GREENHILL ACADEMY

MATHEMATICS LESSON NOTES FOR PRIMARY FIVE (TERM 1)

TERM 1 TOPICS

- **SET CONCEPTS**
- **NUMERATION SYSTEMS**
- **OPERATION ON NUMBERS**
- **NUMBER BASES**
- **FINITE SYSTEM**
- **NUMBER PATTERNS**
- **FRACTION**

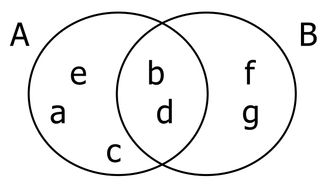
WK. 1: Lesson 1 & 2

SETS

Review of P.4 work on sets

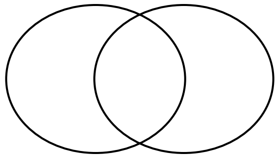
1. Draw set symbols for:
   a) Subset of
   b) b) union set
   c) Intersection set
   d) Null set
   e) Equal set
   f) Non equivalent set
   g) Equivalent set
   h) Non equivalent set.

2. Give that Set A = { 1, 2, 3, 4}
   B = { 5, 6, 7, 8}
   C = { 1, 3, 4, 2} and
   D = { a, e, I, o, u}
   a) Describe set A
   b) Using symbols show the relationship between sets
      (i) A and C
      (ii) B and C
      (iii) A and D.
3. Draw a venn diagram and shade the regions below.
   (i) $A \cap B$ (ii) $P \cup Q$ (iii) F – G   (iv) G – F
4. Study the Venn diagram below and answer the questions that follow.



   a) Find n(A – B)   b) n(B – A)
   c) Write down all members of
      i) Set A   ii) Set B   iii) Set $A \cap B$ iv) Find $n(A \cup B)$

5. Given that X = { 0, 1, 2, 3, 4} and Y = { 1, 3, 6, 9, 12}
   a) Represent the two sets on the Venn diagram.



   b) From the venn diagram, find

      (i) $X \cap Y$ (ii) $n(X \cup Y)$ (iii) $n(Y - X)$

WK. 1: Lesson 3

Complement of sets

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

OR

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

Example

Given that; P = {4, 3, 6, 7, 9}

and

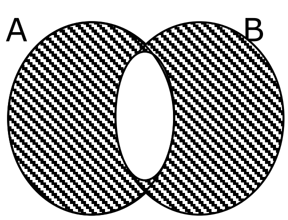
Q = {1, 2, 3, 5, 7}

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

P' = {1, 2, 3} * Find $n(P \cap Q)$

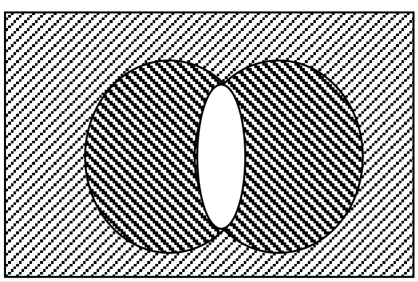
Note: The symbol for complement of a set

Shading regions for complement of a set



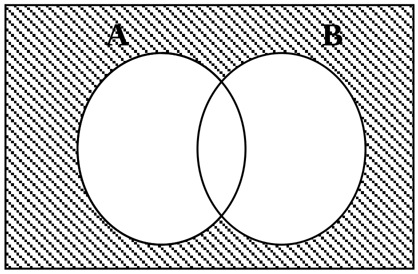
= $(A \cap B)'$

$A \cap B$ the complement



= (AnB)'

Draw and shade (A∪B)'



= (A∪B)'

ACTIVITY

Mk Book 6 page 8 - 10 primary school Maths book 15 pg 7 – 8.

Fountain Primary Mtc bk. 6 pg 8 – 10

WK. 1: Lesson 4

SUBSETS

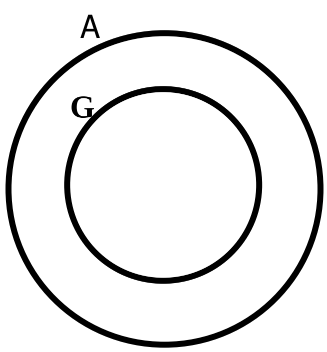
A subset is a small set got from a big set.

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

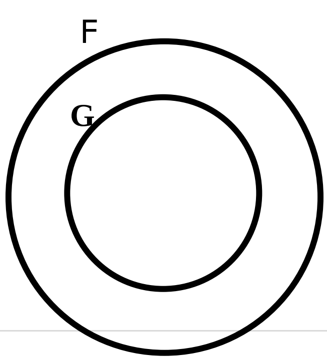
The symbol for subset is **C.**

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

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



2. Draw a venn diagram to show that girls are a subset of females



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

{a}, {b}, {c}

{ab}, {ac}, {bc}

{}, {abc} $\Longrightarrow$ Subsets $\Longrightarrow$ 8 in number.

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

4. <u>By calculating,</u> find the number of subsets in set Z if Z = {7, 5, 3}

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

$\therefore$ set Z has 3 elements

$\therefore$ n(c) = 2^n

= 2^3

= 2 x 2 x 2

= 4 x 2

<u>= 8 subsets</u>

<u>Ref : Mk. Bk 7 Pg 2</u>

<u>WK. 1: Lesson 5</u>

<u>PROPER SUBSETS</u>

These are all subsets of a given set excluding the given set itself. (Universal set)

Set P = {1, 2, 3}. Find by listing all the proper subsets of set P.

These are :-

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

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

$\Longrightarrow$ 7 proper subsets.

ii) By calculation

Number of proper subsets

= $2^n - 1$

= $2^3 - 1$

= (2 x 2 x 2) – 1

= 8 – 1

= 7

REF: Mk bk 7 pg 2 – 3

WK. 1: Lesson 6

APPLICATION OF SETS

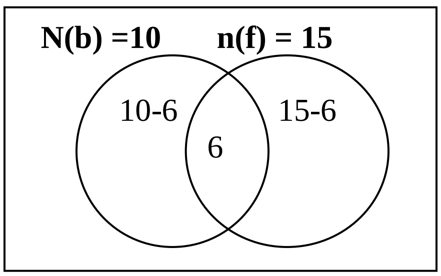
In a group of swimmers, 15 do free style (f) 10 do backstroke (b) and 6 do both

$n(f) = 15$

$n(b) = 10$

$n(f \cap B) = 6$

a) Represent the above information on a venn diagram.



b) How many swimmers swim only back stroke?

10 - 6

4 swimmers

c) How many do only free style?

15 – 6

19 swimmers

d) How many swimmers are in that group?

(10 + 6) + 6 + (15 – 6)

4 + 6 + 9

10 + 9

= 19 swimmers

e) How many swim only one style?

Backstroke only + free style

(10 – 6) + 15 – 6

4 + 9

= 13 swimmers

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

a) Represent the above information on a venn diagram

REF: Mk book 6 pg 29 – 30

WK. 2: Lesson 1

PLACE VALUES AND VALUES OF WHOLES

Reviewing place values up to millions.

6 1 4 2 0 8 7

Ones

Tens

Hundreds

Thousands

Ten thousands

Hundred thousands

Millions

Give the value of each digit in 4123456.

M	Hth	TTH	TH	H	T	O
4	1	2	3	4	5	6

6 X 1 = 6

5 X 10 = 50

4 X 100 = 400

3 X 1000 = 3000

2 X 10,000 = 20,000

1 X100,000 = 100,000

4 X 1,000,000 = 4,000,000

NUMBER	DIGIT	PLACE VALUE	VALUE
6,142,572	6	MILLIONS	6 X 1,000,000 = 6,000,000
	1	HUNDRED THOUSANDS	1 X 100,000 = 100,000
	4	TEN THOUSANDS	4 X 10,000 = 40,000
	2	THOUSANDS	2 X 1000 = 2000
	5	HUNDREDS	5 X 100 = 500
	7	TENS	7 X 10 = 70
	2	ONES	2 X 1 = 2

REF: MK Bk 5 page 26 – 27

Understanding MTC bk 5 pg 16 – 17

Mk bk 6 pg 34

WK. 2: Lesson 2

Writing figure in words

When writing in words, we group the number into it's major groups:

Example

4,156,036

Millions	Thousands	Units
4	156	036

4 156 036 $\longrightarrow$ **Four millions one hundred fity six thousands thirty six.**

REF: Understanding MTC bk 5 pg 13, bk 6 pg 23

Prim MTC, Macmillan bk 5 pg 18 – 19

WK. 2: Lesson 3

Writing words in figures

Write six hundred two thousand, four hundred sixty four in figures.

Solution: **b**reakdown the number in it's groups.

Six hundred two thousand = 602,000

Four hundred sixty four = + 464

602,464

Example II

Write two million, seven hundred thirty two.

Two million $\longrightarrow$ 2,000,000

Seven hundred sixty five thousand $\longrightarrow$ 765,000

Four hundred thirty two $\longrightarrow$ 432

2,765,432

REF: Mk bk 6 pg 38 -39.

WK. 2: Lesson 4

PLACE VALUES AND VALUES OF DECIMALS

Write the place value and value of each digit in the No. below.

0 . 3 4 6 4

Ten thousandths (1/10,000)

Ones

Thousandths (1/1000)

Hundredths (1/100)

Tenths (1/10)

Values (Note: Value = digit x place value)

0 . 3 4 6 4

4 x $\frac{1}{10,000}$ = $\frac{4}{10,000}$ = 0.0004

6 x $\frac{1}{1000}$ = $\frac{6}{1000}$ = 0.006

4 x $\frac{1}{100}$ = $\frac{4}{100}$ = 0.04

3 x $\frac{1}{10}$ = $\frac{3}{10}$ = 0.3

What is the value of 8 in 0.238

0 . 2 3 8

8 x $\frac{1}{1000}$ = $\frac{8}{1000}$ = **0.008**

Writing decimals in words.

i) 0.5 = $\frac{5}{10}$

= **Five tenths**

ii) 1.8 **One and eight tenths.**

iii) 21.008

Twenty one and eight thousandths.

iv) 195.075

<u>One hundred ninety five and seventy five thousandth.</u>

Reference: 1) Learning Math standard five pg 29.

2) Mk bk 6 pg 46

WK. 2: Lesson 5 & 6

Writing decimals in figures

Example

1) Thirty six and four tenths

36 and $\frac{4}{10}$

<u>36 and 0.4</u>

$$\begin{array}{r} 36.0 \\ \underline{0.4} \\ \underline{\underline{\mathbf{36.4}}} \end{array}$$

2) Six tenth

$\frac{6}{10}$ = **<u>0.6</u>**

3) Fourteen hundredths

$\frac{14}{100}$ = **<u>0.14</u>**

4) One hundred twenty and fourteen hundredths.

120 and $\frac{14}{100}$

<u>120 and 0.14</u>

Or

$$\begin{array}{r} 120.00 \\ \underline{0.14} \\ \underline{\mathbf{120.14}} \end{array}$$

Reference: 1) Mk bk 6, pg 45.

WK. 3: Lesson 1

EXPANDING WHOLE NUMBERS

Expanding using values

1) Expand 349

349 = (3 x 100) + (4 x 10) + (9 x 1)

300 + 40 + 9

2) Expand 48914

48914 = (4 x 10,000) + (8 x 1000) + (9 x 100) + (1 x 10) + (4 x 1)

40,000 + 8000 + 900 + 10 + 4

Expanding using powers / exponents

148 =

1	4	8
10^2	10^1	10^0

$(1 \times 10^2) + (4 \times 10^1) + (8 \times 10^0)$

7 9 6 2 =

7	9	6	2
10^3	10^2	10^1	10^0

$(7 \times 10^3) + (9 \times 10^2) + (6 \times 10^1) + (2 \times 10^0)$

Writing expanded numbers as single numbers / short form.

What number has been expanded to give;

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

REFERENCE: Mk bk 5, pg 31 – 32, MK Bk. 7 pg 48
Understanding Math bk 5, pg 21.

WK. 3: Lesson 2

EXPANDING DECIMALS

1) Using values

i) Expand 2 8 . 3 6 9

=

2	8	. 3	6	9
T	O	TTHS	HTHS	THS

$= (2 \times 10) + (8 \times 1) + (3 \times \frac{1}{10}) + (6 \times \frac{1}{100}) + (\frac{9}{1000})$

20 + 8 + 0.3 + 0.06 + 0.009

ii) Expand 1 3 5 . 6 5

$$(1 \times 100) + (3 \times 10) + (5 \times 1) + (6 \times \frac{1}{10}) + (7 \times \frac{1}{100})$$

<u>100 + 30 + 5 + 0.6 + 0.07</u>

2. **<u>Using powers</u>**

Expand 28.369 using powers.

2	8	.	3	6	9
10^1	10^0		10^{-1}	10^{-2}	10^{-3}

<u>$(2 \times 10^1) + (8 \times 10^0) + (3 \times 10^{-1}) + (6 \times 10^{-2}) + (9 \times 10^{-3})$</u>

Writing expanded decimals in their shortest form. Mk bk. 7, pg 48 – 49

<u>WK. 3: Lesson 3</u>

<u>ROMAN NUMERALS</u>

HINDU	1	5	10	50	100	500	1000
ROMAN	I	V	X	L	C	D	M

A) **<u>Repeated Roman numerals</u>**

Numbers with 2 and 3.

2 = I+ I = <u>II</u>

3 = I + I + I = <u>III</u>

20 = 10 + 10 = <u>XX</u>

30 = 10 + 10 + 10 = <u>XXX</u>

200 = 100 + 100 = <u>CC</u>

300 = 100 + 100 + 100 = <u>CCC</u>

B) **<u>Subtraction Roman Numerals</u>**

(number with 4 and 9)

4 = (5 – 1) = <u>IV</u>

9 = (10 – 1) = <u>IX</u>

400 = (500 – 100) = <u>CD</u>

40 = (50 – 10) = <u>XL</u>

90 = (100 – 10) = <u>XC</u>

900 = (1000 – 100) = <u>CM</u>

C) **Addition Roman numerals**

Numbers with (6, 7 and 8)

6 = (5+1) = VI	60 = 50 + 10 = LX	600 = 500 + 100 = DC
7 = (5+2) = VII	70 = (50+20) = LXX	700 = 500 + 200 = DCC
8 = (5+3) = VIII	80 = (50 + 30) = LXXX	800 = 500 + 300 = DCCC

Examples

Write the following as Roman numerals.

i) 75 = 70 + 5

=LXX + V

= **LXXV**

445 = 400 + 40 + 5

= CD + XL + V

= **CDXLV**

Changing roman numerals to Hindu – Arabic

Express LXXVI in hindu – Arabic numerals

= LXX + VI

= 70 + 6

= **76**

Mzee Yokana was born in the year MCMXLII. Express this year in Hindu – Arabic.

MCMXLII = M + CM + XL + II

1000 + 900 + 40 + 2

1942

REFERENCE: **Mk bk 6 pg 50, Mk bk 5 pg 5 – 6**

Learning MTC standard 5, pg 11

WK. 3: Lesson 4

ROUNDING OFF WHOLE NUMBERS

Rounding off means taking a given place value to another level.

When rounding off, we consider that if the digit on the right of the required place value is less than 5 we add to it 0 and replace all digits on it's right with 0's.

If the figure on the right of the place value is 5 or more add one to it.

Example

Round off 214 to the nearest tens.

H	T	O
2	1	4
	0	
2	**1**	**4**

= **210**

Example II

Round off 7591 to the nearest thousands.

Th	H	T	O
7	5	9	1
1	↓	↓	↓
8	0	0	0

$\therefore$ **7591 ≈ 8000**

REFERENCE: **Mk bk 6 pg 47**

Mk bk 5 pg 20

Macmillan bk 5 pg 22 – 24.

WK. 3: Lesson 5

ROUNDING OFF DECIMALS

Example

1) Round of 31.46 to the nearest tenths.

31.46

1

31.5

NB: When rounding off decimals the digits on the right of the place value rounded off are not replaced.

2) Round off 4.169 to the nearest whole number.

Note: nearest whole number also means the place of ones.

4.169

0

4.000

$\therefore$ **4.169 ≈ 4**

NB:

$$\underbrace{0,\quad 1,\quad 2,\quad 3,\quad 4,}_{\textbf{Round down}}\qquad \underbrace{5,\quad 6,\quad 7,\quad 8,\quad 9}_{\textbf{Round up}}$$

REFERENCE: Understanding MTC bk 6 pg 25-26

Mk bk 6 pg 48.

OPERATION ON NUMBERS

WK. 3: Lesson 6

Review of work done in P.4 on addition and subtraction.

WK. 4: Lesson 1

MULTIPLICATION

Terms used: product

Example

1) Find the product of 28 and 23.

$$\begin{array}{r} 28 \\ \underline{\times\ \ 23} \end{array}$$

23 = 20 + 3

28 x 20 = 560

28 X 3 = + 84

644

2) In Moses' house there are 13 rooms and each room has 24 chairs. How many chairs are there altogether?

$$\begin{array}{r} 13 \\ \underline{\times\ \ 24} \end{array}$$

24 = 20 + 4

13 x 4 = 52

13 X 20 = + 260

312 chairs

REFERENCE: Understanding MTC bk 5 pg 42 – 45, MK BK. 5 pg 54 – 56

Macmillan MTC bk 5 pg 31 – 32

WK. 4: Lesson 2

DIVISION

Terms used: **share.**

Quotient.

Share 288 book s equally among 12 classes.

$$
\begin{array}{r l}
 & 024 \\
 & 12\sqrt{288} \\
0 \times 2 = & \underline{0\ \ } \\
 & 28 \\
2 \times 12 = & \underline{24\ } \\
 & 4\ 8 \\
4 \times 12 = & \underline{\ 48\ }
\end{array}
$$

1	12
2	24
3	36
4	48
5	60
6	72
7	84
8	96
9	108

Each class gets 24 books

REFERENCE: Understanding MTC bk 5 pg 62 – 66

Macmilan Pr MTC pg 32 – 36.

Mk bk. 5 pg. 57 – 62

WK. 4: Lesson 3

MIXED OPERATION (BODMAS)

Brackets

Of

Division

Multiplication

Addition

Subtraction

1) Workout: $240 \div (5 \times 8)$

$240 \div 40$

$\frac{240}{40} = \underline{\mathbf{6}}$

2) Simplify: $8 - 12 + 4$

$8 + 4 - 12$

$12 - 12$

$\underline{\underline{\mathbf{0}}}$

REFERENCE: Understanding MTC bk 6 62 – 66 MK. BK. 5 PG. 63
Macmillan bk 5 pg 37 – 38

WK. 4: Lesson 4

BASES

Introduction - Names of bases
- The digit used in each base.
- Place values

Bases: are systems of counting or grouping numbers.

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

Base	Name of base	Digits used
Base Two	Binary	0, 1
Base Three	Ternary	0, 1, 2
Base Four	Quaternary	0, 1, 2, 3
Base Five	Quinary	0, 1, 2, 3, 4
Base Six	Senary	0, 1, 2, 3, 4, 5
Base Seven	Septenary	0, 1, 2, 3, 4, 5, 6
Base Eight	Octal	0, 1, 2, 3, 4, 5, 6, 7
Base nine	Nonary	0, 1, 2, 3, 4, 5, 6, 7, 8
Base Ten	Deciaml (denary)	0, 1, 2, 3, 4, 5, 6, 7, 8, 9

<u>Place values in base five</u>

Give the place value of each of the digits in 324_{five}

$3 \quad 2 \quad 4_{five}$

one

five

five fives

<u>Example II</u> 124_{five}

$1 \quad 2 \quad 4_{five}$

One

Fives

Five fives

In base two the place values are:

$1 \quad 0 \quad 1_{two}$

ones

two

two twos

<u>Writing bases in words</u>

A part form base ten (decimal base), when writing other bases in words we name their individual digits.

Example

i) 43_{five} in words is written as

Four, three, base five.

ii) 213_{five} = Two, one, three, base five.

REFERENCE: MK Bk 5, pg 70 – 71

WK. 4: Lesson 5

EXPANDING BASES

Example

Expand 13_{five}

1 3

ones (3)

fives (1)

= (1 group of fives) (3ones)

= (1 x fives) + (3xones)

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

OR

Using powers

1	3
5^1	5^0

= $(1 \times 5^1) + (3 \times 5^0)$

Expand 213_{five}

Place values 2 1 3

Ones (3)

Fives (1)

Five fives (2)

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

Example III

Expand 1 0 1_{two}

```
1 0 1
| | |__ ones
| |____ two
|______ two twos
```

$(1 \times 2 \times 2) + (0 \times 2) + (1 \times 1)$

(REF: MK. BK. 7, PG. 38)

WK. 4: Lesson 6

CHANGING FROM BASE FIVE TO BASE TEN

Example I

Change 14_{five} to base ten

```
14five
| |____ ones
|______ fives
```

$= (1 \times 5) + (4 \times 1)$

$5 + 4$

$= \mathbf{9_{ten}}$

Example II

Change 213_{five} to base ten

```
place values 2 1 3
             | | |__ ones
             | |____ fives
             |______ five fives
```

$= (2 \times 5 \times 5) + (1 \times 5) + (3 \times 1)$

$50 + 5 + 3$

$= \mathbf{58_{ten}}$

Example III

Change 2 1 3_{four} to base five.

2 1 3

- 3 — ones
- 1 — fours
- 2 — four fours

(2 x 4 x 4) + (1 x 4) + (3 x 1)

(8 x 4) + 4 + 3

= **39_{ten}**

REFERENCE: MK bk 5 pg 71 // MK Bk 7, pg 39

WK. 5: Lesson 1

CHANGING FROM BASE TEN TO OTHER BASES

Change 9_{ten} to base five

	No.	Rem
5	9	4
	1	

= **14_{five}**

Change 58_{ten} to base five.

	No.	Rem
5	58	3
5	11	1
	2	

$\therefore 58_{ten}$

= 2 1 3_{five}

Express 33_{ten} to base three

	No.	Rem
3	33	0
3	11	2
3	3	0
	1	

33_{ten} = 1020_{three}

REFERENCE: **MK BK 5 72 // Mk. Bk. Pg. 39**

MACMILLAN BK 5 PG 6

WK. 5: Lesson 2

FINDING UNKNOWN BASES

Examples

Given $23_x = 19_{ten}$

Find the value of x

2	3
x^1	x^0

$$= (2 \times x^1) + (3 \times x^0) = 19$$

$$(2 \times x) + (3 \times x) = 19$$

$$2x + 3$$

$$2x + 3 - 3 = 19 - 3$$

$$2x = 16$$

$$\frac{\cancel{2}x}{\cancel{2}} = \frac{16}{2}$$

$$\underline{\mathbf{x = 8}}$$

ii) $55_y = (5 \times y^1) + (5 \times y^0) = 35$

$$5 \times y + 5 \times 1 = 35$$

$$5y + 5 = 35$$

$$5y + 5 - 5 = 35 - 5$$

$$\frac{\cancel{5}y}{\cancel{5}} = \frac{\cancel{30}}{\cancel{5}}$$

$$\underline{\mathbf{y = 6}}$$

REFERENCE: **Fountain primary math bk 7 pg 37**

Mk Bk 7 old edition pg 43

WK. 5: Lesson 3

ADDITION OF BASES

Workout: $24_{five} + 33_{five}$

$$\begin{array}{r} 24_{five} \\ \underline{33_{five}} \\ \mathbf{112_{five}} \end{array}$$

$4 + 3 = 7 \div 5 = 1^{r2}$

$1 + 2 + 3 = 6 \div 5 = 1^{r2}$

In addition if the answer is bigger than the base we divide, write the remainder and regroup the answer.

Example I

$10011_{two} + 1100_{two}$

$$\begin{array}{r} 10011_{two} \\ \underline{1100_{two}} \\ \mathbf{11111_{two}} \end{array}$$

ACTIVITY: Understanding MTC bk 6 pg 46 – 47 // MTC bk 7 pg 40

WK. 5: Lesson 4

SUBTRACTION OF BASES

Example: $101_{two} - 11_{two}$

$$\begin{array}{r} 101_{two} \\ \underline{-\ 11_{two}} \\ 010 \end{array} \Rightarrow \mathbf{10_{two}}$$

Subtract:

$$\begin{array}{r} 40_{five} \\ -\ \underline{22_{five}} \\ \underline{13_{five}} \end{array}$$

REFERENCE: Mk bk 7 pg 40 – 41 // Fountain Bk. 7 pg 33

WK. 5: Lesson 5

MULTIPLICATION OF BASES

$2_{five} \times 3$

$$\begin{array}{r} 2_{five} \\ \underline{\times\ 3} \\ \underline{11_{five}} \end{array}$$

$= 6 \div 5 = 1^{r1}$

$$\begin{array}{r} 421_{five} \\ \underline{\times\ \ 3} \\ \underline{2313_{five}} \end{array}$$

REFERENCE: Mk bk 5 pg 74

Fountain Bk. 7 pg 34

WK. 5: Lesson 6

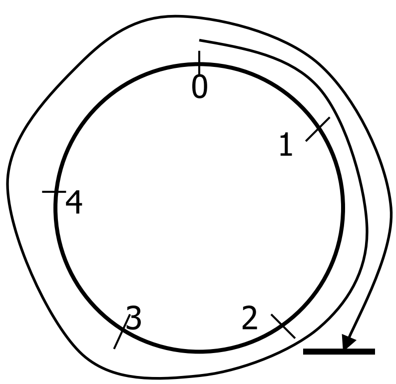
FINITE SYSTEMS

This is a system of grouping where we consider only the remainders.

It can also be called modular (mod) or clock Arithmetic.

Grouping in finite systems

Finite 5.



7 = 2 (finite 5)

By calculation

7 = $7 \div 5$

= 1^{r2}

7 = 2 (finite 5)

Express 10 in finites

10 = $10 \div 5$

= 2^{r0}

10 = 0 (finite 5)

Write 6 in finite 7

Since 6 is less than 7

It remains as 6

6 = 6 (finite 7)

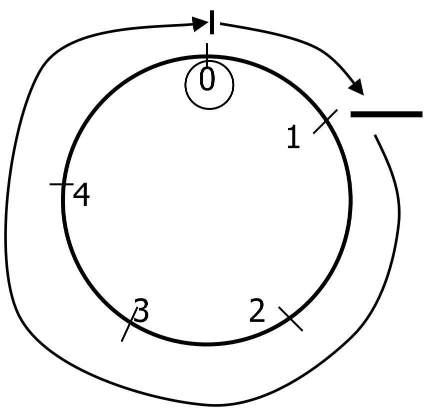
REFERENCE: MK bk 5 pg 206

WK. 6: Lesson 1

ADDITION IN FINITE SYSTEMS

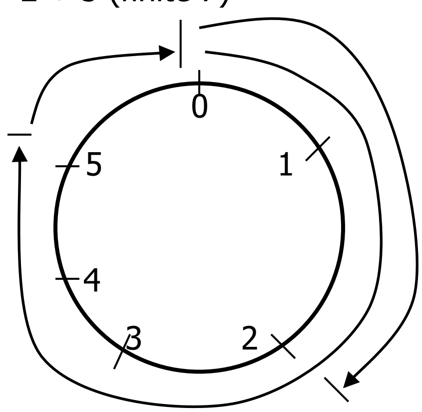
Using a dial

Add: 1 + 4 (finite 5)



1 + 4 = 0 (finite 5)

ii) 4 + 2 + 3 (finite 7)



4 + 2 + 3 + 2 (finite 7)

1 + 4 + (finite 5)

Reference: MK Bk. 5 pg 210

WK. 6: Lesson 2

SUBTRACTION IN FINITE

1. 3 – 4 = ____ (finite 5)

   (5 + 3) – 4

   8 – 4 = 4

2. 6 – 5 = __ (mod 7)

   6 – 5 = 1(mod 7)

Ref: MK Bk 7, pg 330

WK. 6: Lesson 3

NUMBER PATTERNS AND SEQUENCES

Review of P.4 Work on G.C.F and L.C.M from listed factors and multiples Mk Bk. 5 pg 80 – 82

WK. 6: Lesson 4

TYPES OF NUMBERS.

1) Whole numbers ⇒ 0, 1, 2, 3, 4, 5, …………
2) Counting numbers/ Natural numbers ⇒ 1, 2, 3, 4, 5, …………
3) Odd numbers: These are numbers that give a remainder when divided by 2

   ⇒ {1, 3, 5, 7, ………………}
4) Even numbers: These are ones that are exactly disable by two

   ⇒ {0, 2, 4, 6, 8, 10, ………………}
5) Prime numbers: These are numbers with only two factors.

   ⇒ {2, 3, 5, 7, 11, 13, ………………}
6) Composition numbers: These are numbers with more than 2 factors

   ⇒ {4, 6, 8, 9, 10, 12, ………………}
7) Square numbers: These are numbers got by multiplying a number by its self.

   ⇒ {1, 4, 9, 16, 25, ………………}
8) Cubic numbers: These are got by multiplying the same number three times.

   {1, 8, 27, 64, ………………}
9) Triangular numbers: These are got by adding consecutive counting numbers.

   $\{\underbrace{1, 3}_{+2}, \underbrace{3, 6}_{+3}, \underbrace{6, 10}_{+4}, \underbrace{10, 15}_{+5}, \underbrace{15, 21}_{+6}, \ldots\ldots\}$

REFERENCE: **Understanding MTC bk 6 pg 81 – 84**
Mk Bk 5 Pg 80 – 89

WK. 6: Lesson 5

DIVISIBILITY TESTS

These show which number is exactly divisible by another given number.

Divisibility test for 2.

A number is divisible by 2 if the last digit is an even number

i,e 0, 2, 4, 6, 8, ………….

Divisibility test for 3.

A number is divisible by 3 if the sum of its digits is divisible by 3.

Example

State whether 144 is divisible by 3.

Sum of the digits $1 + 4 + 4$

$= 9$

9 is divisible by 3

$\therefore$ 144 is divisible by 3.

Divisibility test for 4

A number is divisible by 4 if its last two digits are zero or divisible by 4.

Divisibility test for 5

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

Divisibility test for 6

A number is divisible by 6 if it is even and the sum of its digits is divisible by 3.

Example:

Is 612 divisible by 6 ?

612 is divisible by 6 since it is an even number and the sum of its digits (6+1+2=9) as shown is divisible by 3.

Divisibility test for 7

When the last digit of a number is doubled and the result is subtracted from the number formed by the remaining digits, the result must be divisible by 7.

Example:

Is 861 divisible by 7?

The last digit is 1 and the number formed by the remaining digits is 86.

When is doubled it gives (1+1) =2. Subtract 2 from 86 (86-2) =84.

84 is divisible by 7 $\therefore$ 861 is also divisible by 7.

Note: For big numbers that cannot easily be detected as numbers divisible by 7, repeat the same procedure on the last result obtained after subtracting.

Divisibility test for 9

A number is divisible by 9 if the sum of its digits is divisible by 9.

Example:

198: The sum of 198 is 1 + 9 + 8 = 18

18 is divisible by 9 therefore 198 is divisible by 9.

Divisibility test for 10

A number is divisible by 10 if its last digit is 0.

REFERENCE: MK BK 6 pg 65 – 67.

WK. 6: Lesson 6

PRIME FACTORIZATION OF NUMBERS

Prime factorizing means dividing a number by its prime factors.

We use prime factors when prime factorizing e.g = {2, 3, 5, 7, 11, 13, …………}

Example I

Prime factorise 18.

We can either use a ladder or a factor tree. i.e

2	18
3	9
3	3
	1

We can represent the prime factors as follows.

Set notation / subscript form

18 = $\{2_1, 3_1, 3_2\}$

Multiplication form

18 = 2 x 3 x 3

power form (expanded form)

18 = $2^1 \times 3^2$

Example II

Prime factorise 100.

* Take note of factors of 100 that are prime numbers.

	100
2	50
2	25
5	5
5	1

Subscript form ÷

100 = $\{2_1, 2_2, 5_1, 5_2\}$

Multiplication form

100 = 2 x 2 x 5 x 5

Power form

100 = $2^2 \times 5^2$

WK. 7: Lesson 1

FINDING L.C.M BY PRIME FACTORIZING

Example

Find the L.C.M of 4 and 12 by prime factorization.

2	4	12
2	2	6
3	1	3
	1	1

L.C.M = 2 x 2 x 3

= 4 x 3

= **12**

Example II

Find the L.C.M of 12 and 20.

2	12	20
2	6	10
3	3	5
5	1	5
	1	1

L.C.M = 2 x 2 x 3 x 5

= 4 x 15

= 60

REFERENCE: MK MTC Bk 5 pg 86.

WK. 7: Lesson 2

Finding G.C.F by prime factorizing

Example:

Find the G.C.F of 6 and 8

2	6	8
	3	4

G.C.F = 2

Example II

Find the G.C.F of 24 and 36.

2	24	36
2	12	18
3	6	9
	2	3

G.C.F = 2 x 2 x 3

= 4 x 3 = **12**

WK. 7: Lesson 3

Representing rime factors on Venn diagrams

Example I

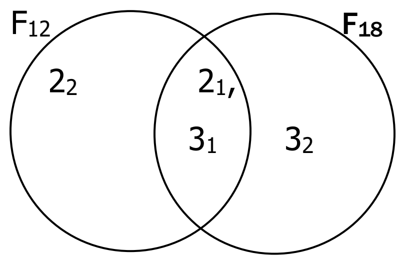
Represent the prime factors of 12 and 18 on a Venn diagram.

2	12
2	6
3	3
	1

2	18
3	9
3	3
	1

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

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



a) Find the G>C>F of 12 and 18.

G.C.F product of the intersection

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

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

<u>6</u>

L.C.M = product of the union.

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

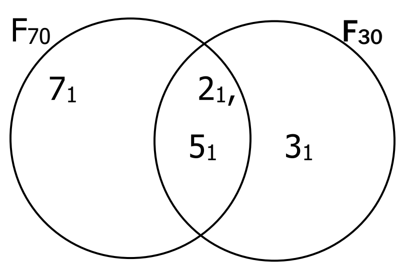
= 2 x 2 x 3 x 3

= 4 x 9

= **<u>36</u>**

<u>Example 2</u>

Below is a venn diagram showing factors.



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

G.C.F = product of the intersection

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

G.C.F = 2 x 5

= **<u>10</u>**

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

L.C.M = product of the union

$F_{70} \cup F_{30} = \{2_1, 3_1, 5_1, 7_1\}$

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

$= 6 \times 35$

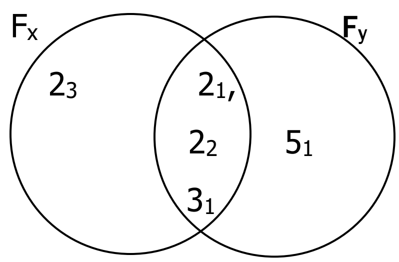
L.C.M = **<u>210.</u>**

Activity: Understanding MTC Bk 6 Pg 79 – 81

MK BK. 6 pg. 86

<u>WK. 7: Lesson 4</u>

<u>Finding the unknown number given prime factors on a venn diagram</u>



a) Find the value of x.

$F_x = \{2_1, x\ 2_2, x\ 3_1\}$

$x = 4 \times 6$

$x =$ **<u>24</u>**

b) Find the value of y.

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

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

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

$y = 4 \times 15$

$y =$ **<u>60</u>**

REFERENCE: MK BK 6 Pg 88 – 89

WK. 7: Lesson 5

SQUARE ROOTS OF NUMBERS

Review of square numbers.

i.e. {1, 4, 9, 16, 25, 36, 49, 64, 81, ………………}

A square number is got by multiplying a number by it's self.

A square root is a number that is multiplied by its self to give a square number.

The symbol for square root is $\sqrt{\quad}$

Example

Find the square root of 36.

2	36
2	18
3	9
3	3
	1

$\sqrt{36} = \sqrt{(2x\cancel{2})x(2x\cancel{3})}$

$\sqrt{36}$ = 2 x 3

= **6**

Example:

Find the square root of 100.

2	100
2	50
5	25
5	5
	1

$\sqrt{100} = \sqrt{(\cancel{2}x2)x(5x\cancel{5})}$

= 2 x 5

= **10**

WK. 7: Lesson 6

Review of P.4 work on fraction)

FRACTIONS

1) Express the missing following as mixed fractions.

   a) $\frac{3}{2}$　　b) $\frac{11}{3}$　　c) $\frac{47}{10}$　　d) $\frac{49}{6}$

2) Express each of these fractions as improper fractions

   a) $1\frac{1}{2}$　　b) $1\frac{1}{4}$　　c) $3\frac{5}{12}$　　d) $33\frac{1}{3}$

3) Write five equivalent fractions to each of these fractions

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{8}$ d) $\frac{4}{9}$

4) Reduce these fractions to their lowest terms

a) $\frac{2}{4}$ b) $\frac{12}{18}$ c) $\frac{8}{12}$ d) $\frac{27}{45}$ e) $\frac{125}{200}$

5) Compare the fractions below using the symbols <, > or = (show the working)

a) $\frac{5}{6}$ ______ $\frac{5}{8}$ b) $\frac{1}{3}$ ______ $\frac{1}{4}$ c) $\frac{1}{2}$ ______ $\frac{1}{3}$ d) $\frac{1}{2}$ ______ $\frac{4}{8}$

e) $\frac{7}{9}$ ______ $\frac{7}{8}$ f) $\frac{14}{30}$ ______ $\frac{7}{15}$

REFERENCE: **Learning MTC pg 12 – 23**

MK Bk 5 pg 118.

WK. 8: Lesson 1

Ordering fractions

This involves arranging in either ascending or descending order.

Ascending order

Means from lowest to highest.

Descending Order

Means from highest to lowest.

Example

Arrange $\frac{1}{3}, \frac{1}{2}, \frac{1}{4}$ in ascending order.

L.C.M method;

M_3 = { 3, 6, 9, 12, 15, ……………..}

M_2 = { 2, 4, 6, 8, 10, 12, 14, ………..}

M_4 = { 4, 8, 12, 16, ………..}

L.C.M = 12

$\frac{1}{\cancel{3}} \times \cancel{12} \Rightarrow 1 \times 4 = 4$

$\frac{1}{\cancel{2}} \times \cancel{12} \Rightarrow 1 \times 6 = 6$

$\frac{1}{\cancel{4}} \times \cancel{12} \Rightarrow 1 \times 3 = 3$

In ascending order

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

Method II

Arrange $\frac{5}{8}, \frac{3}{4}, \frac{4}{6}$ in descending order.

Renaming (equivalent fractions)

$\frac{5}{8} = \frac{10}{16} = \boxed{\frac{15}{24}} = \frac{20}{32} = \frac{25}{40} = \frac{30}{48}$

$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{15}{20} = \boxed{\frac{20}{24}}$

$\frac{4}{6} = \frac{8}{12} = \frac{12}{18} = \boxed{\frac{16}{24}} = \frac{20}{30} = \frac{24}{36}$

In descending order = $\frac{3}{4}, \frac{4}{6}, \frac{5}{8}$

REFERENCE: MK Bk 5, pg 119

Comparing fractions using <, > or =

Example

Use **>, < or =**

$\frac{1}{3}$ **>** $\frac{1}{4}$ M$_3$ = 3, 6, 9, 12

$\frac{1}{\cancel{3}} \times \cancel{12}$ M$_4$ = 4, 8, 12, 16

= **4** $\frac{1}{\cancel{4}} \times \cancel{12}$ = **3**

ii) Which is smaller $\frac{5}{6}$ or $\frac{1}{2}$

L.C.M of 2 and 6.

= 6

$\frac{5}{\cancel{6}} \times \cancel{6} = \underline{5}$ $\frac{1}{\cancel{2}} \times \cancel{6} = \underline{3}$

$\frac{1}{2}$ **<** $\frac{5}{6}$

REFERENCE: MK Bk 5 pg 120.

WK. 8: Lesson 2

ADDITION OF FRACTIONS

Example I

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

$\frac{1}{4} = \frac{2}{8} = \frac{3}{12}$

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$

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

$\frac{3}{4}$

Example 2

John filled $\frac{1}{2}$ of a tank in the morning and $\frac{2}{5}$ in the afternoon, what fraction did he fill altogether?

$\frac{1}{2} + \frac{2}{5}$

M_2 = { 2, 4, 6, 8, 10, 12, ...}

M_2 = { 5, 10, 15, 20, ...}

$\frac{1}{2} + \frac{2}{5} = \frac{5+4}{10}$

$= \frac{9}{10}$

REFERENCE: MK BK 5 Pg 121 -125.

WK. 8: Lesson 3

SUBTRACTION OF FRACTIONS

Example I

Subtract; $\frac{4}{5} - \frac{1}{5} \Longrightarrow \frac{4-1}{5} = \frac{3}{5}$

Example II

A baby was given $\frac{5}{6}$ of a glass of water. If it drunk $\frac{7}{12}$, What fraction remained?

$\frac{5}{6} - \frac{7}{12}$

M_2 = { 6, 12, 18, 24}

M_{12} = { 12, 24, 36}

L.C.M = 12.

$\frac{10-7}{12} = \frac{3}{12} \Longrightarrow \frac{1}{4}$

Activity: Mk bk 5 Pg 126 – 127.

2) Isaac had $\frac{3}{4}$ of sugarcane. If he gave $\frac{3}{5}$ of it to Peter. What fraction did he remain with.

$$\frac{3}{4} - \frac{3}{5} = \frac{15-12}{20}$$

$$= \underline{\frac{3}{20}}$$

REFERENCE: Understanding MTC Std 5 pg 19 – 22.
MK BK 5 Pg 126 – 127.

WK. 8: Lesson 4

Multiplication of fractions

1) i) $\frac{1}{3}$ X $\frac{2}{5}$ $= \frac{1X2}{3X5} = \frac{2}{15}$

ii) $\frac{1}{2}$ X $\frac{1}{2}$ $= \frac{nxn}{dxd}$

$\frac{1x1}{2x2} = \frac{1}{4}$

2) What is $\frac{2}{5}$ of 20 books?

$\frac{2}{\cancel{5}}$ x $\cancel{20}$

2 x 4 = **8 books**

3) What is $2\frac{1}{2}$ of 2 dozens.

1 doz = 12 books

2 dozens = 12 x 2

= 24 books

$2\frac{1}{2}$ x 24

$\frac{5}{\cancel{2}}$ x $\cancel{24}$ = **60 books**

REFERENCE: Mk Books 5 page 129 – 137

Learning MTC Std 5 pg 26 – 28

WK. 8: Lesson 5

RECIPROCALS OF FRACTIONS

Reciprocal of $\frac{3}{5}$ is $\frac{5}{3}$

A reciprocal is a number multiplied by a given fraction to give 1.

The Reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$

Check: $\frac{2}{3}$ x $\frac{3}{2}$ = $\frac{\cancel{6}}{\cancel{6}}$

= 1

Any fraction multiplied by its reciprocal always gives 1.

Example:

Find the reciprocal of $\frac{3}{4}$

Let the reciprocal be m

$\frac{3}{4}$ x m = 1

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

3m = 4

$\frac{\cancel{3}m}{\cancel{3}} = \frac{4}{3}$

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

Consider the reciprocal of

a) 7

b) 0.7

c) $1\frac{1}{3}$

d) 2.5

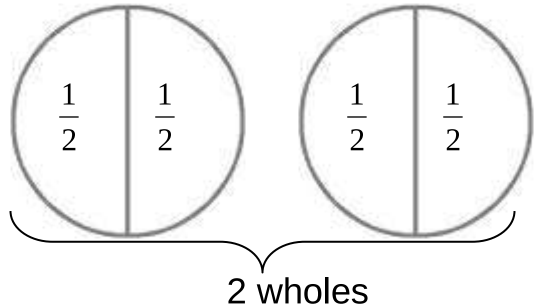
REFERENCE: Mk Bk 5 pg 133.

WK. 8: Lesson 6

Division of fractions

Wholes by fractions

1) $2 \div \frac{1}{2}$ (Use of diagrams)



$\therefore 2 \div \frac{1}{2} = \underline{\mathbf{4}}$

Example 2

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

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

Example 3

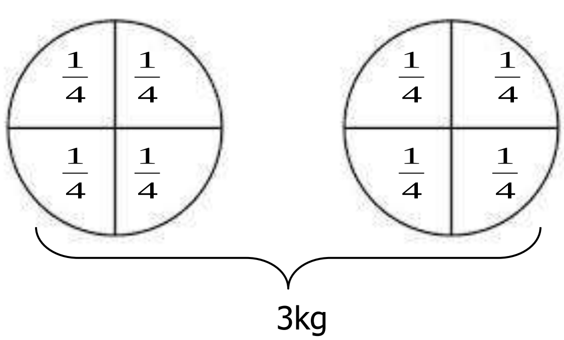
How many half litre cups are in a 3 litre jerry can?

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

$3 \times \frac{2}{1} = 6$ cups

Example 4

How many $\frac{1}{4}$ kg packets of sugar can be packed from 3kg?



12 packets can be packed.

Division of fractions by fractions

Example I

$\frac{2}{3} \div \frac{4}{5} \Longrightarrow \frac{2}{3} \times \frac{5}{4}$

$= \frac{\cancel{10}}{\cancel{12}} = \frac{5}{6}$

Example 2

$\frac{3}{4} \div \frac{1}{3}$

$\frac{3}{4} \times \frac{3}{1} = \frac{9}{4}$

$\mathbf{2}\frac{1}{4}$

REFERENCE: MK Bk 5 pg 134 – 136

ii) How many boys are there?

$\frac{1}{\cancel{3}} \times \cancel{60}$

1 x 20

= **20 boys**

c) How many girls are there?

$\frac{2}{3} \times \cancel{60}$

2 x 20

40 girls

d) How many more girls are there than the boys?

$$\begin{array}{r} 40 \\ -\ 20 \\ \hline 20 \end{array}$$

2 0 more girls

REFERENCE: Mk Bk 5 pg 132.

WK. 9: Lesson 1

Ordering decimals

Arrange 0.4, 0.44, 4.4 in ascending order.

As common fractions $\Longrightarrow \frac{4}{10}, \frac{44}{100}, \frac{44}{10}$

LCD = 100 (biggest denominator)

Multiply each by the biggest denominator.

$\frac{4}{1\cancel{0}}$ **x** $10\cancel{0}$

= 40

$\frac{44}{\cancel{100}}$ **x** $1\cancel{00}$

= 44

$\frac{44}{1\cancel{0}}$ **x** $10\cancel{0}$ In ascending order,

= 440 **0.4, 0.44, 4.4**

REFERENCE: ***Learning MTC Std 5 pg 31 – 32***

***Mk bk 5 pg 145 – 146*.**

WK. 9: Lesson 2

MULTIPLICATION OF DECIMALS

Multiply: 0 . 2 x 0 . 3

Method 1

Re-write decimals ad fractions.

0.2 x 0.3

= $\frac{2}{10}$ **x** $\frac{3}{10}$ Remember $\frac{nxn}{dxd}$

= $\frac{2x3}{10x10}$

= $\frac{6}{10}$ **=0.06**

Method 2

0.2 x 0.3

$$\begin{array}{rl} 0.2 & \text{1dp} \\ \times\ \underline{0.3} & \text{1 dp} \\ 0.6 & \\ \underline{+\ 0\ 0} & \\ \underline{0.06} & \end{array} \quad \text{2 dp in answer}$$

$\because$ 0.2 x 0.3

= **<u>0.06</u>**

<u>REFERENCE:</u> **Learning MTC Std pg 33 – 34.**

<u>WK. 9: Lesson 3</u>

<u>DIVISION OF DECIMALS</u>

Example 1: 0.2 ÷ 0.4

$= \frac{2}{10} \div \frac{4}{10}$

$= \frac{2}{\cancel{10}} \times \frac{\cancel{10}}{4}$

$= \frac{2x1}{1x4} = \frac{\cancel{2}}{\cancel{4}} = \frac{1}{2}$

Example 2: 0.3 ÷ 0.03

$= \frac{3}{10} \div \frac{3}{100}$

$= \frac{3}{\cancel{10}} \times \frac{\cancel{100}}{3}$

= 1 x 10

=**<u>10</u>**

REFERENCE: **MTC Bk 6 pg 118 – 119.**

WK. 9: Lesson 4

RATIO

A ratio is a comparison of two numbers.

e.g 2 : 3 which is read as two to three.

Expressing ratios as fractions

i) Express 2 : 3 as a fraction.

$2 : 3 = \frac{2}{3}$

ii) The ratio of boys to girls in a class is 3 : 4, express this as a fraction.

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

Expressing fractions as ratios

i) Express $\frac{1}{3}$ as a ratio.

$\frac{1}{3}$ **=** 1:3

ii) $\frac{5}{6}$ of a class are present, express this in ratio from $\frac{5}{6}$.

= 5 : 6

REFERENCE: Mk Bk 6 Pg 125 - 126

WK. 9: Lesson 5

Expressing quantities as ratios

Example

Henry has 12 books and John has 20 books. What is the ratio of Henry's books to John's books?

Henry	to	John
12	:	20
$\frac{\cancel{12}}{\cancel{4}}$	:	$\frac{\cancel{20}}{\cancel{4}}$ Reduce

3 : 5

Express 20 minutes as a ratio of 1 Hr.

1Hr = 60minutes

20Min : 60Min

$\frac{\cancel{20}}{\cancel{20}} : \frac{\cancel{60}}{\cancel{20}} \longrightarrow$ Reduce

$\underline{\underline{1 \quad : \quad 3}}$

NB:

When comparing two or more quantities, rations must be expressed in the same units and in the lowest terms.

REFERENCE: Mk Bk 6 Pg 127.

WK. 9: Lesson 6

PROPORTIONS

Proportions are ways of comparing quantities.

Direct proportion

This is a type of proportion in which the two quantities decrease or increase in the same ratio.

Example (price of pens and N$^{o.}$ of pens)

The cost of a pen is shs 1500. Find the cost of 5 similar pens

1 pen sh 1500

5 pens 5 x sh 1500

= 1500

x 5

shs 7500

NB:

Always start by finding the equivalence of 1 item.

REFERENCE : MK BK. 6 PG. 136