}/_{1}$.
2. $^{125}/_{100}$.
3. $^{65}/_{10}$.
4. $^{625}/_{1}$.
5. $^{625}/_{100}$.
6. $^{25}/_{10}$.
7. $9^{5}/_{10}$.
8. $5^{25}/_{100}$.
9. $13^{7}/_{10}$.
10. $4^{9}/_{100}$.
11. $15^{8}/_{100}$.
12. $2^{3}/_{10}$.

CONVERTING DECIMALS TO FRACTIONS

NOTE.:

a) 1 decimal place gives 1 zero on the denominator. Eg 0.5 = $^{5}/_{10}$.
b) 2 decimal places give 1 zeros on the denominator. Eg 0.05 = $^{5}/_{100}$.

Example I

Express 6.9 as a common fraction.

6.9 = $^{69}/_{10}$. (1 decimal place gives 1 zero on the denominator.)

= $^{69}/_{10}$. Change to mixed fraction.

= $\underline{6^{9}/_{10}}$.

Example II

Express 3.05 as a common fraction.

3.05 = $^{305}/_{100}$. (2 decimal places give 1 zeros on the denominator.)

= $^{305}/_{100}$. (Change to mixed fraction)

= $3^{5}/_{100}$. (Reduce $^{5}/_{100}$ to give $^{1}/_{20}$.)

= $\underline{3^{1}/_{20}}$.

EXERCISE C 17

Express as common fractions and reduce where necessary.

1. 0.1
2. 2.5
3. 0.25
4. 6.75
5. 64.41
6. 11.2

ORDERING DECIMALS

Example I

Arrange from the smallest: 0.1, 1.1, 0.11
Change to common fractions. = $^{1}/_{10}$, $^{11}/_{10}$, $^{11}/_{100}$.
The biggest denominator is the LCM. = 100

Multiply each fraction by the LCM $= \frac{1}{1\cancel{0}} \times 10\cancel{0} = 10$ (1st)

$= \frac{11}{1\cancel{0}} \times 10\cancel{0} = 110$ (2nd)

$= \frac{11}{1\cancel{00}} \times 1\cancel{00} = 11$ (3rd)

From smallest = 0.1, 0.11, 1.1.

Example II

Arrange from the smallest: 0.22, 0.2, 1.2

Change to common fractions. = $^{22}/_{100}$, $^{2}/_{10}$, $^{12}/_{10}$.

The biggest denominator is the LCM. = 100

Multiply each fraction by the LCM $= \frac{22}{1\cancel{00}} \times 1\cancel{00} = 22$ (2nd)

$= \frac{2}{1\cancel{0}} \times 10\cancel{0} = 20$ (3rd)

$= \frac{12}{1\cancel{0}} \times 10\cancel{0} = 120$ (1st)

From biggest = 1.2, 0.22, 0.2.

Example III

Which is less than the other? 0.2 or 0.1 (Use < or > correctly)

0.2 0.1

Change to common fractions. = $^{2}/_{10}$, $^{1}/_{10}$

The biggest denominator is the LCM. = 10

Multiply each fraction by the LCM $= \frac{2}{1\cancel{0}} \times 1\cancel{0} = 2$

$= \frac{1}{1\cancel{0}} \times 1\cancel{0} = 1$

y 0.2 > 0.1

EXERCISE C 18

A. Arrange the decimals as instructed in the brackets.

1. 0.1, 0.3, 0.33 (from smallest)
2. 2.2, 0.22, 0.02 (from biggest)
3. 1.05, 0.15, 1.5. (from smallest.)
4. 0.08, 0.8, 0.34. (from biggest)

B. Compare by replacing the star with < or > (show your working)

5. 0.2 * 0.3
6. 5.4 * 5.3

7. 0.5 * 0.9

8. 0.8 * 0.9

ADDITION OF DECIMAL FRACTIONS

Example I

Add: 14.9 + 8.02 + 36.48

Arrange vertically and put
the decimal point in line

14 . 90
8 . 02
+ 36 . 48
59 . 40

Example II

Add: 0 . 45 + 13 . 2 + 52 . 00

Arrange vertically and put
the decimal point in line

0 . 45
13 . 2
+ 52 . 00
65 . 65

EXERCISE C 19

Add the following:

1. 4.96 + 1.7 + 0.36
2. 0.56 + 5.8 + 58.00
3. 0.22 + 2.22 + 22.22
4. 2.7 + 8.92 + 0.37
5. 2.76 + 3.85 + 1.09
6. 65.5 + 4.5 + 20.8

SUBTRACTION OF DECIMALS

Example I

97 .4 – 13 . 69

Arrange vertically and put
the decimal points in line

97 . 40
+13 . 69
83 . 71

Example II

63 – 19 . 78

Arrange vertically and put
the decimal points in line

63 . 00
+19 . 78
43 . 22

EXERCISE C 20

Subtract the following:

1. 73 – 19.5
2. 12 – 9.5
3. 57.9 – 3.51
4. 8.54 – 2.34
5. 166 – 66.9
6. 14.9 – 3.51

ADDITION AND SUBTRACTION OF FRACTIONS

Example I

Work out 13.75 – 27 + 91 .25

Collect positive terms first.

= 13.75 + 91.25 – 27 (First add)

= 13 . 75

+ 91 . 25

105. 00 (Then subtract)

\- 27. 00

78. 00

EXERCISE C 21

Work out:

1. 35.1 – 44.3 + 17.6
2. 8.24 + 22.9 – 7.8
3. 14 – 5.26 + 7.02
4. 6.25 – 4.7 + 3.42
5. 65.6 – 45.9 + 0.36
6. 7.98 – 9.08 + 4.07

THE END

TERM III

GRAPHS

PICTOGRAPHS

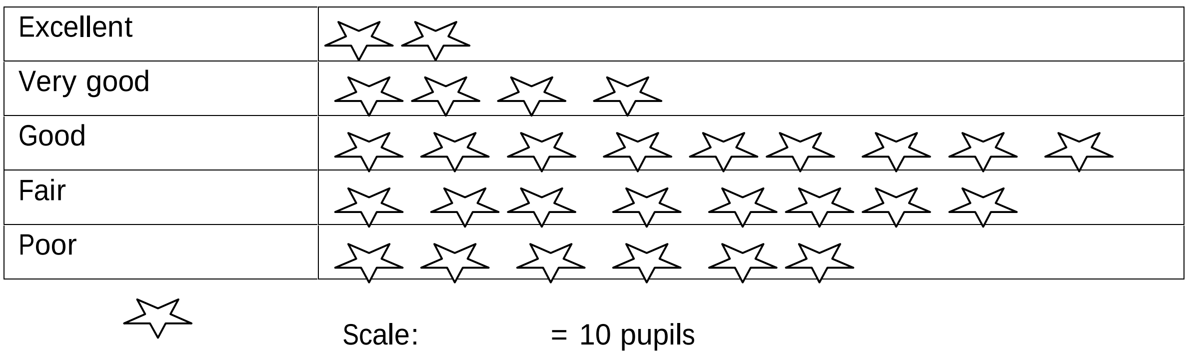
i) This is information represented in pictorial form

ii) It always has a title and a scale.

Example

Study the pictograph below and answer the questions that follow:

NUMBER OF PUPILS WHO GOT DIFFERENT GRADES.



Questions

i) How many pupils are in the excellent grade?
ii) Which grade had the biggest number of pupils. Find their number.
iii) How many more pupils were in the poor grade than in the very good grade?

Solution:

i) 1 Star = 10 pupils
1½ Star = 3/2 x 10
= $^3/_2$ x 10
= 15 pupils
15 pupils were in the excellent grade.

ii) The 'good' grade had the biggest number of pupils;

1 star = 10 pupils

9 stars = 9 x 10 pupils

= 90 pupils

iii)

Poor grade	Very good grade	Difference
1 star = 10 pupils	1 star = 10 pupils	= 55 – 40 pupils in
5 ½ stars = 5 ½ x 10	4 stars = 4 x 10 pupils	= 15 more pupils than in
= $^{11}/_2$ x 10	= 40 pupils.	Very good.
= 55 pupils		

EXERCISE A1

A) Teacher will discuss Exercise 10.1 with learners.
B) Learners will do Exercise 10.2. New Mk 2000 Page 214 – 17

Numbers 1 and 2.

READING AND INTERPRETING TABLES

Example

A farmer recorded the number of pineapples he harvested each month as shown in the table below:

Month	JAN	FEB	MAR	APR	MAY	JUN
No. of pineapples	420	360	330	380	400	480

From the above Table we note that:

i) The highest number of pineapples was harvested in June.

ii) The lowest number of pineapples was harvested in March and they were 330.

iii) The difference between the highest and lowest harvest was:
480 – 330 = 150 Pineapples

iv) The sum of all the pineapples harvested was :
420 + 360 + 330 + 380 + 400 + 480 = 2370 Pineapples.

EXERCISE A2

Study the table below and answer the questions that follow.

THE TABLE SHOWING THE AMOUNT OF FUEL A CAR USES IN A WEEK.

DAY	MON.	TUE.	WED.	THU.	FRI.
AMOUNT OF FUEL	10 litres	20 litres	25 litres	15 litres	5litres

a) On which day does the car use a lot of fuel?
b) What is the least amount of fuel used?
c) Calculate the amount of fuel used that week.
d) For how many days did the car use fuel more than 15 litres?
e) What is the difference in fuel used by the car on Monday and Wednesday?
f) Find the average amount of fuel used in litres for the whole week.
g) Which two days did the car use fuel less than 15 litres?
h) If each litre of fuel is sh. 2,300, how much money is required on Thursday and Friday?

DRAWING AND INTERPRETING TABLES

EXAMPLE

A farmer collected20 eggs on Monday, 25 eggs on Tuesday, 15 eggs on Wednesday, 30 eggs on Thursday and 25 eggs on Friday. Draw a table to show the above information.

DAY	MON.	TUE.	WED.	THU.	FRI.

	20	25	15	30	25

a) On which day was the highest number of eggs collected?
   The day was Thursday.
b) Which day had the lowest number of eggs collected?
   The day was Thursday.
c) What is the sum of eggs for the 5 days?
   20 + 25 + 15 + 30 + 25 = <u>115 eggs</u>.

EXERCISE A3

Read the information and draw a suitable table for it.

1. British Airways recorded Passengers who traveled to Europe in the first half of the year as follows:

   January 120, February 90, March 150, April 160, May 100 and June 200.

   a) Draw a suitable table to show this information.
   b) What is the sum of all the passengers from January to June?

2. A teacher on duty recorded pupils who came late that week.

   Monday 25, Tuesday 15, Wednesday 10, Thursday 8 and 10 on Friday.

   a) Put this information on a table.
   b) What was the sum of all the late comers that week?
   c) On which two days did the teacher record the same number of late comers?

<u>BAR GRAPH</u>

Features of a bar Graph

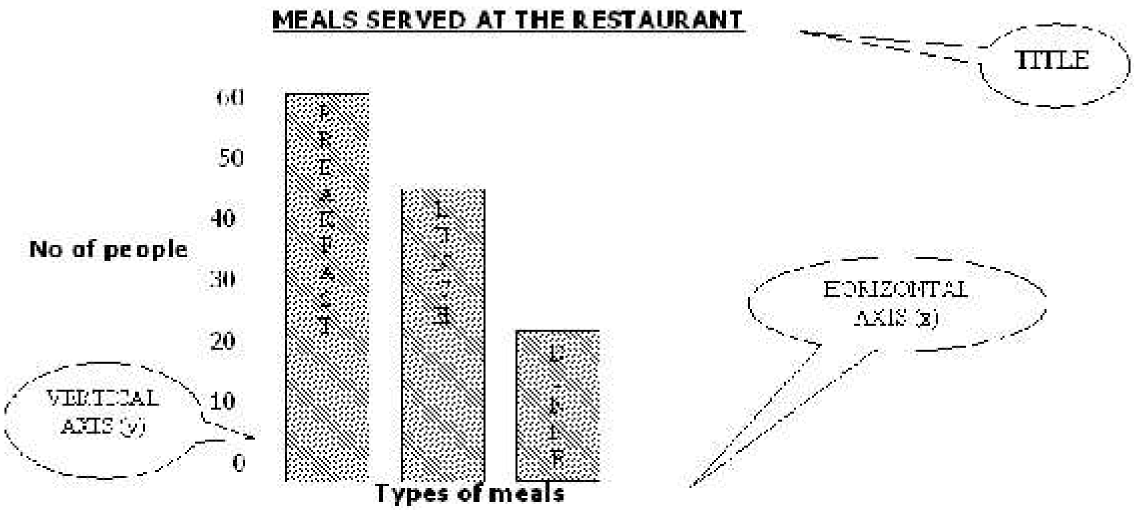
i) Title – Tells us what the graph is about.

ii) Vertical axis (y) – A line to the left running either upwards or downwards.

iii) Vertical scale - Recording what one small division (square) stands for.

iv) Horizontal axis (x) - A line below running from left to right.

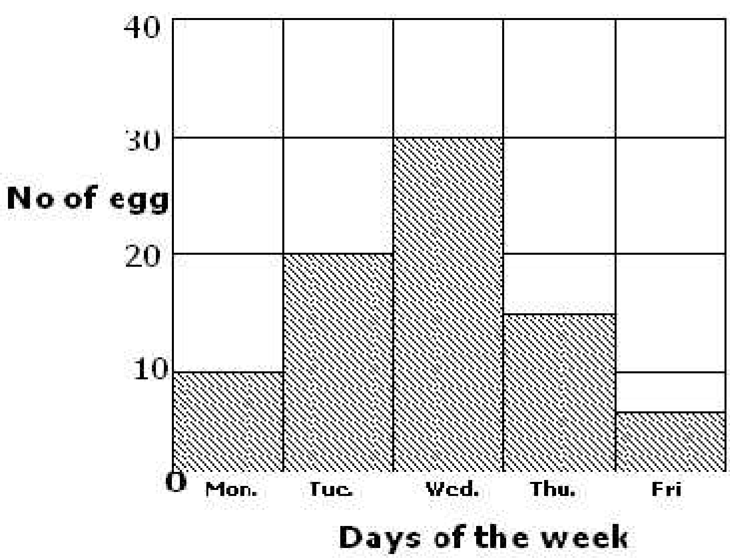
v) Horizontal scale - Recording what one small division (square) stands for.



INTERPRETING BAR GRAPHS

EXAMPLE

THE NUMBER OF EGGS COLLECTED FROM MONDAY TO FRIDAY



Questions

a) On which day were more eggs collected?

b) What is the difference between eggs collected on Wednesday and on Friday?

c) What is the Title of the graph below?

d) Which axis represents:

i) Number of eggs? ii) Days of the week?

e) Describe the scales used on the:

i) Vertical axis ii) Horizontal axis.

EXERCISE A4

Exercise 10:5 New Mk 2000 page 222.

DRAWING A BAR GRAPH FROM TABLES

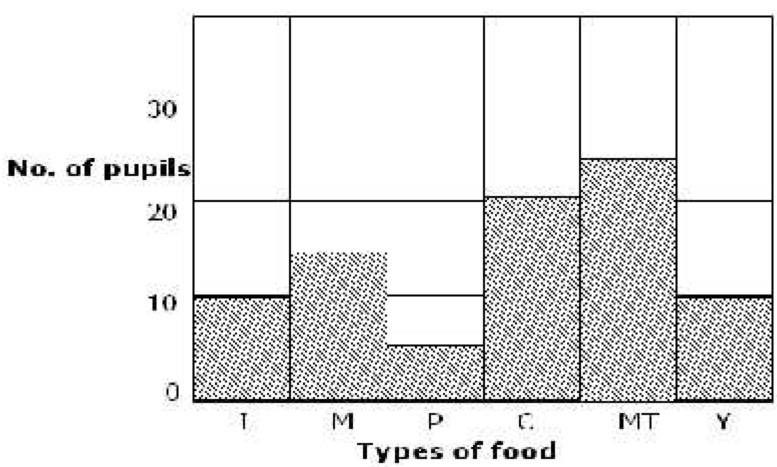
Example

The table below shows types of food liked by pupils in a P.5 Class.

No. of pupils	10	15	5	20	25	10
Food	Irish (i)	Millet (m)	Potatoes(p)	Cassava(c)	Matooke(m)	Yams (y)

GRAPH

TYPES OF FOOD LIKED BY P. 5 PUPILS



Questions

a) Which type of food do most pupils prefer?
b) Which food is least liked by pupils?
c) On which axis is “Type of food “ plotted?
d) Describe the scale used on the vertical axis.
e) Which types of food are equally preferred?

EXERCISE A5

The table below shows the Average rainfall at Rocky Hill Academy.

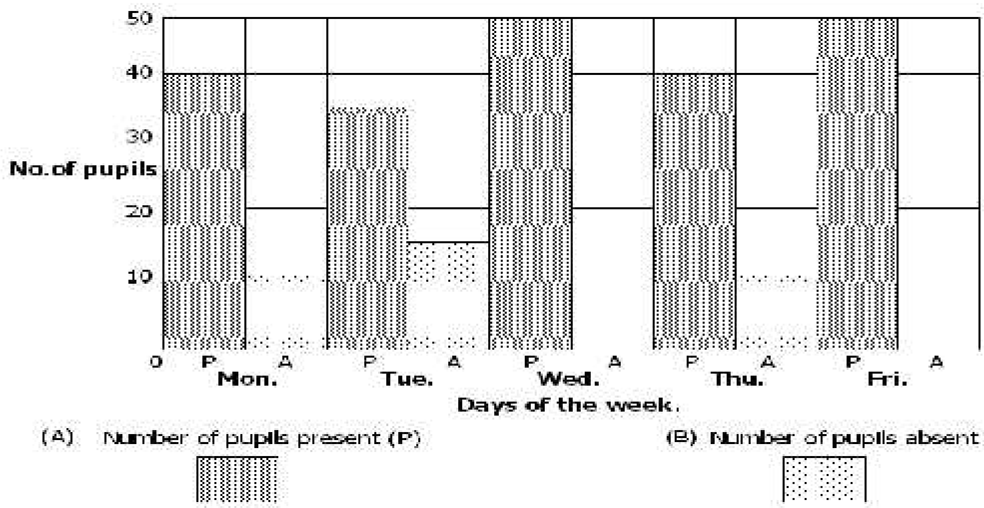
Month:	J	F	M	A	M	J	J	A	S	O	N	D
Rainfall (mm):	90	85	40	15	45	40	60	70	60	70	75	60

RECORDING INFORMATION FROM A BAR GRAPH TO A TABLE.

Example

Study the graph and answer the questions that follow

ONE WEEK'S ATTENDANCE IN A CLASS.

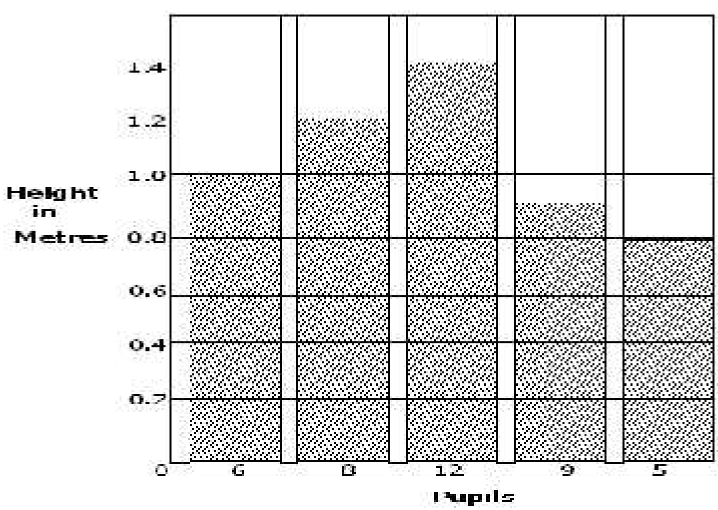


a) Complete the table below?

	Mon.	Tue	Wed	Thu	Fri
Absent	10	15	00	10	00
Present	40	35	50	40	50

EXERCISE A6

1. The graph below shows the heights in metres of pupils in a class.



a) How many pupils are below 0.1 metres in height?

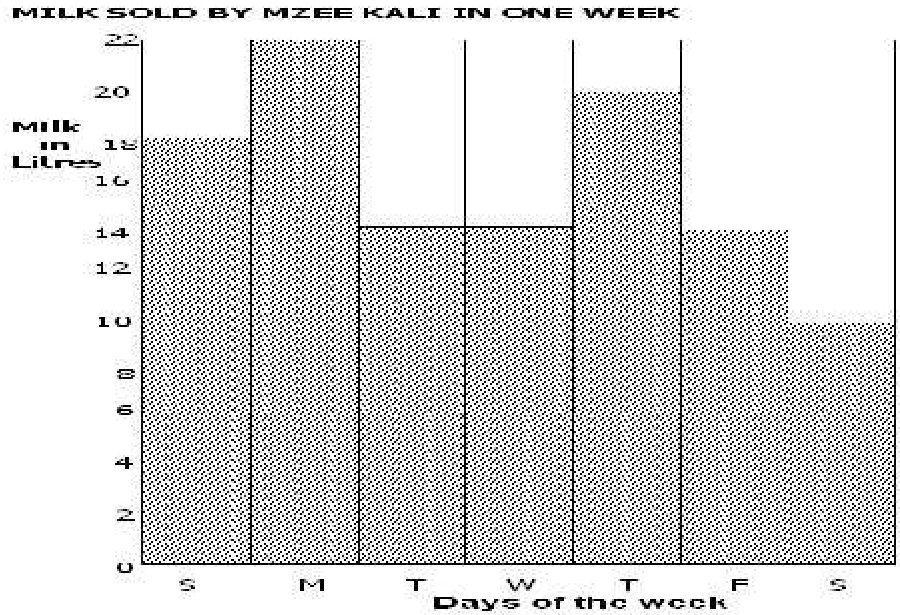
b) How many pupils are above 1.2m in height?

c) How many pupils are in this class?

d) Record the information from the graph into the table below.

Height	0.8	0.9	________	1.2	________
No. of pupils.	________	________	6	________	12

2. The graph below shows the amount of milk sold by Mzee Kali in one week.



a) Draw a table to represent the above information.

b) ON which day did Mzee Kali sell most milk?

c) How much milk did he sell the whole week?

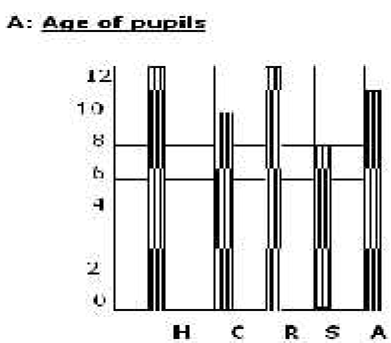
d) If he sold each litre at sh 600, how much did he earn the whole week?

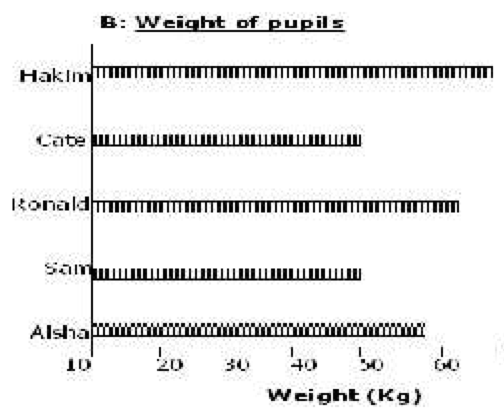
BARLINE GRAPH

Instead of bars, we can use lines to form bar line graphs.

Example

The graphs below show the age and weight of 5 pupils.





A:

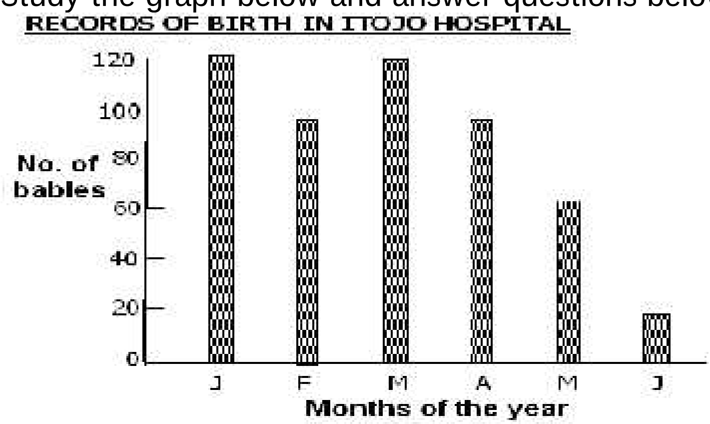
i) Name the pupils with the same age.
ii) How old is the youngest pupil?
iii) How old is Aisha?
iv) Who is 10 years old?
v) Calculate their average age?

B:

i) How heavy is Ronald?
ii) Name the pupils with same weight?
iii) How much heavier is Hakim than Ronald?
iv) How heavy is Aisha?
v) What is the average weight of the 5 pupils?
vi) Who is 55Kg heavy?

EXERCISE A7

Study the graph below and answer questions below.



a) In which month was the biggest number of babies born?
b) Which two months had the same number of babies produced?
c) How many babies were born in February?
d) Which two months had a total number of births of 200 babies?
e) How many months had less than 100 births?
f) Find the range of babies born.
g) What was the minimum number of births?
h) Find the total births of children in the six months.

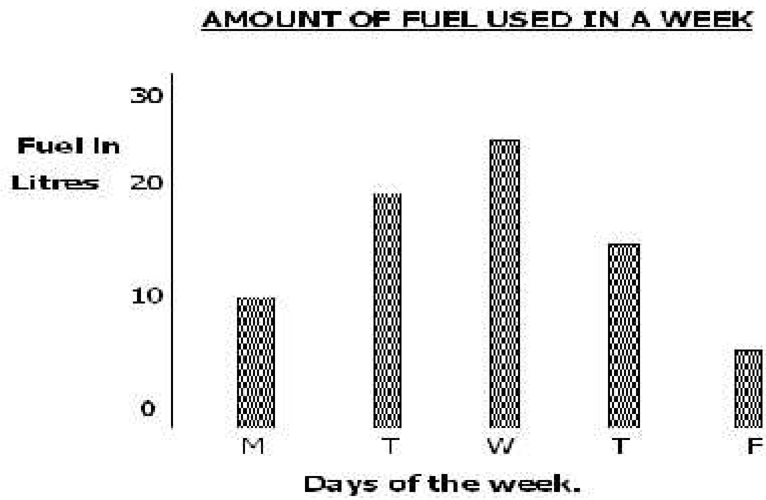
DRAWING BAR LINE GRAPHS USING INFORMATION FROM TABLES

Example:

A driver recorded the amount of fuel he used throughout the week. Mon. 10 litres, Tue. 20 litres, Wed. 25 litres, Thur. 15 litres and Fri. 5 litres.

a) Draw a bar line graph to represent the information.

Days:	Mon.	Tue.	Wed.	Thu.	Fri.
Fuel (litres):	10	20	25	15	5



b) Which day did he use least amount of fuel?

c) If he bought each litre at sh. 1600, how much money would he pay on Wednesday?

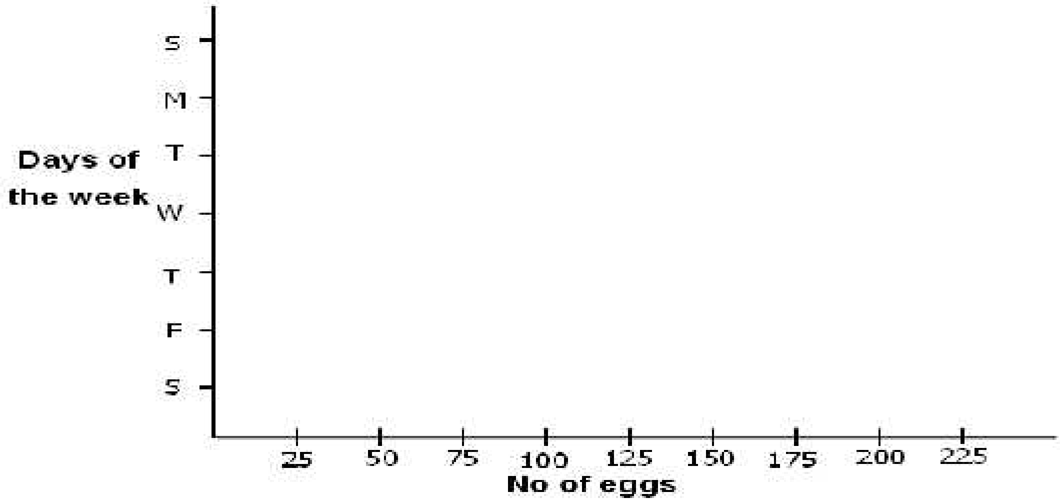
d) If one litre of fuel covers 2km, how much fuel does he need to cover 30km?

EXERCISE A8

The table below represents the number of eggs laid at Dr Kalyowa's farm in a week.

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	200	200	150	175	175	200	225

a) Represent the information on the graph below.



a) What is the total number of eggs laid in that week?

b) What is the difference between the maximum and the minimum number of eggs laid that week?

MEASURES

TEMPERATURE

(Discussion on Mk: old pg. 233)

i) Temperature is a degree of hotness or coldness

ii) We measure temperature using a thermometer.

iii) Temperature is measured in degrees Celsius (^oC) or Fahrenheit (^oF)

SOLVING PROBLEMS RELATED TO TEMPERATURE

Example:

The temperature of food at a time of serving was 95^0 C. After leaving it on the plate for 10 minutes, its temperature was 48^0 C. What was the fall in temperature?

Temp. at serving = 95^0 C
After 10 minutes = 48^0C
Fall in Temp. = Serving Temp. – After 10 Minutes.
= 95^0C – 48^0C
= $\underline{47^0C}$

EXERCISE B1

1. What is the difference in temperature below?

a) 10^0C and 5^0C

b) 100^0F and 50^0F

2. The room temperature was 10^0F at night and day time 37^0F. What was the difference between the night daytime temperature?
3. The boiling point of water is 212^0F. Musa got water from the tap at 40^0F and started heating it. Through how many degrees will the temperature rise in order for the water to boil?
4. The temperature of a sick person was 39.5^0C. What was the increase in the patient's body temperature above normal? (NB: Normal body temperature is 36.6^0C)
5. Kakama got milk from a cow at a temperature of 37C and kept it in a freezer at a temperature of –8C. What was the fall in the temperature of the milk?

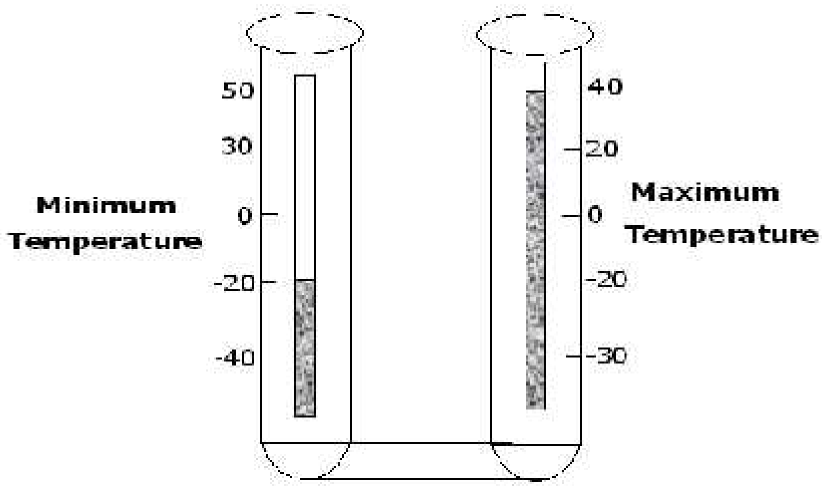
READING MAXIMUM AND MINIMUM TEMPERATURE

i) The highest temperature reading in a day is called Maximum temperature for the day.

ii) The lowest temperature reading in the same day is called Minimum temperature for that day.

Example

Study the maximum and minimum temperature below



a) Maximum temperature = 40C

b) Minimum temperature = -20C

Difference = $40^0C - {}^-20^0C$
$= 40^0C + 20^0C$
$= \underline{60^0C}$

EXERCISE B2

1. Read and record the maximum and minimum temperatures on the thermometers below.

(NEW MK BK. 5 PG. 235) Diagrams W, X and Y.

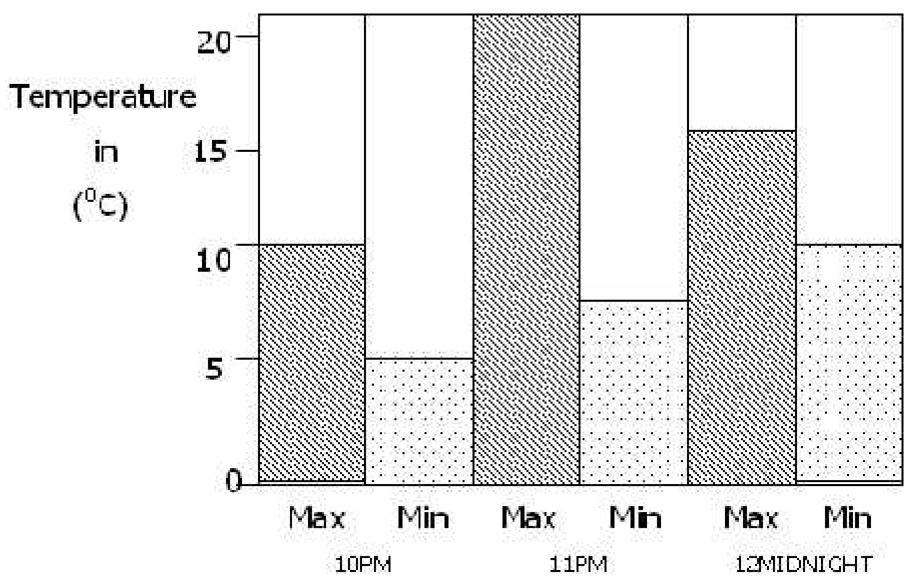
DRAWING AND INTERPRETING A BAR GRAPH TO REPRESENT MAXIMUM AND MINIMUM TEMPERATURE

Example:

Draw a bar graph to represent the maximum and minimum temperature below.

Time	10pm	11pm	12 Midnight
Minimum (^{0}C)	5	10	10
Maximum (^{0}C)	10	20	15

GRAPH SHOWING MINIMUM AND MAXIMUM TEMPERATURE.



EXERCISE B3

Draw a bar graph showing the maximum and minimum temperature s on the following days.

	Wed	Thu.	Fri	Sat
Max. (^{0}C):	30	10	25	20
Min. (^{0}C):	10	5	15	10

Questions.

a) What was the highest temperature recorded?

b) What was the lowest temperature on Thursday?

c) What was the coolest day of the week?

MONEY

BUYING AND SELLING

PROFIT

Profit (P) = Selling price (SP) – Cost Price(CP)/Buying Price(BP)

$$\boxed{P = SP - CP}$$

Example I

John bought a bucket for sh. 2,000 and sold it at sh. 2,400. Find his profit.

Cost price = 2,000
Selling price = 2,400
Profit = SP – CP
= 2,400 – 2,000
= 400
Profit = sh. 400

Example II

A man bought a goat for sh. 25,000. He then sold it for sh. 35,000. What profit did he make?

Profit = Selling Price – Cost Price
= 35,000 – 25,000
= 10,000
Profit = sh. 10,000

EXERCISE B4

1. A man bought a tray of eggs at sh 2,800 and then sold the eggs for sh. 3,600. What was his profit?
2. A woman bought bananas for sh. 850. She then sold them for sh. 2,250. What profit did she make?
3. Morine bought a bunch of bananas for sh. 3,000. She then sold it at sh.7, 500. What profit did she make?
4. A trader buys sugar from a whole sale shop at sh. 1,000 per kg. Calculate his profit if he bought 5kg.
5. After making a suit, Adeke found out that it cost her sh. 135,000. If he sold it at sh. 1,500, how much profit did she make?

LOSS

Loss = Cost price – Selling Price

= CP – SP

Example I

The cost price of a radio is sh.100, 000. If it is sold at sh. 80,000, Find the loss made.

Loss = CP – SP
= 100,000 – 80,000
= 20,000
<u>Loss = sh. 20,000</u>

Example II

Kagendo bought a dozen of pens at 2400 and later sold each pen at sh. 150. What loss did he make?

1 dozen = 12 objects.
SP = 150 x 12
= 1,800
Loss = CP – SP
= 2,400 – 1800
= 600
<u>He made a Loss of sh. 600</u>

<u>EXERCISE B5</u>

1. Rita bought oranges for sh. 3,400. She then sold them for sh. 2,850. What was her loss?
2. Anita sold her dress to Joan for sh. 35,000. She had bought it at sh. 29,000. What was her loss?
3. Andama bought a bicycle at sh. 90,000 from the factory and sold it at sh. 87,000. What loss did Andama make?
4. Batto bought a bull for slaughtering at sh. 225,000. When he sold the meat, he earned sh. 218,000. Calculate hiss loss.
5. Aketch bought 4 ducks at sh. 6,000 each. He sold them at sh. 5,800 each. Find her loss.
6. Sophia bought 80 mangoes at sh. 150 each. She sold all of them for sh. 10,000. What loss did she make?
7. Wanjala bought 10 chicken at sh. 2,500 each. She sold 6 of them at sh. 2,500 each and 4 0f them at sh. 2,600 each. Calculate her loss.

FINDING BUYING PRICE / COST PRICE

i) When a profit is realised, we can calculate the buying price by subtracting the profit from the selling price.

Buying Price = Selling Price – Profit

ii) When a loss is realised, we can calculate Buying Price by adding loss to profit.

Buying Price = Selling Price + Loss

Example I

Kitanda sold a goat at sh. 225,000 and made a profit of sh. 35,000. What was his buying price?

BP (CP) = SP – P

= 225,000 – 35,000

= 190,000

Cost Price = sh. 190,000

Example II

Matinda sold a goat for sh. 25,000 and made a loss of sh. 3,000. What was the buying price for the goat?

BP = SP + Profit

= 25,000 + 3,000

= 28,000

Buying price = sh. 28,000

EXERCISE B6

1. Kasim sold a plate for sh. 1,400 and made a profit of sh. 300. At how much did he buy it?
2. Tina sold a blanket for sh. 2,600. She made a Profit of sh. 550. What was the buying price for the blanket?
3. A factory sells uniforms at sh. 16,000 each and makes a profit of sh. 4,500 on each uniform. What is the cost price of each uniform?
4. Mulogo sold a jacket for sh. 7,500. He made a profit of sh. 1,200. What was the buying price?
5. Masaba sold a motorcycle at sh. 720,000 and made a profit of sh. 56,500. How much did he buy it?

EXERCISE B7

1. A Jerrycan of cooking oil is sold at sh. 21,000 making a loss of sh. 6,000. What was the Buying price of the Jerrycan of cooking oil?
2. Kabode sold 3 tins of onions at sh.15,500 and made a loss of 7,550. Find the cost price of the onions.
3. A piece of land is sold at sh. 850,000 making a loss of sh. 115,500. What was the buying price of the piece of land?
4. James sold 2 calculator for sh. 16,000 each calculator making a loss of sh. 4,000 on each calculator. What was the buying price of the calculator?
5. Lina sold a dress for sh. 1,500. She made a loss of sh. 250. What was the buying price of the dress?

FINDING SELLING PRICE

i) When Profit is realised, we calculate selling price by adding profit to buying price.

Selling price = Buying price + Profit.

ii) When loss is realised, we calculate Selling Price by subtracting loss from buying price.

Selling Price = Buying – Loss

Example I

A trader bought a shirt at sh. 7,500. She sold it and made a profit of sh. 3,500. What was her selling price?

Selling Price = Buying Price + Profit

= 7,500 + 3,500

= 11,000

She sold it at sh. 11,000

Example II

Ojambo bought a bicycle for sh. 56,000. He later sold it making a loss of sh. 15,000. What was the selling price?

Selling price = Buying Price – Loss

= 56,000 – 15,000

= 41,000

Ojambo sold it at sh. 41,000

EXERCISE B8

1. Inzi bought earrings for sh. 6,500. She later sold the making a profit of sh. 2,900. What was the selling price?
2. Malibu bought 5 goats at sh. 200,000, he sold each of them making at a profit of sh. 8,000. How much will he earn after selling the goats?
3. Katooke bought a television set at sh. 415,000. He sold it making a profit of sh. 35,800. What was the selling price of the television?
4. Masaba bought a bicycle for sh. 92,000. After selling it he made a profit of sh. 18,000. What was the selling price?
5. Sekeba bought a turkey at sh. 12,500. He later sold it making a profit of sh. 1,750. Calculate the selling price of the turkey.

EXERCISE B9

1. A bunch of matooke was bought at sh. 4,000, it was sold at a loss of sh 1,000. What was the selling price?
2. A sheep was bought at sh. 70,000. It was sold at a loss of sh. 9,000. What was the selling price?
3. 2 cupboards were bought at sh. 94,000 and were later sold at a loss of sh 7,000. Calculate the selling price.

4. Jamwa bought a radio for sh. 96,500. He later sold it making a loss of sh. 1,300. What was selling price of the radio?
5. Nakuya bought 8 tomatoes for sh. 1,50. After selling them, she made a loss of sh 15. What was the selling price?

SIMPLE RATES I

Example

A book costs sh. 500. What is the cost of 3 similar books?

1 book = 500
3 books = 3 x 500
= 1,500
3 books cost sh. 1,500

EXERCISE B10

1. The cost of 1 table is sh. 10,500. Find the cost of 3 similar tables.
2. One kilogram of sugar costs sh. 2500. Find the cost of 5 kilograms.
3. A pair of shoes costs sh. 50,000. How much shall I pay for 3 pairs of shoes?
4. 1 school bag costs sh. 6,500. What will Mary's mother pay if she wants 5 school bags for her children?
5. Find the cost of 12 colored pencils if each pencil costs sh. 250.

SIMPLE RATES II

Example

6 pens cost sh. 900. What is the cost of one pen?

6 pens = 900
1 pen = 900 ÷ 6
= 150
1 pen = sh 150

EXERCISE B11

1. 2 books cost sh 2,400. What will one pay 1 book?
2. Timothy bought 4 sweets at sh. 1000. What is the cost of 1 sweet?
3. A tin of 40 oranges cost sh. 2,000. Find the cost of 1 orange
4. Hadijja bought 2 skirts at sh. 16,000. What is the cost of one skirt?
5. A dozen of cups costs sh. 6,000. Find the cost of 1 dress.

SIMPLE RATES III

Example I

5 books cost sh. 1,000. Find the cost of 12 similar books.

5 books = 1,000

Example II

10 Mangoes cost sh. 5,000. What is the cost of 7 Mangoes?

10 Mangoes = 5,000

1 book = 1,000 ÷ 5	1 Mango = 5,000 ÷ 10
= 200	= 500
12 books = 12 x 200	7 mangoes = 7 x 500
= 2,400	= 3,500
12 books cost sh 2,400	7 Mangoes cost sh. 3,500

EXERCISE B12

1. 5 pencils cost sh. 450. What is the cost of 10 pencils?
2. 5 mathematical sets cost sh. 7,500. What is the cost of 4 such sets?
3. 4 boxes of chalk cost sh. 10,000. What is the cost of 11 similar boxes of chalk?
4. Sempa went to buy 7kg of sugar. How much will he pay if 6kg cost sh. 7,200?
5. A dozen of pencils cost sh. 2,400. What is the cost of 3 pencils?
6. Two envelopes cost sh. 250. Find the cost of 12 similar envelopes.
7. 8 dresses cost sh. 64,000. Find the cost of 10 similar dresses.
8. 7 bars of soap cost sh. 5,600. Find the cost of 12 such similar bars.
9. 8 show tickets cost sh. 8,000. Find the cost of 23 such tickets.
10. A green grocer sells 8 mangoes for sh 1,600. How much shall I pay if I need 13 such mangoes?

SHOPPING BILLS (NO TABLES)

Example I

Brenda bought the following items from a shop:

2 loaves of bread for sh. 600 @

4 sodas for sh 500 @

2 kg of sugar at sh 1,000 @

A bail of maize flour for sh 9,000

3 litres of milk for sh 600 @ litre.

a) Calculate her total expenditure.

b) What was her balance if she had a 20,000 shilling note?

Bread	Soda	Sugar	Flour
1 loaf = 600	1 bottle = 500	1kg = 1,000	1 bail = 9,600
2 loaves = 2 x 600	4 bottles = 4 x 500	2kg = 2 x 1,000	= 9,600
= 1,200	= 2,000	= 2,000	

Milk	Total	b) Balance
1 litre = 600	1,200	20,000

3litres = 3 x 600	2,000	- 16,600
= 1,800	2,000	3,400
	9,600	
	1,800	
	16,600	

Example II

A mother bought the following items:
4 kg of rice at sh 800 @ kg
500g of salt at sh 800@ kg
1bunch of matooke for sh. 6,000

a) If she had sh. 10,000, how much balance did she get?

NB: Change grams to Kg

$\boxed{1 \text{ kg} = 1000\text{g}}$ $\boxed{½ \text{ kg} = 500\text{g}}$ $\boxed{¼ \text{ kg} = 25}$

Rice	Salt	Matooke
1kg = 800	1kg = 800	1banch = 6,000
4kg = 4 x 800	500g (½ kg) = ½ x 800	
= 3,200	= 400	= 6,000
	500g =sh. 400	

Total	Balance
3,200	10,000
400	9,600
6,000	400
9,600	Balance = sh. 400

EXERCISE B13

Prepare bills for the following (show all your working)

1. 3pairs of shoes at sh. 1,500 @
   2 blouses at sh 7,000 @
   4pens at sh 1,100 @

   2 ties at sh. 5,000 @

   a) Find the total expenditure

   b) Calculate the balance if Alupo bought the above items and had a 50,000shiling note.

2. A head teacher went to the stationary shop and bought the following.

10 boxes of chalk at sh 2,500 @ box

½ dozen of counter books at sh. 14,000 @ dozen.

12 exercise books at sh. 120 @ book.

6 pencils at sh 100 @

3 ½ cartons of toilet paper at sh. 5,000 @ carton.

a) Calculate his total expenditure

b) If he had sh 60,000, how much did he remain with?

SHOPPING BILLS (TABLES)

Example

Brenda bought the following items from a shop.

2 loaves of bread at sh. 600 @

4 sodas for sh. 500@

2kg of sugar for sh. 1,000@

A bag of maize flour for sh 9,000

a) Prepare a bill table to show her expenditure.

Item		Amount
Bread	2 x 600 = 1,200	1,200
Soda	4 x 500 = 2,000	2,000
Sugar	2 x 1,000 =2,000	2,000
Maize	1 x 9,000 = 9,000	9,000
Total		14,200

b) If she went with 15,000, how much did she remain with as her balance?

Balance

15,000

-14,000
800 Her balance is sh. 800

EXERCISE B14

1. A father asked his son to go to the market to buy the following items. He gave him sh. 30,000.

   2 chicken at sh. 3,500 @

   3¼ kg of rice at 1,200@ kg

   5kg of Irish at sh. 400 @ kg

   2 bunches of bananas at 3,500 each banch

   500g of salt at sh 700@ kg.

   a) Draw a bill table to represent the above information. Find out how much the son spent altogether.

   b) What balance does he expect from his son?

2. A pupil who was going back to school prepared the bill below for his requirements.

   a) Complete the table correctly.

Item	Quantity	Unit cost	Total
Books	1 ½ dozen	Sh. 4,000	Sh._____
Pens	_______ Dozen	Sh. 2,400	Sh. 600
Tooth Paste	3 Tubes	Sh. ______	Sh. 2,700
Omo	½ Kg	Sh. 3,600	Sh. _____
Nido Milk	_______	Sh. 14,000	Sh. 3,500
Total			Sh. _____

b) Calculate the amount of money the pupil is likely to spend.

TRANSPORT CHARGES (WORD)

Example I

A taxi driver charges sh. 2,000 for a trip from Kampala to Jinja per person. How much will 7 people pay.

1 person = 2,000

7people = 7 x 2,000

= 14,000

7people will pay sh. 14,000

Example II

Kagoda traveled from Kampala to Jinja and then back to Kampala. How much will he pay altogether?

Going – 2,000

Back - 2,000

Total – 4,000

He will pay sh. 4,000

Example III

A man, his wife and2 children traveled to Jinja from Kampala. If the man and his wife were charged sh 3,000 each, and each child sh. 1,500, how much will they pay altogether?

1 person = 3000	1 child = 1500	Total amount
2people = 2 x 3,000	2 children = 2 x 1,500	6,000
= 6,000	= 3000	+ 3,000
		9,000

EXERCISE B15

1. A taxi charges sh. 500 for a journey from Kampala Taxi Park to Mpererwe.
   a) How much will two people pay from Kampala to Mpererwe?
   b) A man boards a taxi with his wife and 3 grown up children. How much will the whole family pay for the journey?

2. It costs sh. 2,000 to move from Kampala to Jinja and sh. 5,000 From Jinja to Mbale.
   a) How much will one pay for a journey from Kampala to Mbale?
   b) If 5 people are traveling from Kampala to Mbale, how much will they pay altogether?

TRANSPORT CHARGES (TABULATED)

The table below shows transports charges by train between different towns in Uganda. Use it to answer questions below it.

Town	Charges
Kampala – Kasese	Sh.3,500
Kasese – Tororo	Sh. 5,500
Kampala – Lugazi	Sh. 1,500
Mukura – Kampala	Sh. 3,000

a) How much will 3 people pay to travel from Mukura to Kampala by train?

b) Awor traveled from Kampala to Tororo. How much will 5 people pay?

c) How much will I pay if I traveled from Lugazi to Kasese via Kampala?

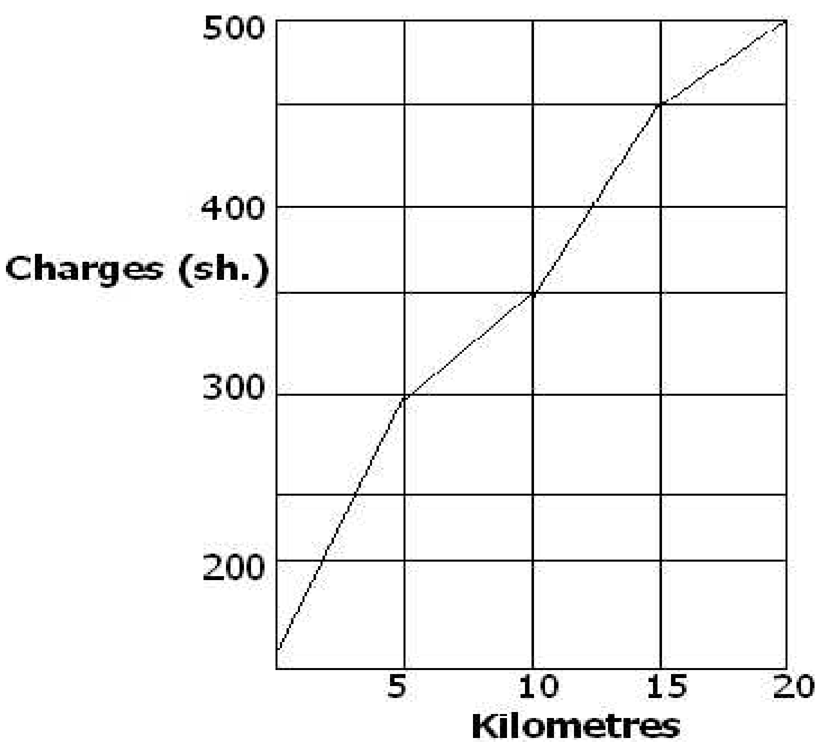
d) How much will 4 people pay if they make a to and fro. Journey to Tororo from Kasese?

e) If each Wagon carries 60 people, how much will Uganda Railways get from 3 full wagons transporting people from Kampala to Lugazi?

TRANSPORT CHARGES (GRAPHS)

Example

The graph below shows bus charges along Kampala – Mukono Rd. Use it to answer questions below it.



a) How much will one pay for a distance of 15km

One will pay sh. 450

b) What distance will require me to pay sh. 400?

Between 10 to 15 km

c) What is the difference in the cost of a journey of 15 km and 5km?

450 – 300 = 150

The difference is sh 150

d) If the cost of travelling 5 km is sh.200. What will I pay if I'm to travel for 100km?

5km = 200/=

1km = 200 ÷ 5

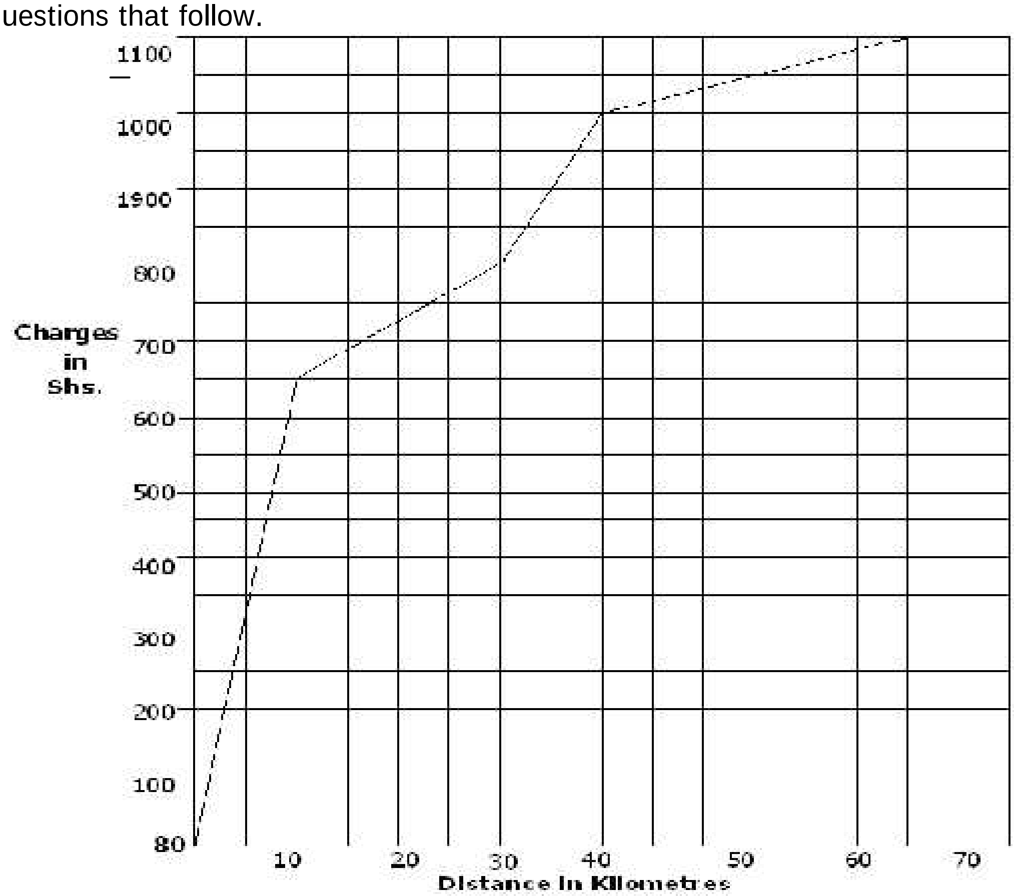
= 40/=

100km = 40 x 100

= 4000/=

EXERCISE B16

The graph below shows bus transport charges along Bombo Road. Study it carefully and answer questions that follow.



a) How much does one pay for a distance of 40km?

b) What is the difference in the cost for a journey of 10km and50km?

c) How much will 4 people pay for a journey of 25 km?

d) Apiriga traveled for a distance of 50km and her husband a distance of 30km. How much did they pay altogether?

e) If Kampala to Gulu is 120km, how much will Obote pay with his son if each kilometre is sh. 120?

TIME

UNITS OF TIME

1 Hour = 60 minutes
1 Minute = 60 seconds

1 Hour = 3,600 seconds

CONVERTING FROM ONE UNIT OF TIME TO ANOTHER

Example I

Convert 2 hours to minutes
1 hour = 60 minutes

2 hours = 2 x 60 minutes

= 120 minutes

Example II

Change 240 minutes to hours

60 minutes = 1 hour

1 minute = $^1/_{60}$

204 minutes = $^1/_{60}$ x 240

= 4 Hours

240 minutes = 4 hours.

Example III

Change 40 minutes to hours

60 minutes = 1hour

1 minute = $^1/_{60}$

40 minutes = $^1/_{60}$ x 40

= $^2/_3$ hours

40 minutes = $^2/_3$ Hours.

EXERCISE B17

1. Convert the following in minutes

a) 2 ¼ Hours
b) 3 Hours
c) 3.5 Hours
d) 11 Hours
e) 7 Hours
f) 15 Hours
g) 3 ½ Hour

2. How many seconds are in:

a) 30 Minutes
b) 4 Minutes
c) 5 ¼ Minutes
d) 12 Minutes
e) 1 ½ Minutes

3. Write in hours:

a) 30 Minutes
b) 120 Minutes
c) 45 Minutes
d) 540 Minutes

e) 90 Minutes f) 1080 Minutes

TELLING TIME USING "AM" OR "PM"

A:

- We use "am" after midnight and in the morning.
- "am" means Anti-meridian – meaning time before midday or noon;

B:

- We use "pm" in the afternoon and evening
- "pm" means Postmeridian – referring to time after noon.

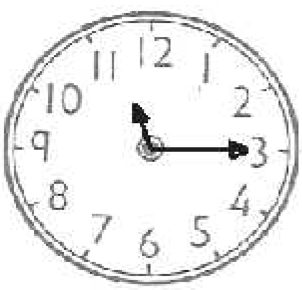
Example

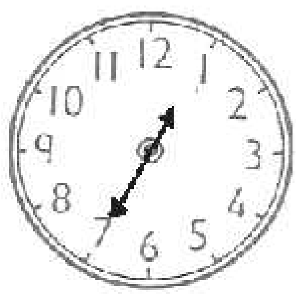
Morning time

It is 2.00 O'clock in the morning. or 2.00 am

Twenty five minutes past eight in the morning or 8:25am.

a) Afternoon time





Quarter past eleven in the afternoon Or 11:15pm

Twenty-five to one in the afternoon or 1:35 pm.

EXERCISE B18

Learners will do Exercise 11;14 page 251 New Mk Bk5

ADDITION OF TIME

Example I

Work out:

Example II

Work out:

Hours	Minutes	Hours	Minutes
10	15	10	50
+ 2	30	+2	30
12	45	13	20

(80 ÷ 60) = 1 rem 20

= 12 hours and 45 Minutes

13 Hours and 20 Minutes

Example III

An English paper exam took 2 hours 10 minutes and the Math took 2 hours 15 Minutes. How much time did the two examinations take?

Example IV

Oluka sat for interviews at 10.20 am. If the interview lasted 2 hours 30 minutes, what time did it stop?

Hours	Minutes	Hours	Minutes
2	15	10	20
+ 2	10	2	30
4	25	12	50

4Hours 25 Minutes

It stopped at 12:50 pm.

EXERCISE B19

1. Add the following:

a)

Hours	Minutes
3	12
4	25

b)

Hours	Minutes
3	20
5	35

b)

Hours	Minutes
3	20
5	35
+ 8	42

d)

Hours	Minutes
5	16
11	38
+ 9	20

The time now is 9.00am. What will the time be;

a) After 2 hours 40 minutes?

b) After 5 hours 10 minutes?

c) After 8 hours?

2. A watchman slept at 11.00pm. He woke up 4hours later.
   What time did he wake up?
3. Msafari Bus started from Kampala at 8.00am. It arrived Hoima 3 hours20minutes later. At what time did it arrive?

SUBTRACTION OF TIME

Example I

Hours	Minutes	Side work
~~10~~ 9	30	(60 + 30) = 90
- 2	45	90 - 45
7	45	= 45

Example II

Grandma Kali went to her garden and was away from home for 4 hours 25 minutes. If she stayed in the garden for 2 ours 40minutes, How much time did she spend walking?

Hours	Minutes	Side work
4	25	(60 + 25) = 85
2	40	85 – 40
1	45	= 45

She spent 1 hour 45 minutes walking.

EXERCISE B20

1.

Hours	Minutes
10	10
6	30

2.

Hours	Minutes
13	36
9	45

3.

Hours	Minutes
20	15
16	30

4.

Minutes	Seconds
42	30
25	47

4. It took Jane a total of 2 hours 20 minutes to walk to the shops and do her shopping. If She spent 45 minutes shopping, how much time did she spend walking?
5. English and math examinations took a total of 3 hours 20 minutes. If English exam took 1hour 30 minutes, how long did the math exam take?

DURATION INVOLVING ‘AM’ AND ‘AM’ PM, “PM” AND “PM”

Example

Luyiya started walking from her home at 7.05 am and reached town at 9.15 am. How long did it take her?

Hours	Minutes
9	15
-7	05
2hrs	10min.

She took 2 hours and 10 minutes.

EXERCISE B21

1. We started our morning lessons at 8.05 am and ended at 11.25am. How long did it take?
2. A train started travelling from Jinja at 6.30am. and reached Kampala at 11.00 am. How long did it take?
3. Nsubuga started his journey at 2.20pm and reached his destination at 4.05pm. How long did the journey take?
4. A man started digging at 7.30am and stopped at 10.10 am. For how long did he dig?
5. It started raining at 2.20am and stopped at 8.10am. How long did the rain take?
6. A football match started at 3.30pm and ended at 5.30pm. How long was the match?

DURATION INVOLVING "AM" AND "PM"

Example:

A bus started its journey to Mbale at 9.00am and reached its destination at 1.30 pm. How long did the journey take?

Subtract: 12:00
- 9:00
3hours

Next add: 3hrs : 00minutes
+1hour : 30hinutes
4hours: 30 minutes

EXERCISE B22

1. A church service began at 11.45am. and ended at1.00pm. How long was the service?
2. A show at the theatre began at 11.15am and ended at 8.00pm. How long, how long was the show?
3. A speech day started at 8.15am. and ended at 5.00pm. How long was the speech day?
4. How long is it from 1.25am to 1.00pm?
5. How much time is between 3.20am and 3.20pm

TIME TABLES.

i) IMPORTANT WORDS:

a) Departure:- Leaving a place
b) Arrival: - Reaching a destination.

Example

The timetable below is a distance timetable for a bus traveling from Masindi to Kitgum. Use it to answer questions that follow.

Town	Dist. From Masindi	Arrival	Departure
Masindi		?	9.00am
Kigumba	39km	9.40am	10.00am
Kamudini	115km	11.10am	11.25am
Lira	191km	12.30pm	1.00pm
Kitgum	125km	3.15pm	4.55pm

a) At what time did the bus reach Kamudini?
b) What was the departure time of the bus from Lira?
c) What is the distance between Kigumba and Lira?
d) How long does the Bus take to travel from Kamudini to Kigumba?
e) What time of the day did the bus leave Lira?
f) How long did the bus stop at Kigumba?
g) How long did the bus take to travel between Kigumba and Kamudini?

EXERCISE B23(UNDERSTANDING MATH PG. 184)

1. Use the following bus timetable to answer the questions that follow

Station	Arua	Pakwach	Gulu	Lira	Soroti	Mbale	Tororo	Kisumu
Arrival		7.15pm	9.00pm	10.15pm	11.30pm	1.15am	2.30am	8.00am
Departure	6.15pm	7.30pm	9.15pm	10.30pm	midnight	1.30am	3.00am	

a) At what time did the bus leave Arua?
b) Was this time morning or evening?
c) At what time did the bus leave Pakwach?
d) How long did the bus stop at Pakwach?
e) At what time did the bus arrive at Gulu?
f) How long did the bus take to travel between Gulu and Lira?
g) At what time did the bus arrive at Tororo?
h) Did it arrive at Tororo during nighttime or daytime?
i) At what station was the bus at midnight?
j) Was this a night bus or a day bus?

2. Study the table below and answer the questions that follow.

TOWN	TIME OF DEPARTURC	TIME TAKEN	TOWN	TIME OF ARRIVAL
Kampala	7.00am	1hr 38min	Masaka	8.38am
Moroto	6.00am	6hrs 50min	Kampala	12.50pm
Rukungiri	6.30am	5hrs 15min.	Kampala	11.45am
Kampala	6.30am	4hrs 50 min.	Bushenyi	11.20am
Lira	7.30am	4hrs 40min.	Kampala	12.10pm
Nairobi	7.00am	10hrs 15 min.	Kampala	5.15pm

a) At what time did the bus to Masaka leave Kampala?

b) Did the bus leave in the morning, evening or in the nighttime?

c) At what time did the bus arrive at Masaka?

d) How long was the journey between Moroto and Kampala?

e) For which journeys did th bus arrive in the evenings?

f) For which journey did the bus arrive in the afternoons?

g) At what time did the bus leave Lira?

h) At what time did the bus from Rukungiri arrive at Kampala?

i) At what time did the bus from Nairobi arrive at Kampala?

j) Which bus had the longest journey?

12 HOUR CLOCK SYSTEM (UNDERSTANDING MATH. PG. 180)

UNITS

i) Morning am. (Anti- meridiem)

ii) Afternoon pm. (Post-Meridiem)

iii) The use of “to” and “past”

iv) A new day begins at midnight.

v) A day has 24 hours.

Example

What is the time shown by the clock faces A and B

Ten minutes to four or fifty Minutes past three or 3.50

Twenty-five minutes past two or 2.25.

We use “am” referring to time in the morning and “pm” from afternoon to before midnight.

EXERCISE B24

Write the following filling in the gaps with the required information.

1. Use the am/pm guide below to fill in the gaps.

Night

Day

12 : 00	Midnight
1 : 00	a.m.
2 : 00	a.m.
3 : 00	a.m.
4 : 00	a.m.
5 : 00	a.m.
6 : 00	a.m.
7 : 00	a.m.
8 : 00	a.m.
9 : 00	a.m.
10 : 00	a.m.
11 : 00	a.m.

Night

12 : 00	a.m.
1 : 00	p.m.
2 : 00	p.m.
3 : 00	p.m.
4 : 00	p.m.
5: 00	p.m.
6: 00	p.m.
7: 00	p.m.
8: 00	p.m.
9: 00	p.m.
10: 00	p.m.
11: 00	p.m.

1. a.m/p.m. and long form.
   a) 1.45pm is a quarter to two in the afternoon.
   b) 3.30am. is a half past three in the morning.
   c) 7.15 am is quarter past seven in the morning.
   d) ______ is half past eight in the morning
   e) ______ is half past one in the afternoon.
   f) ______ is five O'clock in the morning.
   g) ______ is midday.
   h) ______ is a quarter past four in the morning.
   i) ______ is twenty minutes to seven in the evening.
   j) ______ is quarter past four in the afternoon.
   k) ______ is half past eight in the evening.
   l) ______ is eleven O'clock in the morning.
   m) 4.30am is ________________________________
   n) 4.30pm is ________________________________

2. Fill in the gaps by giving time in words.
   a) 7.05am – Kakonge walked to school at __________
   b) 5.30pm – Namale closed her shop at ____________
   c) 8.15am – Nakafeero started her lesson at _________
   d) 7.30pm – Kajjubi ate supper at _________________
   e) 5.00am – Lukwago milked the cow at ____________

f) 8.45pm – Katureebe went to sleep at ____________

24 HOUR CLOCK SYSTEM

Units used are hours and written in four digits.

12 Hour Clock	24 Hour Clock
12.00am (Midnight)	0000hrs
1.00am	0100hrs
2.00 am	0200hrs
3.00am	0300hrs
4.00am	0400hrs
5.00am	0500hrs
6.00am	0600hrs
7.00am	0700hrs
8.00am	0800hrs
9.00am	0900hrs
10.00am	10000hrs
11.00am	1100hrs
12.00Noon	1200hrs
1.00pm	(1.00 + 12.00) = 1300hrs

CONVERTING 12 HOUR CLOCK TO 24HOUR CLOCK

1. In a 12-hour clock system, when time is in the p.m. Scale, you add that hour to 1200hours to get a 24-hour time.
2. When the time is in the am units, ensure that the dots are removed and the 24hour time has 4 digits.

Example I

What is 1.00pm in 24hour clock?

$$\begin{array}{r} 1.00 \\ +\ \underline{12.00} \\ \underline{13\text{hours}} \end{array}$$

So 1.00pm = 1300hours

Example II

Change 3.45am to a 24-hour time

3.45 = 0345Hours

EXERCISE B25

1. Change the following 12 hour time to 24hour time

a) 1.20pm b) 3.20pm c) 6.15pm d) 8.25pm

e) 4.40am f) 3.30am g) 1.05am h) 7.35am

i.) 9.50am j) 5.50pm

CONVERTING 24HOUR TIME TO 12 HOUR CLOCK

a) Subtract 1200hours from the given 24hour time.

Example I

Change 1545hours to 12hour clock

15.45

_ 12.00

3.45pm So 1545hours = 3.45pm.

b) Time between 1.00am to 12 noon are written in four digits to change them to 24hour clock

Example

a) What is 7.00am in 24hour clock?

7.00am is 0700hours in 24hour time.

b) What is 11.05am in 24hour clock?

11.05am is 1105hours in 24hour clock.

c) 12.00am (midnight) is 0000hours.

EXERCISE B26

2. Change the following 24hour time to 12 hour time

a) 1416hours b) 1820hours c) 1105hours

d) 1040hours e) 1930hours f) 1745hours

g) 0920hours h) 2130hours i.) 1640hours

j) 2300hours

DISTANCE, TIME AND, SPEED

DISTANCE

Distance = Speed x Time Or D = S x T

Example I

Find the distance covered by a driver for 2 hours at a speed of 60km/hr.

Distance = Speed x Time

= 60km/hr x 2hrs

= 60km x 2

= 120km

Distance covered is 120km

EXERCISE B27

1. A train moving at a speed of 5km/hr took 7hours between Tororo and Gulu. What is the distance between these two towns?

2. A lorry moving at a speed of 66km/hrtakes3hours to move from Kampala to Kinoni. Find the distance from Kampala to Kinoni.
3. Tebendwana takes 1½ hours to walk from his house to the school at a steady speed of 4km/hr. Find the distance from Tebendwana's home to his school.
4. A motorist drove a carat a speed of 90km/hr. If he spent 2hours driving at the same rate, what distance did he cover?
5. A bus traveled at a speed of 80km/hr for 4 hours. How far did it reach?

SPEED.

Speed = $\frac{\text{Distance}}{\text{Time}}$ Or $S = \frac{D}{T}$

Example

At what speed does a cyclist travel if he completes a distance of 150km in 3 hours?

Speed = $\frac{\text{Distance}}{\text{Time}}$

= $\frac{150\text{Km}}{3\text{hrs.}}$

= 50km/hr

His speed was 50km/hr.

EXERCISE B28

1. A man walked a distance of 15km in 3 hours. What was his average speed?
2. A motorist drove her car for 180km in 2 hours. What was her speed?
3. A safari Rally car covered a distance of 600km in 5hours. At what speed was the car moving?
4. The distance from Moroto Kampala is 480km. If the journey from Kampala to Moroto takes 6 hours, find the average speed at which the bus traveled.
5. Kyobe's school is 72 km away from his home. If he takes 2 hours riding his bicycle to school, at what average speed is he cycling his bicycle?

TIME

Time = $\frac{\text{Distance}}{\text{Speed}}$ Or: $T = \frac{D}{S}$

Example

Calculate the time taken by a car traveling at 60 Km/hr to cover a journey of 480km.

Time = $\frac{\text{Distance}}{\text{Speed}}$

$= \dfrac{480\cancel{km}}{60\cancel{km}/hr}$

= <u>8hours</u> <u>The car took 8 hours</u>.

EXERCISE B29

1. Kiirya rides to school at a speed of 12km/hr. How long will it take him to ride 6km to his school?
2. The distance from Soroti to Kampala is 360km. If a bus travels at 60 km/hr, how long will it take to travel from Soroti to Kampala?
3. A car travels at 120km/hr. How long does it take to cover 480km?
4. Namale runs from her home to school at a steady speed of 5km/hr. It takes her 30 minutes to get to school. How far is the school from Namale's home? (first change minutes to hours)
5. Mudoe has to cover a journey of 240km at a speed of 80km/hr. What time does he need?

<u>MEASURES IN LITRES AND MILLILITRES</u>.

<u>CLASS DISCUSSION I (New Mk Bk. 5 Pg. 259</u>)

Study the soda bottles below and answer the questions that follow.

300Ml 300cc 500ml 500cc

a) What is the capacity of each bottle in millilitres?
b) What is the capacity of the bigger soda bottle?
c) How many cubic centimetres are equal to 500ml?

CLASS DISCUSSION II

Study the two packets of milk and answer the questions below.

a) What is the capacity of each packet of milk in millilitres?
b) What is the capacity of each packet in litres?
c) What in the volume of the second packet? (Volume = L x W x H)
d) How many cubic centimetres are equal to 1000millilitres?

COMPLETE THE FOLLOWING

1 litre = ____________ cm^3 = ____________ Millilitres.

2 litres = ____________ cm^3 = ____________ Millilitres.

½ litre = ____________ cm^3 = _____________ Millilitres

EXERCISE B30

1. Express 1 litre of juice in:
   a) Cubic centimetres (Cm^3)
   b) Millilitres (Ml)

10. . Write 5 litres of water in:
   a) Cubic centimetres (Cm^3)
   b) Millilitres (Ml)

2. Express 10 litres of milk in:
   a) Cubic centimetres (Cm^3)
   a) b) Millilitres (Ml)

4.Express ½ litre of paraffin in:
   a) Cubic centimetres (Cm^3
   b) Millilitres (Ml)

3. Write 20litres of paint in:
   a) Cm^3
   b) Ml

NB:) One Litre is equal to $1000Cm^3$ or 1000Ml

4. Copy and fill in the Capacity in Ml or Cm

LITRES	MILLILITRES	CUBIC CENTIMETRES
1 Litre		
½ Litre		
¼ litre		
2 litres		
5 litres		
10 litres		
20 litres		
17 litres		

5. How many ¼ litre bottles are in 2 litres?
6. How many 200ml tins are in 4 litres?
7. How many ½ litre mugs are in a 10-litre bucket?
8. How many ¼ litre cups are in a 5-litre jerrican?

CHANGING LITRES TO MILLILITRES

Example I

Change 7 litres to Millilitres

1 litre = 1000ml

7 litres = 7 x 1000ml

= 7000ml

Example II

Change 2 ½litres to millilitres.

1litre = 1000ml

2½litres = 2½ x 1000ml

= $^5/_2$ x 1000

2½litres = 2500millilitres

Example III

Change 0.82 litres in millilitres.

1litre = 1000ml

0.82 = 0.82 x 1000

= $^{82}/_{100}$ x 1000

= 820ml

0.82litres = 820 millilitres.

EXERCISE B31

Express the following in millilitres.

1) 2 litres	2) 3 ½ litres	3) ¾ litre
4) 0.5 litres	5) 40.09 litres	6) 0.3 litres
7) 2 ¾ litres	8) ¼ litre	9) 0.25 litres.

EXPRESSING MILLILITRES AS LITRES

Example I

Change 4200ml to litres

1000ml = 1litre

1ml = $^1/_{1000}$ litres

4200ml = $^1/_{100}$ x 4200

= $^{42}/_{10}$

4200ml = 4.2litres

Example II

Express 9250ml in litres.

1000ml =1litre

1ml = $^1/_{1000}$ litres

9250ml = $^1/_{100\cancel{0}}$x 925$\cancel{0}$

= $^{925}/_{100}$

9250ml = 9.25litres.

EXERCISE B32

How many litres are in the following?

1) 6000 ml	2) 6300ml
3) 8700ml	4) 3500ml

5) 100ml 6) 250ml

7) 21500ml 8) 200ml

9) 4270ml 10) 2700ml

COMPARING METRIC UNITS

CLASS DISCUSSION

A:

Study the meanings of the metric names from the table below.

	Kilo	Hecto.	Deca.		Deci.	Centi	Milli
Meaning	1000m	100m	10m	GRAM	$^1/_{10}$ of m	$^1/_{100}$ of m	$^1/_{1000}$ of m
				LITRES			

BASIC MEASURES (UNITS) FOR:

a) Weight – Gram.

b) Length – Metre.

c) Capacity – Litre.

ORDERING OF LENGTH, WEIGHT AND CAPACITY.

Weight	Km	Hm	Dm	M	dm	Cm	Mm
Length	Kg	Hg	Dg	G	dg	Cg	Mg
Capacity	Kl	Hl	Dl	L	dl	Cl	Ml

COMPARING UNITS WITH STANDARD UNITS

LENGTH		WEIGHT		CAPACITY
1Km - 1000m		1Kg - 1000g		1Kltr - 1000ltrs
1Hm - 100m		1Hg - 100g		1Hltr - 100ltrs
1Dm - 10m		1Dg - 10g		1Dltr - 10ltrs
1m - 1m		1g - 1g		1ltr - 1ltr
1dm - 0.1m		1dg - 0.1g		1dltr - 0.1ltr
1cm - 0.01m		1Cg - 0.01g		1Cltr - 0.01ltr
1Mm - 0.001m		1Mg - 0.001g		1Mltr - 0.001ltr

EXERCISE B33

Write the equivalency of each of the following:

1. 1km = 1000m
2. 1Hm = _____ Metres
3. 1 Dm = _____ Metres
4. 1dm = _____Metres
5. 1Cm = _____Metres
6. 1Kg = _____grams
7. 1Hg = _____ grams
8. 1kg = _____ grams
9. 1dg = ______ grams
10. 1Cg = ______ grams
11. 1Kltr = ______litres
12. 1Hltr = ______ litres
13. 1Dltr = ______ litres
14. 1dltr = ______ litres
15. 1Cl = ______ litres

CHANGING KILOGRAMS TO GRAMS

Example I

Express 5kg to grams

1kg = 1000g

5kg = 5 x 1000g

= 5000g

5kg = 5000grams

Example II.

Express 6 ¼ kg in grams.

1kg = 1000g

6 ¼kg = $^{25}/_{4}$ x 1000

= 25 x 250

= 6250gms.

6 ¼kg = 6250grams

EXERCISE B34

Express the following in grams.

1. 2kg
2. 15kg
3. 11 ¼kg
4. 13kg
5. 4.5kg
6. 3 ¾ kg
7. 8 ½kg
8. 14 kg
9. ¼kg
10.

EXPRESSING GRAMS TO KILOGRAMS

Example I

Express 4000g to kilograms

1000g = 1kg

1g = $^{1}/_{1000}$

4000g = $^{1}/_{1000}$ x 4000

= 4kg

4000g = 4kg

Example II

Express 3700g as kilograms

1000g = 1kg

1g = $^{1}/_{1000}$

3700g = $^{1}/_{1000}$ x 3700

= $^{37}/_{10}$

3700g = 3.7kg

EXERCISE B35

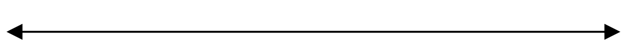
Change the following to kilograms

1. 1500g
2. 750g
3. 3,200g
4. 500g
5. 7000g
6. How many kg are in 12600g
7. Akurut's goat weighed 14780g. How many kg did it weigh?
8. .Asingwire bought 50,000g of sugar. How much sugar did she buy in kg?

GEOMETRY

LINES:

1. A line is a union of two opposite rays.
2. A line is also a set (collection) of points.



3. A line segment is a part of a line with two end points.

A• • B

TYPES OF LINES:

a) Parallel lines.
b) Intersecting lines.
c) Perpendicular lines.
d) Lines of symmetry.
e) Circle.

PARALLEL LINES:

1. Parallel lines are lines which do not meet.
2. They have the same distance apart at every point.
3. The symbol for parallel lines is
4. To show that lines are parallel, we use arrows as below.

> A

> B

5. > A

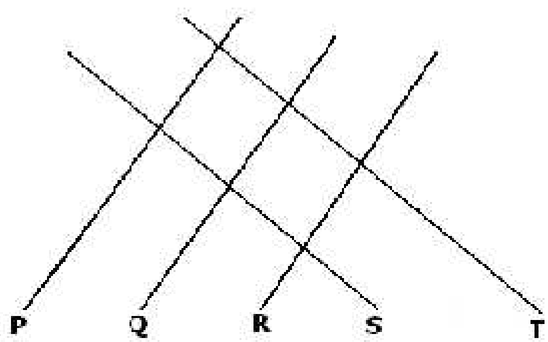
> B

> C

a) Line A is parallel to line B;
b) Line B is parallel to line C;
c) Line A is parallel to line C.

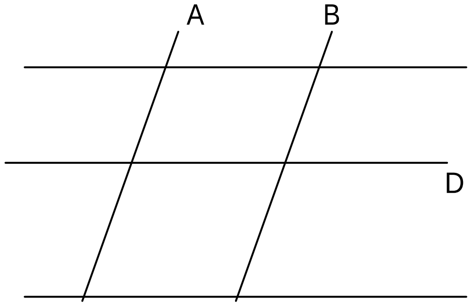
EXERCISE C1

1. Write True or False.



a) Line P is parallel to line Q.
b) Line Q is parallel to line R.
c) Line S is Parallel to line R.
d) Line S is parallel to line T.
e) Line T is parallel to line R.

2. Name pairs of parallel lines.



INTERSETING LINES

Two lines intersect if they meet and cross each other.

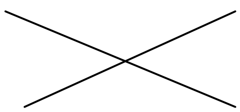
<u>ACTIVITY</u>

i) Get two sticks and a string / rubber band.

ii) Tie the sticks so that they form a cross.

1. The points at which the lines meet is called <u>Point of Intersection.</u>

<u>Example.</u>

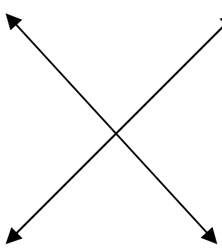


The point of intersection is O

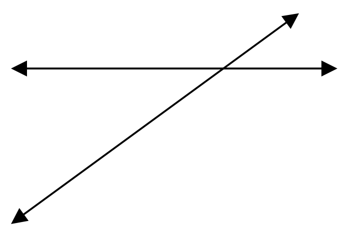
EXERCISE C2

Name the point of intersection for any two intersecting lines.

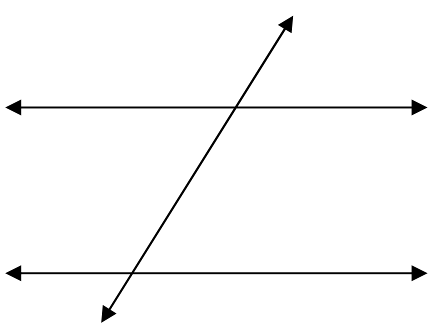
1.



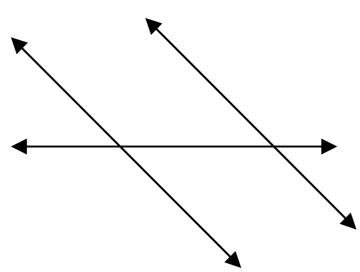
2.



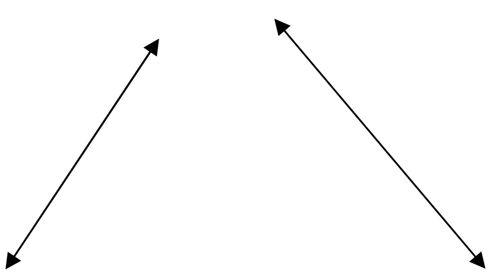
3.



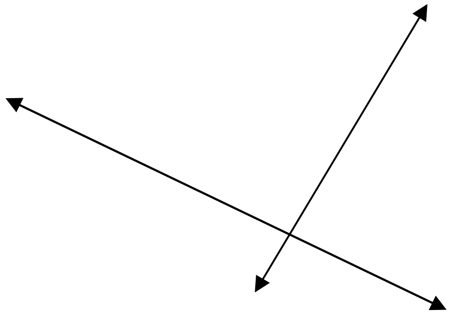
4.



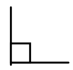
5.



6.



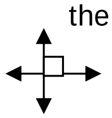
PERPENDICULAR LINES

1. Two lines which form a right angle are said to be perpendicular lines.
2. The symbol for perpendicular lines is: 

ACTIVITY

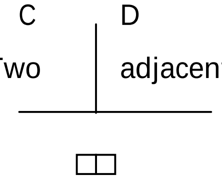
Identify areas in the class that form a right angle.

3. In the figure below, AB is perpendicular to CD



C D

4. Two adjacent right angles at a point make a straight line.

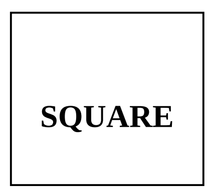


EXERCISE C3

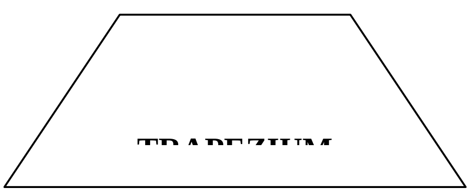
Study the tables and complete the table.

A

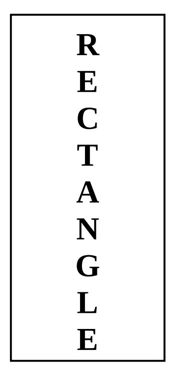
B



C



D



E

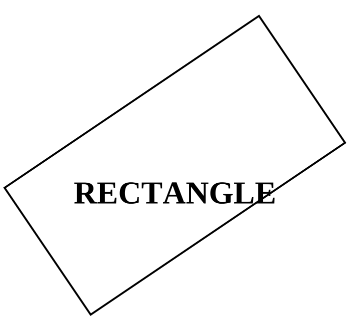
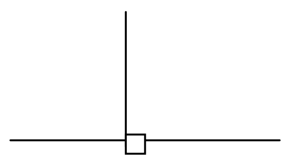


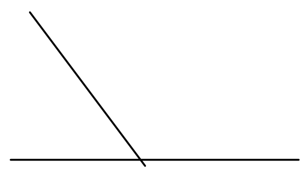
Figure	Parallel sides.	Perpendicular sides
A	i) PQ is parallel to SR. ii) PS is parallel to QR.	i) PS is perpendicular to PQ. ii) SR is perpendicular to RQ.
B	i) ii)	i) ii)
C	i) ii)	i) ii)
D	i) ii)	i) ii)
E	i) ii)	i) ii)

3. Which of the following are perpendicular?

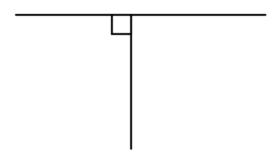
a)



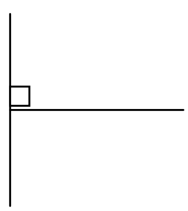
b)



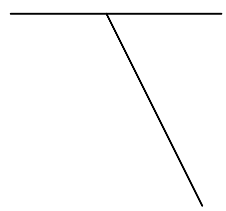
c)



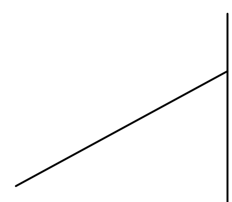
d)



e)



f)



LINES OF SYMMETRY

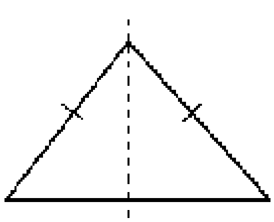
1. a) A line of symmetry is a line that divides a figure or an object into two equal parts such that when folded, the parts do not overlap but cover each other completely.

   b) A fold that divides a figure into identical parts. Sometimes it is also called axes of symmetry. Lines of symmetry are dotted.

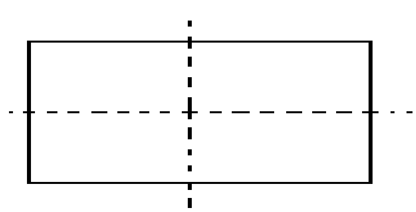
2. A figure is said to be symmetric if it has atleast one line of symmetry; otherwise, it is not symmetric.

LINES OF SYMMETRY ON DIFFERENT POLYGONS

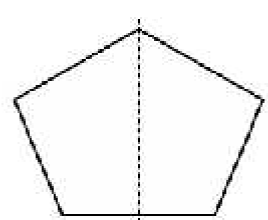
A.



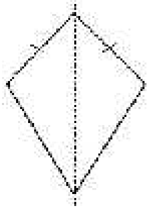
B.

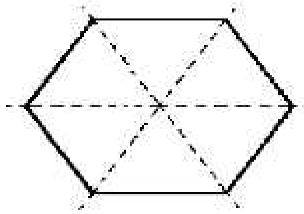


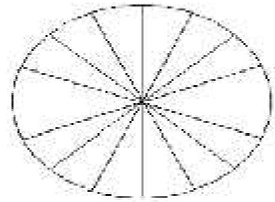
C



D. E. F.







EXERCISE C4

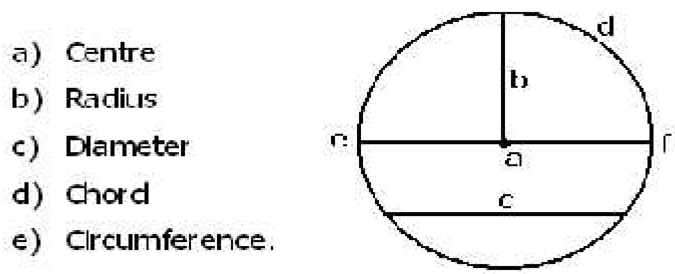
How many lines of symmetry do the following polygons have? Draw sketch diagrams.

1. An Isosceles triangle
2. An equilateral triangle
3. A rectangle
4. A square.
5. A regular pentagon.
6. A kite.
7. A Hexagon.
8. A circle.

A CIRCLE

A circle is a simple closed curve.

PARTS OF A CIRCLE



FINDING RADIUS WHEN DIAMETER IS GIVEN

1. Radius is part of a circle that runs from the centre to the circumference.
2. To calculate radius, we use the formula;

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

EXAMPLE I

Find the radius of a circle if the diameter is 8cm

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

$$= \frac{8cm}{2}$$

$$= 8 \div 2 \text{ (cm)}$$

EXAMPLE II

The diameter of a circle is 13cm. Find its radius.

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

$$= \frac{13cm}{2}$$

$$= 13 \div 2 \text{ (cm)}$$

Radiu = 4cm

= 6 rem 1

= 6 ½ cm

Radius = 6 ½

EXERCISE C5

Find the radius of a circle whose diameter is:

1. 6cm
2. 10cm
3. 14cm
4. 15cm
5. 20cm
6. 17cm

FINDING DIAMETER WHEN RADIUS IS GIVEN

1. Diameter is part of a circle that runs from the circumference through the centre to the circumference.
2. Th find diameter; we use the formula'

Diameter = radius x 2

= 2r

EXAMPLE

Find the diameter of a circle whose radius is 13cm.

Diameter = 2r

= 2 x r

= 2 x 13

Diameter = 26cm

EXERCISE C6

Find the diameter of a circle whose radius is:

1. 7cm
2. 5cm
3. 2 ½ cm
4. 12cm
5. 14 ½ dm
6. 15.5mm

CONSTRACTING CIRCLES

a) When Radius is given

Step I. Adjust your compasses from 0 to the required radius ON A RULER.

Step II. Draw a circle of the required radius and show the radius.

EXERCISE C7

Use a pair of compasses and ruler only to construct a circle of radius.

1. 3cm
2. 2.5cm
3. 5cm
4. 4.5cm
5. 5.5cm

b) When diameter is given.

Step I. First find the radius using the formula: Radius = $\frac{\text{Diameter}}{2}$

Step II. Adjust the compasses from 0 to the required radius on a ruler.

Step III. Draw a circle of the required radius and show the diameter.

(Practically done with an example on the blackboard)

EXERCISE C8

Use pair of compasses and a ruler only to construct a circle of diameter;

1. 4cm
2. 6cm
3. 7cm
4. 8cm
5. 10cm
6. 5cm

CONSTRUCTING EQUILATERAL TRIANGLES

EXAMPLE

Construct an equilateral triangle in a circle of radius 2.5cm.

Step I – Draw a ruler of any dimension using a ruler and a well sharpened pencil.

Step II – Adjust the compass from 0 to 2.5cm.

Mark an arc at one side of the line and above. In the same radius mark off an arc on the opposite side and above, such that the arcs at the top intersect each other.

EXERCISE C9

Construct an equilateral triangle of the following dimensions

1. 4cm
2. 6cm
3. 5cm
4. 4.5cm
5. 3.5cm

CONSTRUCTING AN EQUILATERAL TRIANGLE IN A CIRCLE

EXAMPLE

Construct an equilateral triangle in a circle of a radius 2.5 cm using a ruler and a pair of compasses only.

Step I – First construct a circle of radius 2.5cm.

Step II – Use the same radius to mark off points on the circumference.

Step III – Join the points as follows.

EXERCISE C10

Construct equilateral triangles in circles of given radii below:

1. 2.3cm
2. 3cm
3. 3.4cm
4. 4cm
5. 4.5cm

CONSTRUCTING REGULAR HEXAGON

Example

Construct a regular hexagon in a circle whose radius is 2.5cm

Step I – Use pair of compasses to construct a circle of radius 2.5cm.

Step II – Use the same radius to mark off six points and label them PQRSTU.

Step III – Join adjacent points until a hexagon is formed.

EXERCISE C11

Construct a regular hexagon of radii below.

1. 3cm
2. 4cm
3. 3.5cm
4. 4.5cm

ROTATION AND REVOLUTION

ANGLES

An angle is the amount of turning.

ANGLES AND TURNS

1. a) 1 revolution makes 360^0

   b) A half turn makes 180^0

   c) A quarter turn makes 90^0

   d) An eighth of a turn makes 45^0

2. We should also note that;

a) A quarter a turn = 1 right angle

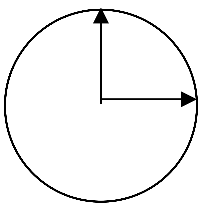
b) A half turn = 2 right angles.

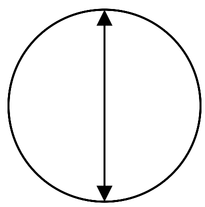
c) Three quarter turns = 3 right angles.

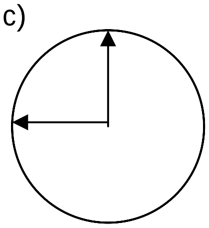
d) One revolution or one full rotation = 4 right angles.

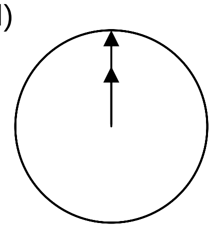
EXERCISE C12.

1. How many degrees are there in a half a turn?
2. How many revolutions are in 360^0?
3. How many quarter turns are in 270^0?
4. A man turns through an angle of 180^0. How many quarter turns does he make?
5. How many quarter turns are in a revolution?
6. Use the clock face to describe the turn.

a) 

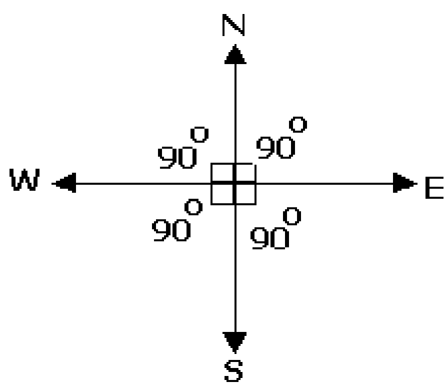
b) 

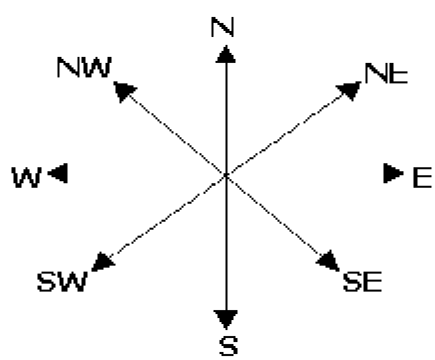
c) 

d) 

COMPASS DIRECTIONS

Smaller angles and bigger angles between directions





Example

What is the smaller angle between North and East?

The smaller angle is 90^0.

Example II

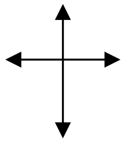
What is the smaller angle between East and South west?

The smaller angle is $45^0 + 45^0 + 45^0$

$= 135^0$.

Example III

What is the larger angle between North and East?

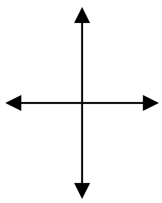


The larger angle is $90^0 + 90^0 + 90^0$

$= \underline{270^0}$.

Example IV

What is the larger angle between East and South West?



The larger angle is: $45^0 + 45^0 + 45^0 + 45^0 + 45^0$

$= 90^0 + 90^0 + 45^0$

$= 180^0 + 45^0$

$= 225^0$

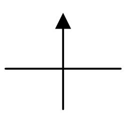
<u>The larger angle is 225^0.</u>

EXERCISE C13

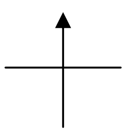
1. What is the smaller angle between North and West?
2. What is the larger Angle between South and East?
3. What is the smaller angle between Southwest and Southeast?
4. What is the larger angle between Northeast and Southeast?
5. What is the smaller angle between Northwest and Southeast?
6. What is the larger angle between Southwest and West?

<u>CLOCKWISE AND ANTICLOCKWISE TURN</u>

1. Right hand turn is clockwise.

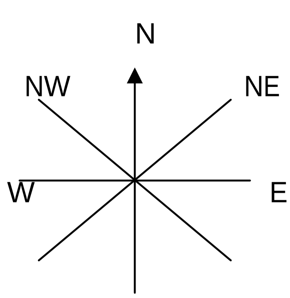


2. Left-hand turn is anti clockwise.



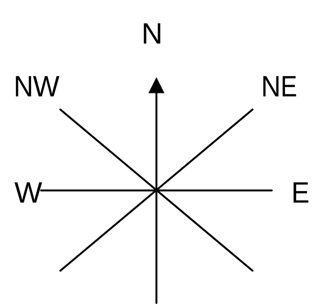
<u>Example I</u>

A boy was facing North. He turned clockwise to face Southeast.



<u>Example II</u>

A girl was facing West. She turned 90 anti clock wise. In which direction did she end?



SW SE SW SE

S S

Clockwise:

= North to East

= $45^0 + 45^0 + 45^0$

= $\underline{135^0.}$

Anti-clockwise

= West through 90

= <u>South</u>

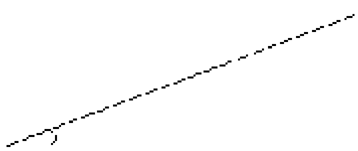
EXERCISE C4

1. Through what angle do i turn from North to North East in a clockwise direction.
2. John took a clockwise turn from West through an angle of 270^0. Where is he facing now?
3. Kapongoso was facing in the West. He turned anti-clockwise to face NorthEast. Through what angle did he turn?
4. In which direction will I be facing if I turned 225 from North anti-clockwise.
5. What is the smaller angle between east and North?

TYPES OF ANGLES

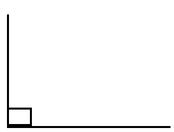
ACUTE ANGLE

Is any angle less than 90^0.



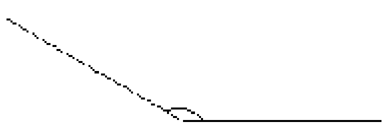
RIGHT ANGLE

Is an angle of 90^0.



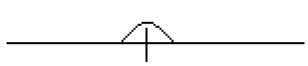
OBTUSE ANGLE

Is any angle greater than 90^0 but less than 180^0.



A STRAIGHT ANGLE

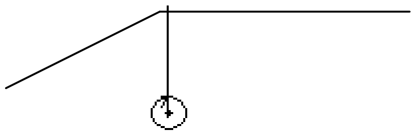
Is angle of 180^0.



REFLEX ANGLE

Is any angle greater than 180^0 but less than 360^0.

AN ANGLE AT A POINT



Is a centre angle/revolution. It is 360^0.

EXERCISE C15

Name the type of angles below;

1. 45^0	5. 150^0	9. 60^0
2. 90^0	6. 70^0	10. 200^0
3. 120^0	7. 135^0	11. 179^0
4. 180^0	8. 300^0	12. 36^0

MEASURING ANGLES USING A PROTRACTOR

1. A protractor has two scales;
   a) The outer scale
   b) The inner scale
2. The inner scale is used when measuring starts from the left-hand side.
3. The inner scale is used when measuring starts from the right hand side.
4. When measuring angles, we start from 0^0. The 0^0 on the protractor helps you to decide which scale to use.

EXERCISE C16

Learners will do exercise 8.15, 8.16 and 8.17.

DRAWING ANGLES USING A PROTRACTOR

Example

Draw an angle of 65^0.

Step I

Draw a line and on it mark a point (A)

Step II

a) Place a protractor along the line with its centre at A.
b) Let the line on the protractor marked (0^0 – 180^0) lie on top of the line drawn.
c) Read from 0^0 through 10^0, 20^0, upto 65^0 and mark a point P at 65^0.

Step III

Join point P to A using a sharp pencil.

EXERCISE C17

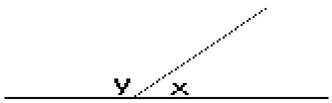
Use a protractor to draw angles whose measures are:

1. 40^0	5. 130^0	9. 90^0
2. 110^0	6. 170^0	10. 180^0
3. 75^0	7. 145^0	
4. 85^0	8. 100^0	

MEASURING ANGLES ON A STRAIGHT LINE

Example

Measure angle x and angle y. Find x + y.



a) angle y $=120^0$

b) angle x $= 60^0$.

c) $x + y = 180^0$.

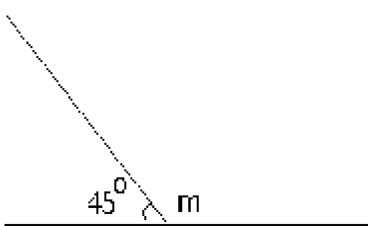
EXERCISE C18

Learners will do exercise 8.19 page 198. MK

FINDING ANGLES MARKED BY LETTERS

1. Supplementary angles add up to 180^0.
2. Complementary angles are angles that add upto 90^0.

Example I

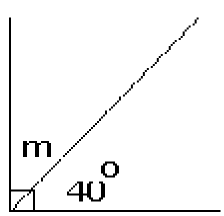


$m + 45^0 = 180^0$(Sup. Angles)

$m + 45^0 – 45^0 = 180^0 – 45^0$

$m = 135^0$.

Example II



M + 40 = 90(Comp. Angles)

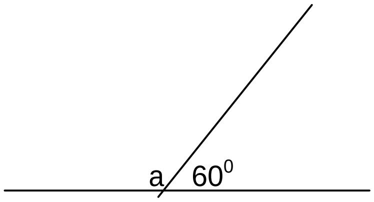
m + 40 – 40 = 90 - 40

$m = 50^0$.

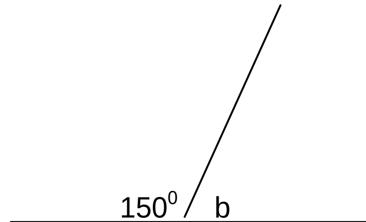
EXERCISE C19

Find the size of the unknown angles

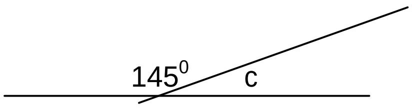
1.



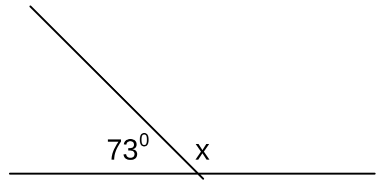
2.



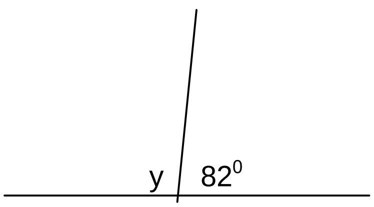
3.



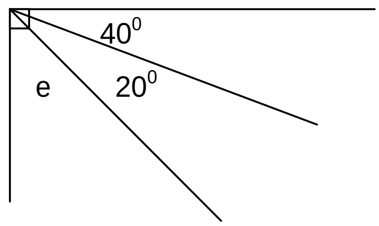
4.



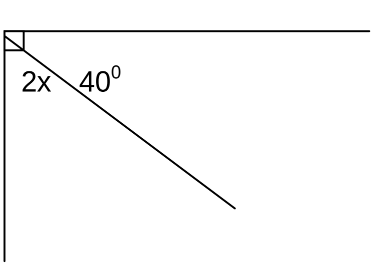
5.



6.



7.



8.