INTRODUCTION TO GENERAL MATHEMATICS FOR BEGINERS

By

Muhammed Umar Faruq

Department of Computer Science

Kwara state college of Arabic and Islamic legal studies, Ilorin

OBJECTIVES OF THE COURSE

By the end of this course, students should be able to define fraction and explain the its types the arithmetic of buying and selling and also solve problem.

1. Interpret fraction in respect of its addition, subtraction, multiplication and division.
2. Solve all problem involving fraction
3. Solve problem involving simple interest, profit and loss.
4. Have a broad idea about measurement and there unit.
5. Discuss some statistical average [mean, median and mode of given data]
   Course outline
   Definition of fraction i.e a part of whole [proper and improper fraction], mixed number fraction in lowest terms ordinary of fraction, division of a whole number by another whole number, decimal fractions, addition, subtraction, multiplication and division of decimal fractions.
   Problems on the use of money in our daily life, profit and loss [buying and selling], simple interest, and measurement of time, telling time in hour and minute seconds &introduction to statistic [mean, median & mode].
   Fraction
   A fraction is simply a part of a whole e.g [i] if we divide a loaf of bread into four equal parts, each part is one fourth (a quarter) (1/4) of the whole (ii) if a long stick is divided into six equal parts, each part is one six of the while (1/6)/

Examples

1) Find the ¼ of #3 in kobo
2) How many pieces of string each 8 ½ cm long can be cut from the string 42 ½ cm long?
3) A note book has 128 pages and 88 of them have been used. What fraction of the note book remain unused?

Solution

1) #3 = 300k

   ¼ of #3 implies ¼ of 300k

   = ¼ x 300

   = ¼ x $\frac{300}{1}$

   = $\frac{300}{4}$ = 75kb

   = $\frac{2}{15}$

   b) $\frac{3}{4} - \frac{1}{3}$

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

$$= \frac{9-4}{12}$$

$$= \frac{5}{12}$$

c) $\frac{2}{5} - \frac{3}{10}$

$$= \frac{2}{5} - \frac{3}{10}$$

$$= \frac{4-3}{10}$$

$$= \frac{1}{10}$$

In both equation addition and subtraction of fraction looking for term (lowest common imply) is necessary.

MULTIPLICATION AND DIVISION OF FRACTION

To multiply fraction, we multiply the numerator (the top line) and multiply the denominator E.g

(i) $\frac{3}{7} \times \frac{5}{9} = \frac{3 \times 5}{7 \times 9} = \frac{15}{63}$

(ii) $\frac{1}{12} \times \frac{3}{9} = \frac{3}{48} = \frac{1}{16}$

To divide fraction by a whole number, such as 2, we find one half of the fraction e.g

$\frac{5}{7} \div 2 = \frac{1}{2} \times \frac{5}{7} = \frac{5}{14}$

To divide a fraction by another we can multiply numerator and denominator of any fraction by the same number of give an equivalent fraction. E,g

i. $\frac{8}{5} \div \frac{3}{4} = ?$
ii. 2 & 3 will be a class work

So, when explaining fractions we are expected to see one number on top of another of divisions of a whole number by another whole number ¾, 5/3, ½, 2/5, etc. the number on top is numerator and the other is denominator fractions can be classified into two types:

PROPER FRACTION

This fraction exists when numerator is smaller than denominator e.g ¼, 2/3, 1/5, 3/13 etc. it could be written as p/q where p is the numerator smaller than q. (p<q) and q/0

IMPROPER FRACTION

This fraction exists when numerator is bigger than denominator e.g 5/2, 4/2, 9/3 i.e p/q where p>q and q/0.

MIXED NUMBER (FRACTIONS)

These are obtained when a fraction is with another whole numbers combination of a whole number and fraction e.g $1\frac{2}{3}$, $3\frac{3}{7}$, $5\frac{1}{2}$ etc.

FRACTION IN LOWEST TERMS OR ORDINARY FRACTIONS

This is obtained when a fraction is re-divided to its lowest equivalence e.g 1/3 = 2/6, 3/7 = 4/12. Any of the fraction apart from 1/3 after further division will give the result (1/3) 6/18 gives 1/3, which is the lowest term.

More examples of fraction in their lowest terms are:

   i.   25/100 = 5/20 = ¼
  ii.   20/80 = 5/20 = ¼
 iii.   49/343 = 7/49 = 1/7
 iv.   16/128 = 8/64 = 2/16 = 1/8
  v.   27/162 = 9/54 = 3/18 = 1/6

SUBTRACTION OF FRACTIONS

Subtraction of fraction is also easier if the items

Evaluate the following

a) $\frac{8}{10} - \frac{6}{9}$

$$= \frac{4}{5} - \frac{2}{3} \; lowest\; term$$
$$= \frac{12-10}{15} \; \text{L.c.m}$$
$$= \frac{8}{5} \times 2 \qquad = \frac{8}{5} \times 4$$
$$= \frac{3}{4} \times 4$$

There are numbers with decimal points (decimal fraction) it is obtained a result of simplifying a fraction.
e.g ¼ = 0.25,   1/5 = 0.2
10/24 = 5/12 = 0/417, 21/2 = 10.5

ADDITION OF FRACTIONS

The addition of fraction is easier if taken to its lowest terms

Example: evaluate the following fractions

   i. $\frac{24}{100} + \frac{3}{18}$ lowest terms

$$= \frac{6}{25} + \frac{1}{6}$$

$$= \frac{36+25}{150} \text{ L.cm}$$

$$= \frac{61}{150}$$

   ii. $\frac{9}{12} \times \frac{8}{12}$

   iii. $\frac{3}{4} + \frac{2}{3} =$

   iv. $\frac{9+8}{12}$ L.c.m

$$= \frac{17}{12} \quad = 1\frac{5}{12}$$

   I. $\frac{18}{24} + \frac{6}{48}$

$$= \frac{3}{4} + \frac{1}{8}$$

$$= \frac{6+1}{8} \text{L.c.m}$$

$$= \frac{7}{8}$$

PROPORTION, RATIO AND RATE PROMOTION

Proportion

Proportion means share, when a quantity is divided into parts that are in the ration 3:4, first split into seven equal shares (3+4=7). The required parts will be 3 and 4 of these equal shares i.e 3/7 and 4/7 of the original quantity.

The above is also referred to as proportional division.

Rate

Rate connects quantities of different kinds. The following are connected inform of rate.

   i.   A part time lecturer is paid #1800 for a 10 hour day. His rate of pay is #180 per hour.

ii. A cyclist travels 28km in 2 hours. His rate is 14km per hour. In this case, the rate is called speed.

Examples

1) A worker gets #900 for 10 days works find amount for (a) 3 days (b) 24 days (c) x days

   Solution

   If for 10 days, the worker gets #900

   For 1 day, the worker gets #900 ÷ 10   = #90

   a) For 3 days, the worker gets 3 x #90   = #270
   b) For 24 days the worker gets 24 x #90   = #90 x 24 = #2,160
   c) For x days the worker will get x #90   = 90 x X = 90x

2) A woman is paid #750 for 5 days. Find her pay for (a) 1 day (b) 2 days (c) 22 days

   Solution

   If the woman is paid #750 for 5 days she will be paid #750 ÷ 5 for 1 day

   a) For 1 day she is paid   =   #150
   b) For 2 days she is paid = 2 x #150 = #300
   c) For 22 days she is paid = 22 x #150 = #3,300

Exercises

i. A woman is paid #750 for 5 days. Find her pay for (a) 22 days
ii. The temperature of 6 litres of liquid is 300c. find the temperature of (a) 1 litre (b) 8 litres (c) 400ml
iii. Nine equal bottles hold 4 ½ litres of altogether. How much water does (a) one bottle (b) five bottles (c) x bottle hold?
iv. It takes three lorries 84 trips to carry all the sugar in a warehouse to the market. How many trips will it take (a) one lorry (b) seven lorries (c) x lorries?
v. it takes five students 1 hours to sweep their dormitory. Find how long it will take (a) one student (b) three students (c) 12 students to sweep the dormitory.

Ratio

Ratio to much space is a device used to make comparison of related quantities. i.e ratios compare quantities of the same kind.

The ratio a:b can be expressed as $\frac{a}{b} : 1$ or $1:\frac{b}{a}$ or $simply$ as $\frac{a}{b}$

Suppose that two books cost #400 and #600 respectively. The ratio of their prices is 400:600 the ratios are just like the fractions. E.g 400:600 = 4:6 = 2:3

Both parts of a ratio may be multiplied or divided by the same number it is usual to express ratios as whole number in their lowest terms. E.g 20.30 (ii) 28:21 (iii) 2 days to 2 weeks

2:3   4:3   2:14

Tutorial questions

      i.   # 10,000 for 2 years at 4% per annual
      ii.   # 25,000 for 3 years at 5% per annual
    iii.   # 70,000 for 3 years at 5% per annual
    iv.   # 10,000 for 3 ½ years at 3% per annual
     v.   A women borrowed # 300,000 to pay for a car. She agreed to pay the money back over 2 years, paying simple interest at 9% per annuals.
      a) Calculate the simple interest on # 300,000 at per annual to pay the money back over 2 years
      b) Hence find the total amount she must pay back.
      c) If the total money us paid back on monthly installment over years, how much will she pay each month?
      d) A man bought a cow for #40,000 and sheep for # 12,000. After keeping them for 2 years, the cost of keeping and medical treatment was # 11,000. If he sold the two animals for #70,000, did he make any profit or loss? How much was it as the case may.

MEASUREMENTS AND THEIR UNITS

As every measurement has it's unit so also the time

- Unit of weight is gram/ kilogram/ newton
- Unit of length is cm/ kilometer/ miles
- Unit of liquid is cm^3 dm^3 litre
- In speed is metre / second, kilometer/ hour

So, time is measured in seconds, minute, hour day, week month, year, decade, and century.
60 seconds make 1 hour
60 minute make 1 hour
24 hours make 1 day
4 weeks make 1 month
12 month make 1 year
10 years make 1 decade
10 decades make a century

In 5 days the worker gets # 2,400

In 1 day the worker gets $\frac{\#2,400}{5}$ = #480

The worker's pay per day is #480

II.   A car goes 162km in 2hours. What is the rate in km/h?

Solution

In 2 hours the car travels 162km

1 hour the car travels $\frac{163km}{2}$ = 81km/hr

The rate at which the car travels is 81km/h

Exercise

1. A car travels 126km 1 ½ hours. Find its rate (speed) km/h
2. An athlete runs 90m in 10seconds. Find the in meters per minutes
3. A football player scores 40 goals in 60 games. Find his rate of scoring goal per game.
4. A trader reduces al his prices by 15k in a naira. Find the new price of shirt, which originally cost #400
5. A town with a population of 21,280 registered 633 births in a year, round both numbers to significant figure and estimate the birth rate per 100 population.

EXERCISE

Fill in gaps in the following

i.   4/5 = _____
ii.   3:8 = 9
iii.   10:12 = 25
iv.   120:   = 84:56
v.   22:18 = 33:

PERCENTAGE

Percentages literally means a part of a figure 100. It is represented symbolically by % i.e x% is a short way of writing $\frac{x}{100}$ or 'x percent'

When finding the percentage increase or percentage decrease, always calculate percentage on the original amount.

Examples

1. Express the following percentage as (i) fraction is lowest form (ii) decimals (a) 25% (b) 20% (c) 75% (c) 20 (d) 3% (e) 55%

2. Express the first quality as the percentage of the second (a) # 1.2 (b) 15^0, 360^0 (c) 12.5cm (d) 3km, 5km (e) 200k, #10

3. A woman pays 15% of her taxable income as tax. If her taxable income is #300,000 how much tax does she pay?

SOLUTION

If her taxable income is #1 then pays $\frac{15}{100} \times 1$ =3/20 $\quad\quad$ $0.15 = 15k$

If 15k is paid out , the n 0.15 x 300,000 will be paid on #300,000 = 0.15 x 300,000 = 45,000

INTRODUCTION TO STATISTICS

Statistics is the process of collection and analysis of data for the purpose of decision making mean, median and mode are averages of statistical but data but calculated out differently.

Mean (x) is the sum of variables or scored divided by their number

$$X \frac{Efx}{n} = \frac{Efx}{Ef}$$

n = number of variables

f = frequency

x = variable

Mode is the number of variable that occurs must often. Formular could be used for an ungrouped data i.e $M = L + \frac{(D)}{D1+D2}$

The measurement here is finding the averages such as mean, median, mode and range.

e.g find the mean, median, and range of the set of numbers 8,5,9,7,6

Mean $= \frac{5+6+7+8+9}{5} = \frac{35}{5} = 7$

Median = 5, 6, 7, 8, 9 = 7

Mode = NIL no number exists more than once

Range = 9-5 = 4

2. Find the range and average of the scores 79, 60, 52, 4, 58, 60, 34, 52, 58, 60, 60, 79

Range = 79 − 34 = 45, mode = 60

Median $= \frac{58+60}{2} = \frac{118}{2} = 69$

Mean $= \frac{34+52+58+60+60+79}{6} = \frac{343}{6} = 57.2$

4. The mean of numbers 5, 2, 3, x 9 is 4.8 find the value of x and state the mode of the five numbers.

Given that x = 4.8

$$4.8 = \frac{5+2+3+x+9}{5}$$

4.8 x 5 = 19 + x

24 = 19 + x

24 – 19 = x

X = 5

The numbers are 5, 2, 3, 5, 9

Mode = 5

Median = 2, 3, 5, 5, 9 = 5

Mean = 4.8

   a) How many students scored zero?
   b) What was range marks?
   c) How many students took the test?
   d) What was the mode and median

BAR CHART

Bar chart is a set of rectangular shapes that summarizes a statistical information.

E.g.

The bar chart below shows the result of a mathematics test.

REVISION EXERCISES

1) The shoe sizes of a group of 24 children are:

8	6	7	5	4	6	5	7
6	5	7	6	8	5	4	6
5	5	6	7	8	8	6	9

Find the mean of the data above

2)

5	6	1	2	0	4	8	5
8	7	6	7	1	2	3	4
4	5	6	8	2	4	1	0
0	2	5	5	4	3	2	6
1	5	6	3	2	4	8	3

Tabulate the data and find the range

3) Number of faulty pens, number of boxes

| 0	1	2	3	4	5	6

| 7 | 10 | 12 | 20 | 19 | 18 | 14 |

a) Draw a bar chart to show the information in the table
b) State the modal number of faulty pens
c) Find the median of the distribution
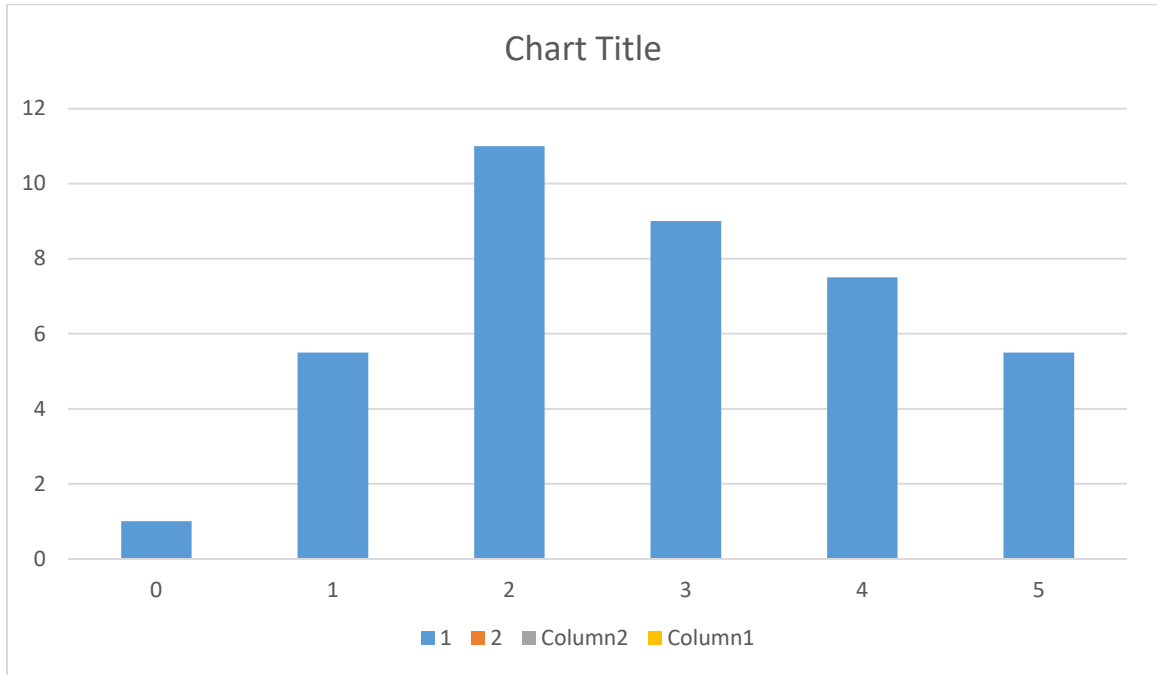
4) Gives the numbers of hour per week allotted to each subject taught at a technical school

SUBJECT	HOURS/WEEK
Mathematics	5
Technical drawing	5
Wood work	2
Mechanical	2
Science	4
Metal work	3

hours/week

mathematics ▪ technical drawing ▪ wood work ▪ mechanical ▪ science ▪ metal work ▪
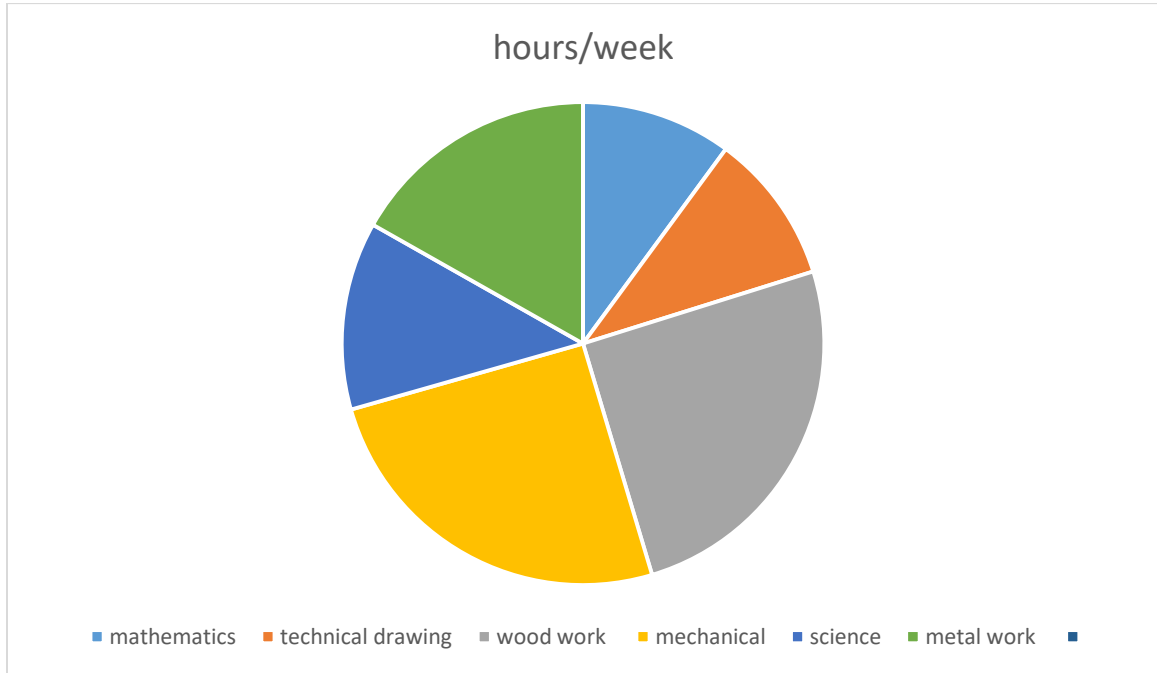
Present this information on a pie chart

REVISON EXERCISES

1. If 135: x = 3:5, evaluate x
2. Evaluate x if 45 : 72 = 40 : x
3. A year ago the daily sales of a newspaper averaged 16320. Now the average daily sales are 28320. Express the ratio of present sale to last year's sale in its simple interest terms
4. As a result of inflation, a trader increased her prices in the ratio 19:18 What will be the new price of a watch marked at #35.70

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