

Course Team

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[...]

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[...]

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iii ECO 153 - Introduction to Quantitative Method I is a three-unit course for 100Level students in National Open University of Nigeria.

COURSE AIMS

The course aims at introducing you to the quantitative method.

COURSE OBJECTIVES

To achieve the aims set above, there are some overall objectives. Each unit also has its objectives. These objectives will guide you in your study. They are usually stated at the beginning of each unit; and when you are through with studying the units, go back and read the objectives again.

WORKING THROUGH THE COURSE

To complete this course you are required to go through the study units and other related materials. You will also need to undertake practical exercises for which you need a pen, a notebook and other materials that will be listed in this guide.

[...]

Certain books are recommended in this course.

ASSIGNMENT FILE

An assignment file and a marking scheme will be made available to you.

TUTOR-MARKED ASSIGNMENT

You will need to submit a specific number of Tutor-Marked Assignment. Every unit in this course has a TMA. You will be assessed on four of them, but the best three will be recorded.

FINAL EXAMINATION AND GRADING

The final examination for ECO 153 will be of three hours duration. All areas of the course will be examined. Find time to study and revise the unit all over before your examination. The final examination will attract

ASSESSMENT

There are two types of the assessment for this course. First is the tutor marked assignments; second, the written examination.

In attempting the assignments, you are expected to apply information, knowledge and techniques gathered during the course.

Assignments File. The work you submit to your tutor for assessment will count for 30 % of your total course mark.

PRESENTATION SCHEDULE

The presentation schedule included in your course materials gives you the important dates for this year for the completion of tutor-mark assignments and attending tutorials.

Module 1 Number and Numeration

Percentages.

Assessment Study this Course Guide thoroughly; it is your foremost

Organise a Study Schedule: refer to the course overview for more details. Note the time you are expected to spend on each unit and how the assignments relate to the units.

Having created your personal study schedule, ensure you adhere strictly to it. The major reason that students fail is their inability to work along with their study schedule and thereby getting behind with their course work. If you have difficulties in working along with your schedule, it is important you let your tutor know.

Assemble the study material. Information about what you need for a unit is given in the 'overview' at the beginning of each unit.

You will almost always need both the study unit you are working on and one of your set books on your desk at the same time.

Work through the study unit.

FACILITATORS/TUTORS AND TUTORIALS

There are ten hours of tutorials provided in support of this course. You will be notified of the dates, times and location of these tutorials, together with the name and phone number of your tutor; as soon as you are allocated a tutorial group. Your tutor will grade and comment on your assignments, keep a close watch on your progress and on any difficulties you might encounter and provide assistance to you during the course. You must mail your tutor-marked assignment to your tutor well before the due date. They will be marked by your tutor and returned to you as soon as possible. Do not hesitate to contact your tutor by telephone, e-mail or personal discussions if you need help.

The Real Number System.....

Percentages.....

Indices, Logarithms and Surds.....

Equations and Formulae.....

Equations.....

Inequalities.....

Set Theory.....

Meaning and Classification of Sets.....

Application of Sets to Managerial and Economic Problems.....

Sequence and Series.....

Arithmetic Progression

Geometric Progression

[...]

In this unit, we will begin this course by introducing the concept of real number system. We will also study the various component of the real number system such as integers, rational number irrational numbers, fractions, decimals and imaginary numbers. Equations and variables are the essential ingredients of mathematical expressions or models. The values economic variables take are usually numerical, there is need to start discussion on this study with the concept of number system. We will find out the relevance of numbers to mathematical analyses as well as the different forms of number list that make up the real number explain the concept “numbers”

Irrational Real Numbers

Fig.1.1: Summary of the Structure of the Real-Number System

Of what relevance is ‘number’ to mathematics and quantitative analyses?

Real Number System The real number system is the set of all the number that are quantifiable in real terms. Whole numbers such as 1, 2, 3, ... are called positive integer; these are the numbers most frequently used in counting.

POSITIVE

Fig. 1.2:Real Number System

Sometimes, positive integers, negative integers and zero are lumped together into a single category, referring to them collectively as the set of all integers.

Integers, of course, do not exhaust all the possible whole number.

Factors such as $\frac{2}{3}$, $\frac{5}{4}$, $\frac{7}{8}$, $\frac{1}{2}$, also fall within the number line showing the members of integers. Negative fractions such as $-\frac{1}{2}$, $-\frac{7}{8}$, $-\frac{5}{4}$ are also components of negative integers. In other words, integers are set of positive or negative whole numbers as well as the set of positive

or negative fraction, zero inclusive.

The common property of all fractional numbers is that each is expressible as a ratio of two integers; thus fractions qualify for the class of rational numbers. However, integers are also rational because any integer, n can be considered as the ratio $n/1$. The set of all integers and the set of all fractions together form the set of all rational numbers.

Change of Fraction to Decimal, Ratio and Percentage

In this unit, we will study the breakdown of a whole numbers into fractions, ratio and proportion. The division of a whole component into divisions is a day to day phenomenon. Individuals income are divided into ratio, fraction or proportion to ensure that all the basic needs are met, the same thing applies to the business organisations' profit and the governments resources, income and wealth. Therefore, it is important to study the fractional parts of a whole as it affects sharing components in terms of ratio and proportion. In the previous unit, fractions have been identified as a component of real numbers which forms between the whole number lines. Therefore, in this unit, we shall examine the components of rational number known as fraction which is also expressed in ratio, proportion or percentages.

identify the relationship between fraction, ratio, proportion and convert fractions to ratio, proportion and percentages and vice versa perform simple mathematical problems involving fraction, ratio, proportion and percentages solve some practical problems involving fraction, ratio, proportion and percentages.

Mathematics is not limited to operation in whole numbers alone. Most often than none, proportion and fractions are used in mathematical analyses to demonstrate the possibilities of treating a unit into denominations or parts. For instance, an orange can be shared among four children equally so that each of them gets a quarter of the orange. If mathematics is limited to the study of whole numbers alone, it will be extremely difficult to share and divide resources among the constituents that own it.

A fraction is a small amount or proportion of a whole. Fractions are used to describe quantities which are less than a whole unit.

Expression of fraction is usually in the form of m/n e.g. $1/2$, $3/5$, $2/7$, $2/3$, etc., where “ m ” is the numerator and “ n ” is the denominator.

$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times x \times y \times y$

2y When fractions have the same number as their denominators, their numerators can simply be added together or subtracted from one another, keeping their denominator constant.

Where the denominators are different, the lowest common multiple is found first and the expression would then be simplified.

e.

$$4 \times 8 = 32$$

It should be noted that, when multiplication is to be carried out for mixed numbers, they are converted to improper fraction before the multiplication.

$$\div 5 = x =$$

When dealing with mixed numbers, the dividend and the divisor are first expressed in improper fraction and the principle of division is then applied. e.g.

M = Multiplication A = Addition

S = Subtraction This implies that in mixed operation, attention should first be based on bracket, followed by 'of', then division before multiplication.

$$1 \times -3$$

E.g. Simplify

Change of Fraction to Decimal, Ratio and Percentage Fraction are converted to decimal by dividing the numerator by the denominator while fraction are converted to percentage by multiplying the fraction by 100 and presenting the answer in percentage .

$$2 = x$$

The addition, subtraction, multiplication and division of fraction can be applied in business management and economics in areas involving the determination of total cost of items, discounts, deductions from salaries, tax liabilities, unit cost of manufactured products or service rendered, return inwards, return outwards etc.

[...]

Anambra, Imo and Ebonyi states decided to go into a joint venture business to produce some products at a large scale.

Anambra provides $\frac{1}{3}$ of the funds required for the investment.

A ratio expresses the functional relationship between two or more magnitude.

[...]

Johnson Construction Company uses metals to produce its products. In a year, the company purchased an alloy with which to construct a frame for a part of a certain building.

[...]

Oyo, Ogun and Lagos invested N300m, N200m and N500m in a joint venture business to produce large quantity of cocoa for exports.

[...]

Danladi and Sons Limited made total sales of N50, 200 on a certain market day. Of this sales figure, sales of beans accounted for N32, 600. What is the ratio of beans sales to the total sales? Ade, Olu and Dayo share profits in a partnership business in the ratio 2:5:8.

3 is multiplied by 4 to get 12, the same 4 should multiply 2 to get x

2: 3 = 8: 12, therefore x = 8.

2: 3 = 10: 9, therefore y = 15.

Since a gallon costs N200

Therefore, 10 gallons cost $N200 \times 10 = N2,000$.

5 men take 20 hours to do the work

1 man takes hours = 100 hours to do the work.

i.e. 10 men takes 20×5

= 10 hours to do the work.

If 250 labourers are needed to clean up the factory of a certain manufacturing companies having 50 machines.

250 labourers needed for 50 machines i.e. $250/50$ labour need for 1 machine

Additional 40 machines make the machine 90 in number i.e. Number of labourers required to clean up 90 machines

450 labourers.

Obiageli Industries Ltd earned N100, 000 as return on investment of N500, 000.

Convert the following to percentages

$1/3 = 1/3 \times 100/1 = 33.33\%$
 $1/4 = 1/4 \times 100/1 = 25\%$
 $2/5 = 2/5 \times 100/1 = 40\%$
Change the following decimal fractions to percentage.

[...]

= 25% The population of a country was 1.5 million in 1998 and in 2008, the population dropped to 1.2 million.

What is the loss percentage?

At independence, a country's population was put at 57 million.

Ten years after independence, it was put at 75 million.

Fractions, ratio, decimal and percentages are basically the same but different ways of expressing one variable in the proportion of the other.

Mathematical and quantitative analyses require sound knowledge of fractions, ratio, percentages and proportions to be able to quantify variables and draw relative proportionality among the variables or magnitudes of interest.

Express the cost of these raw materials in the simplest

Express the weights in the simplest possible ratio.

Change the following to decimal

30th June 2002, it produced 25,500 bottles of Body Pears. By the year ended 30th June 2003, it produced 30,000 bottles of the product. Calculate the percentage increase in production.

Lowest Common Multiples

Counting at a particular interval such as the multiplication tables, gives the multiples of a particular number. Therefore, it is possible for two or more numbers to have some multiples common to them. The lowest of such common multiples is called the Lowest Common Multiples.

[...]

6, 12, 18, 24..., but the least of the common multiples is 6.

$$60 = 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

Find the LCM of 24, 36 and 48.

Find the LCM of $24a^3b^2$, $18c^3$ and $36a^3bx^3$

Multiples are figures or expression obtained when a particular number or algebraic expression are multiplied continuously by natural numbers.

The concept of multiples enables us to know the set of numbers common as multiples of two or more numbers.

Find the Lowest Common Multiples of

$12ax^2$, $18b^3xy$ and $24xy^3$.

Schools and Remedial Students in Higher Institutions.

Highest Common Factors

In the previous unit, we discussed the concept of multiples to common multiples and the lowest common multiple. We identified multiples of a number as to the product of the number with natural whole numbers. For instance, the multiples of 4, 8, 12, 16, 20, 24, 28, 32, 36... Similarly, 4 is a factor of each of the multiples because 4 is divisible by each of the multiples leaving no remainder.

Factors can be defined as numbers that can divide a given number in which there is no remainder in the process of division. For example, the factors of 24 are the numbers that divide 24 and leave no remainder.

Therefore, the factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24. It should be noted that, 1 is a universal factor of every number.

[...]

Simplify by factorisation .

Common factors are the factors common to a pair of numbers or algebraic terms.

Example

Find the common factors of $24a$ and $16a^2$.

Factors of 42 are 1, 2, 3, 6, 7, 21, and 42.

Factors of 72 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36 and 72.

Therefore, the common factors are 2, 3 and 6.

Highest Common Factor

Among a given set of common factors, the highest is called the Highest Common Factor . For example in the previous example, The Factors of 42 are 1, 2, 3, 6, 7, 21, and 42.

Therefore, the highest factor common = 6

Find the highest common factor of 14ab and 28bc Factors of 14ab are 1, 2, 7, 14, a, 2a, 7a, 14a, b, 2b, 7b, 14b, ab, 2ab, 7ab and 14ab.

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

Therefore, HCF = $2 \times 3 = 6$.

$$8b = 2 \times 2 \times 2 \times b$$

$$24bc^2 = 2 \times 2 \times 2 \times 3 \times b \times c \times c \text{ HCF} = 2 \times 2 \times 2 \times b = 8b.$$

Find the HCF of 72, 144 and 120.

$$24x^2 - 12x^2 = 12x^2 - 12x^2$$

$$= 12x^2 - 12x^2 = 0.$$

[...]

The concept of factors of numbers and algebraic expression is very useful in mathematics not only in the process of factorisation but also in reducing algebraic terms to the lowest terms. Therefore, further algebraic exercise requires good knowledge of factorisation. Such areas include solving of quadratic expression and simultaneous linear Factors of a number enable us to know the products of the numbers or expression. It equally enables us to express the product of the prime number that makes up the number.

[...]

Channon, et al. . New General Mathematics for West Africa. . United Kingdom:Longman Group.
Gossage, L. C. .

INDICES, LOGARITHM AND SURDS

43, 4 is called the base while 3 is called the power or the index .

Logarithm of a number is another number that is used to represent it such as in this in this equation $10^2 = 100$, 10 is called the base while 2 is the power . In the case of logarithm, the power i.e. 2 is called the log.

Note that the base of a log can be any positive number or any unspecified number represented by a letter.

The origin of logarithms can be traced back to the works of

MichealStifel in 1544. Logarithms were however independently invented by John Napir in 1614 and JostBurgi, who invented the antilogarithm in 1620. These two men motivated hope of simplifying and speeding up laborious calculations in astronomy and other natural sciences.

What are Indices?

Express 720 as the product of its prime factors in index form.

Trace the origin of logarithm and its relevance to today's mathematics.]

The application of indices involves the usage of some properties, which apply to any base. These properties are called rulesofindices. Using "a"

Examples 1

[...]

$$2^3 = 8 \dots\dots\dots$$

[...]

Just like in indices, simplification of logarithms involves some basic rules.

Log = log a + log b e.g. $\log 6 = \log 2 + \log 3$

$$\log 18 = \log 2 + \log 3 + \log 3$$

$$= 0.3010 + 0.4771 + 0.4771$$

Given that if $\log_a x = b$, $x = ab$.

$$\log_x 9 = 2 \quad \log_{10} x = 4$$

Given that $\log 12 = 1.0792$ and $\log 24 = 1.3802$.

Find x in each of the following $\log_2 64 = x$

With the exception of perfect squares, square roots of numbers are expressed in their simplest surd forms e.g.

$$= 7\sqrt{2} + 5\sqrt{2} = 12\sqrt{2} \quad \square \text{ or}$$

Note: = i.e. multiplying both numerator and denominator by the denominator.

[...]

Commutative Law in Matrix Matrix addition is commutative since matrix addition merely involves the summing of corresponding elements of two matrices of the same order.

$$\text{Similarly, } A - B = -B + A$$

7 18 .

Associative Law of Matrix

Since can be converted to matrix addition $A +$, matrix subtraction is also commutative and associative. Matrix multiplication with few exception is not commutative .

Therefore, $+ C = A + =$

This illustrates that matrix addition is associative.

[...]

$$AC = \begin{bmatrix} 4 & 7 & 2 \\ 5 & - & 4 \end{bmatrix} \begin{bmatrix} 9 & 7 & 5 & 2 & 8 \end{bmatrix} = 87... = A$$

Identity and Null Matrices

An identity matrix I is a square matrix which has 1 for every element on the principal or leading diagonal from left to right and zero everywhere else.

$$AI = IA = A$$

Therefore, any matrix for which $A = A^T$ or $A = A^1$ is said to be symmetrical. A symmetrical matrix for which $A A = A$ is termed an idempotent matrix. Therefore, an identity matrix is symmetric and idempotent.

$$AI = \begin{bmatrix} 9 \\ 90+20+61 \end{bmatrix} - \dots$$

$$90+20+61 - \dots$$

$$B+N=$$

Unique Properties of Matrices When two singular matrices multiply themselves, the result may be a null matrix or a non-null matrix but another singular matrix.

A and B are both singular matrices but their product is a null

$A.B$ gives another singular matrix. When a singular matrix is used to multiply two other different matrices independently, the result obtained may be the same which may neither be a null matrix nor a singular matrix.

A.

A.

Even though $B \neq C$, $AB = AC$.

Show that $A + C = A +$

Matrix operation in terms of addition, subtraction and multiplication is strictly based on some rules. Once these rules are adhered to, matrices can be added together, subtracted from one another and also multiply one another. Some basic identity may evolve in the course of performing matrix operations. These identities are proven results of certain matrix operation which may be general or peculiar to some circumstances.

Two matrices can be added together or subtracted from one another if they have the same order.

Multiplication of two matrices A and b to produce A.B is only possible if the number of columns of A equals the number of rows of B. However, $A.B \neq B.A$.

Which of these matrices is it possible to add together?

a.

$$2D \frac{1}{2} A B - \frac{1}{2} C B + C + E$$

Find A.B, B.C, A.C, A , B , C , A .

$$\text{Given that } \begin{pmatrix} 1 & 2 & 3 \end{pmatrix} = \begin{pmatrix} 2 & 3 \end{pmatrix}$$

$$= 0 - = \text{ and}$$

. Find A.C, B.D, E.D, B.E?

[...]

!9' and

$$= 0 .$$

If @ =

Find where possible IA, AI, BI, IB, CI, IC.

Expansion method

Diagonal Method: When a determinant is of the size 3 by 3, the elements of the first two columns are reproduced as if we put a mirror on the third column. This results into additional two columns to the already existing matrix.

Given that =

Step II: Take the second element of the first row in which it appears. and mentally delete the row and column -1 times determinant of the remaining elements.

Given that = E3

A is a non-singular matrix because $|\square| \neq 0$.

Solve for x given that

2 .is singular matrix.

[...]

$D + D \dots D$

$+ \dots 0.2 - > 0. \dots + 2?$

[...]

Properties of Determinants The following properties of determinants provide the ways in which a matrix can be manipulated to simplify its elements or reduced part of them to zero, before evaluating the determinant.

Also, I

Interchanging any two rows or columns of a matrix will change the sign, but not the absolute value of the determinant.

e.g. =

Multiplying the elements of any row or column by a constant will cause the determinant to be multiplied by the same constant.

e.g. / =

$D - 0D$

The determinant transpose e.g. $\begin{vmatrix} 2 & \dots \end{vmatrix} = \begin{vmatrix} \dots & 2 \end{vmatrix}$ of a matrix equals to the determinant of its

If all the elements of any row or column are zero, the determinant is zero.

$3 \ 0 \ .$

$\dots J = 3 \ 0? - > 4 \ 0?$

e.g. $J =$

$D + \dots |9| = 0 \ D$

If two rows or columns are identical or proportional, i.e. linearly dependent, the determinant is zero.

e.g. if =

Solve for x in the following

$D = 12$. Find the possible values of x.

Given that

of.

$$A =$$

.

Given that $B =$

Outline any four properties of determinants with appropriate illustrations.

$$D = 5 + 15.$$

[...]

In the earlier units, we have added, subtracted and multiplied matrices.

To divide matrices, we need some definitions.

For 3 by 3 matrices, $I = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

To divide by a number is equivalent to multiplying it by its reciprocal.

For example, to divide by 2 is the same as multiply by $\frac{1}{2}$. Hence, we define the inverse of a matrix A , so that dividing by A is the same as multiplying by its inverse.

$$AA^{-1} = I = A^{-1}A$$

Multiplying a matrix by its inverse reduces it to an identity matrix. Thus, the inverse matrix in linear algebra performs much the same function as the reciprocal in ordinary algebra. The formula for deriving the inverse is $A^{-1} = \frac{1}{|A|} \text{adj}(A)$. To obtain the adjoint of A , it may be necessary to obtain the minors and the co-factor first.

Find the inverse of $A =$

.

$$K =$$

$$\begin{pmatrix} 3 & 1 & 0.2 & -0.1 \\ -4 & 2 & 0.4 & 0.3 \end{pmatrix}$$

[...]

as required.

v.

[...]

Find the adjunct of the matrix. To obtain the adjunct of a matrix, we have to obtain the minor, the co-factor matrix and transpose of the co-factors.

[...]

5 -.

Given $\square = \square -2 \ 3$

1 -.

$B = \begin{pmatrix} 2 & 1 & 1 \\ - & & \end{pmatrix}$

b.

Find the determinant and the inverse of $\square = \begin{pmatrix} 2 & 1 & -4 \\ & & \end{pmatrix}$

The Use of Matrix Inversion in Solving Linear Equation The concept of inverse matrix can be used in solving linear equations.

The examples below illustrate how inverse matrix can be used to solve two linear simultaneous equation and three linear simultaneous Use inverse matrix to solve the unknown in each of the following pairs of simultaneous equations.

K

' ... $x = 4$ and $y = 3$

100,

This implies that a pen was sold for ₦5, a book for ₦4 and ₦1 was given to the customer for buying a pencil.

Example 1: $2x_1 + 6x_2 = 22$

Use crammer's rule to solve for x_1 and x_2 .

O with

$$\dots = \infty =$$

$$-2A =$$

Use matrix algebra to solve for x and y in each of the following Use inverse matrix to solve for x1, x2 and x3.

$$x_1 - 3x_2 = 5 + 2x_3.$$

The unit has successfully examined the procedures and techniques involved in obtaining the inverse of square matrices. The unit equally examines the alternative techniques of solving linear equations using both matrix inversion as well as the Cramer's rules.

$$x_3 = -1$$

$$6x_1 - 5x_2 = 3.$$

By method of co-factor expansion, find the inverse of

Amina, Usman who is a merchant dealer in Yobe state deals in three products namely Gold, Ball pen and Diamond.

5 Gold, 7 Ball pens and 4 Diamond were sold in Potiskum

Total products sold at Gashua were in the ratio 1: 2: 2 for Gold, Ball pen and Diamond respectively.

If the sales in Damaturu summed up to N6, 000, that of Potiskum summed up to N7, 000 and that of Gashua summed up to N6, 000.

Present the information using matrix algebra.

Set up a system of linear equations available department are to be used

Determine the product schedule using a matrix method.

REFERENCES/FURTHER READING

Elayn, Marton-Gay. Introductory Algebra. New Jersey: Prentice-Hall Inc.
Hardwood, L. C. Ordinary Level Mathematics.

MCQ1: Determine the value of x and y simultaneously given that $x + y = 10$ and $xy = 21$

Answer: $x, y = (3, 7), (7, 3)$

MCQ2: The sum of twice a number and 5 is less than the sum of one-third of the number and 6, find the number.

Answer: $x < 3/5$

MCQ3: The sum of eight times a number and 15 is less than thrice the same number minus 10, find the number.

Answer: $x < -5$

MCQ4:

Find the sum of eight terms of the GP 2, 6, 18, -----.

Answer: 6560

MCQ5: Simplify $3\sqrt{12} - 4\sqrt{75} + \sqrt{48}$

Answer: $-10\sqrt{3}$

MCQ6: Solve for the value of t and u given that $2^{n+0}=8$ and $3^{2n-0}=27$

Answer: $n = 2$ and $o = 1$

MCQ7: Factorize the equation $2y^2 - 11y + 5$ and get the value of y

Answer: 5 or $\frac{1}{2}$

MCQ8: The sum of twice a number and 15 is less than thrice the same number minus 9. Form an inequality for the statement and get the value of the number.

Answer: $x < 24$

MCQ9: Find 127th term of the AP given as 5,8,11,-----

Answer: 383

MCQ10: The 21st term of an AP is 50,000, if the first term is 20,000. Find the common difference.

Answer: 1500

MCQ11:

If 3, x, y, 18 are AP. Find the values of X and Y.

Answer: $x=8, y=13$

MCQ12: Find the gradient of the line described by the given point. P(5,3) and Q(7,10)

Answer: $\frac{7}{2}$

MCQ13: 8 pencils and 3 books cost N288 while 5 pencils and 2 books cost N184. what is the cost of pencil and books.

Answer: N24 and N32

MCQ14: Using factorization method solve for x, $5x^2 + 12x + 7 = 0$.

Answer: -1 or $-\frac{7}{5}$

MCQ15: Given equation $4x^2 - 9x + 5 = 0$, find the value of x .

Answer: 1 or 1.25

MCQ16: Find the value of K in the perfect square $12x^2 - 6x + K$.

Answer: 0.75

MCQ17: Find the quadratic equation whose root is $-1/2$ and $3/2$.

Answer: $4x^2 - 4x - 3$

MCQ18: Solve $(7\frac{3}{5} \text{ of } 17/19)/15/25$

Answer: $11\frac{1}{3}$

MCQ19: Solve $1\frac{6}{9} \text{ of } \frac{2}{3} - 3\frac{1}{5} + 2\frac{1}{2} / \frac{1}{2}$

Answer: $2\frac{41}{45}$

MCQ20: Convert ratio 4:5 to percentage

Answer: 80%

MCQ21: Given that factor overhead is $\frac{2}{5}$, prime cost is $\frac{1}{5}$. Calculate the fraction of the total spent on other items.

Answer: $\frac{2}{5}$

MCQ22: Express 5hrs as a ratio of 1week and 2days

Answer: 5216

MCQ23:

The ratio by weight (kg) of zinc, tin and copper are 4:3:3, if the work requires 640kg alloy, what is the required kg for zinc.

Answer: 256kg

MCQ24:

For selling an item for N850 a trader made a profit of 15%. What should be selling price be to make a profit of 20%.

Answer:

887

MCQ25:

Solve the simultaneous inequalities $6x - 2y \geq 14$ and $14x + 3y \leq 24$ and determine the values of x and y.

Answer: $x \geq 1.96$, $y \leq 1.12$

MCQ26: Simplify $10! / (10 - 5)!$

Answer: 30240

MCQ27: In how many ways can the letter of the word FRACTIONS be written?

Answer: 362,880 ways

MCQ28: In how many ways can the word EXAMINATION be arranged?

Answer: 4,989,600

MCQ29:

Find the value of $(1.06)^7$

Answer: 1.5

MCQ30: In how many ways can the letter OSOGBO be arranged?

Answer: 120 ways

MCQ31: Five men sit around a circular table, how many ways can this be done?

Answer: 120 ways

MCQ32: Multiply $4\frac{1}{2} \times 12$

Answer: 288

MCQ33: A committee has ten members, how many ways can the MD, Chairman, Secretary and ICT Manager be selected?

Answer: 5040 ways

MCQ34: Solve ${}^7P_4 - {}^4P_3$

828

Answer: 828

MCQ35: From a class of 12 students, six are to be selected as a member of a committee. In how many ways can this be done?

Answer: 665,280

MCQ36: A school committee is to be formed. There are nine girl and six eligible boys. In how many ways can the committee be formed if there are four girls and three boys? $1+xn=1+nx1!+nn-1x22!+\dots$

Answer: 2520

MCQ37: Find 127th term of the AP given as 5,8,11,-----

Answer: 383

MCQ38: An imaginary number is a number that has _____

Answer: negative square root

MCQ39: Simplify $3\frac{1}{2} - 2\frac{7}{12}$ $1+xn=1+nx1!+nn-1x22!+\dots$

Answer: $11/12$

MCQ40: It took 7men 35hours to build a house. How much time will it take 12 men working at the same rate to finish the house.

Answer: 20hrs 42mins

MCQ41: For selling an item for N 900 a trader make a profit of 25%. What should the selling price be to make a profit of 30%.

Answer: N936

MCQ42: Factorise the polynomial $4x^2 + 20x + 3xy + 15y$

Answer: $(x+5)(4x+3y)$

MCQ43: Solve the indices $(2a^3b^2)(a^{-2}b)/(2ab)^{-2}$

Answer: $8a^3b^5$

MCQ44: Solve $\log_5 12.5 + \log_5 2$

Answer: 2

MCQ45: Convert $\log_3 6$ to base 3

Answer: 1.63

MCQ46:

The LCM of $14a^2b^2$, $7ab$ and $28ab^2$ is

Answer: $28a^2b^2$

MCQ47: Express 200g as a ratio of 4kg

Answer: 1g : 20g

MCQ48: It took 4 men 20 hours to clean up the hostel of a certain school. How much time will be taken by 8 men working at the same rate to finish work?

Answer: 10hours

MCQ49: Obaka and Bakare Shared a profit of N50,000 at ratio 3:4, what is Obaka's share of the profit?

Answer: N21,428.57

MCQ50: If 250 labourers are needed to clean up the factory of a certain manufacturing company having 50 machines. How many labourer will be needed if 50 similar machines are required?

Answer: 250

FBQ1: When both numerator and denominator of a fraction are multiplied by the same number (except _____), another fraction is obtained

Answer: zero

FBQ2: Monomials can be added or subtracted to form _____.

Answer: polynomials

FBQ3: An improper rational expression is the one in which the degree of the denominator is _____ than the degree of the numerator

Answer: Less

FBQ4: Since the degree of numerator is greater than that of the denominator, the rational function is _____.

Answer: Improper

FBQ5: There are _____ forms of arrangements of objects that the concept of factorial can assist us to obtain.

Answer: Two

FBQ6: The total expenses of Obaka Nigeria Limited in the year ended 31 December, 2018 were N180, 000. This consists of: Wages and salaries = N 50, 000 Selling and distributing expenses = N 20,000 Insurance = N 5,000 Rent = N 30,000 Electricity = N 35,000 Traveling and fueling = N 35,000 Miscellaneous expenses = N 5,000 The fractional part of the total that is rent is _____;

Answer: $\frac{1}{6}$

FBQ7: The value of $(1.06)^7$ is _____.

Answer: 1.5

FBQ8: The ratio by weight (kg) of zinc, tin and copper are 4:3:3, if the work requires 640kg alloy, the required kg for zinc is _____.

Answer: 256kg

FBQ9: Simplify without using table $\log_5 12.5 + \log_5 2$ is _____.

Answer: 2

FBQ10: Simplify and solve for x, given $(0.125)^{x+1} = \frac{1}{64}$ yields _____.

Answer: 1

FBQ11: Convert $\frac{2}{5}$ to ratio = _____

Answer: 2:5

FBQ12: Convert $\frac{3}{5}$ to percentage = _____

Answer: 60%

FBQ13: If 250 labourers are needed to clean up the factory of a certain manufacturing companies having 50 machines, _____ labourers will be needed if additional 40 similar machines are required.

Answer: 450

FBQ14: It took 5 men 20 hours to clean up the warehouse of a certain company, therefore, _____ hours will be taken by 10 men doing the same work at the same rate.

Answer: 10

FBQ15: The population of a country was 1.5 million in 1998 and in 2008, the population dropped to 1.2 million. The percentage reduction in population was _____ per cent.

Answer: 20

FBQ16: $9 - \frac{3}{2} =$ _____

Answer: $\frac{1}{2}$

FBQ17: $(x-3)^0 =$ _____.

Answer: 1

FBQ18: $a^2b^3/ab =$ _____.

Answer: ab^2

FBQ19: An orange can be shared among four children equally so that each of them gets a _____ of the orange.

Answer: quarter

FBQ20: A _____ is a small amount or proportion of a whole.

Answer: fraction

FBQ21: A proportion is simply an expression of the equation of _____ ratios.

Answer: two

FBQ22: If $\frac{12}{5} = \frac{7}{5}$, then $\frac{32}{7} =$

Answer: $\frac{23}{7}$

FBQ23: Convert $\frac{2}{8}$ to decimal = _____

Answer: 0.25

FBQ24: $x + 2y$ is a mathematical expression but $x + 2y = 7$ is a mathematical x _____.

Answer: equation

FBQ25: The first and last term of an AP are 5 and 100 respectively. The sum of AP, if the AP has 20 terms is _____.

Answer: 1050

FBQ26: The present value of N923 receivable in 7 years if the money is worth 15% per year compounded quarterly is _____.

Answer: 346.98

FBQ27: The present value of 10,000 receivable 5 years from now if money is worth 10% per annum is _____.

Answer: 6,209.20

FBQ28: Five men sit around a circular table, this can be done in _____ ways.

Answer: 120 ways

FBQ29: A committee has ten members, the MD, Chairman, Secretary and ICT manager can be selected in _____ ways.

Answer: 5040 ways

FBQ30: From a class of 12 students, six are to be selected as a member of a committee. This can be done in _____ ways.

Answer: 665,280

FBQ31: Given that the quantity demand of orange $Q_d = 40 - 5p$, then _____ units of orange is demanded if price is N5.

Answer: 15

FBQ32:

Given that A {prime number less than 20}, B {even numbers less than 15}, C {Multiples of 4 less than 15} then $A \cup B \cap C$ is _____.

Answer: {4,8,12}

FBQ33:

A proper subset is a set that has all the _____ of a set in another set

Answer: Elements

FBQ34: Given $\xi = \{1,2,3,4,5,6,7,8\}$, $A = \{1,2,4,8\}$, $B = \{1,3,5,7\}$, $C = \{2,4,6,8\}$, find $A \cap B \cup C$.

Answer: {1,2,3,4, 5,7,8}

FBQ35: ECO 153 is introduction to _____ method I

Answer: quantitative

FBQ36: In $17 + 3y = 20$, the value of y will be _____

Answer: 1

FBQ37: The ability of a positive number to increase is subject to be added to another positive number (except _____).

Answer: 1

FBQ38: A _____ is formed when a set of number is increasing or decreasing by a constant value as the term of the sequences are being formed.

Answer: sequence

FBQ39: If the AP is given as 5, 8, 11.... The 127th term is _____

Answer: 383

FBQ40: The arithmetic progression 8, 11, 14, 17, ..., 380 has _____ terms.

Answer: 125

FBQ41: A student borrows 600 at 7% interest compounded annually. He pays off the loan at end of 3 years. He paid a total amount of _____.

Answer: 735

FBQ42: Make x the subject of the formula $L = \frac{xp}{a(x+p)}$ gives _____.

Answer: $x = \frac{ap}{h} - La$

FBQ43: Tunde save N40,000 in the first year of a new job. In each subsequent year, he saved 15% more than in the previous year. The total amount he has saved in 5years is _____.

Answer: N269,695

FBQ44: Express 5hrs as a ratio of 1week and 2days gives _____.

Answer: 5/216

FBQ45: To convert ratio 4:5 to percentage yields _____.

Answer: 80%

FBQ46: An improper fraction is classified as _____.

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

FBQ47: An imaginary number is a number that has _____

Answer: negative square root

FBQ48: The 3rd and the 6th term of GP are 18 and 486, therefore, the 10th term is _____.

Answer: 39366

FBQ49: The second term of a geometric progression is 6 and the fifth term is 162. The third term is _____.

Answer: 18

FBQ50: The 4th and 7th term of an arithmetic sequence are 6 and 15 respectively. The nth term of the sequence is _____.

Answer: 4