NATIONAL BOARD FOR TECHNCIAL EDUCATION, KADUNA

MATHEMATICS

FOR

NATIONAL VOCATIONAL CERTIFICATE

CURRICULUM AND COURSE SPECIFICATIONS

2007

PLOT 'B' BIDA ROAD, P.M.B. 2239, KADUNA-NIGERIA

PROGRAMME : NATIONAL VOCATIONAL CERTIFICATE

Goal : This course is designed to provide the trainee with a sound knowledge of elementary mathematics to enhance his Knowledge of mathematical concepts and their applications for solving trade problems and to prepare them for Post-secondary technical education.

General Note:

To qualify for the award of the National Vocational Certificate candidates must obtain pass grades in CMA10and CMA 11.

MATHEMATICS

S/N	CODE	MODULES	CONTACT HOURS
1	VMT011	NUMBER AND NUMERATION	36
2	VMT012	ALGEBRA AND GEOMETRY	36
3	VMT013	ALGEBRA AND STATISTICS	24
4	VMT014	TRIGNOMETRY	24
5	VMT015	GEOMETRY	24

PROGRAMME: NATIONAL VOCATIONAL CERTIFICATE

MODULE : NUMBER AND NUMERATION

MODULE CODE: VMT 011

DURATION : 36 Hours 2hrs. Lecture 1hr. Tutorial

GOAL : The module is aimed at providing the trainee with adequate mathematic background in number and numeration.

GENERAL OBJECTIVES:
On completion of this module, the trainee should be able to:

1.0 Understand basic arithmetic operations in different number bases.

2.0 Know S. I. units of length weight and convert from one unit to another.

3.0 Understand arithmetic operations involving vulgar and decimal fractions.

4.0 Understand numbers in standard forms to the required number of significant figures and decimal places.

5.0 Understand values by ratio and proportion.

6.0 Understand the principles of percentage.

7.0 Know how to solve problems involving simple interest.

8.0 Know the laws of indices.

9. 0 Understand the basic rules of logarithms.

10.0 Know how to use logarithms, square and square root tables in solving mathematical problems.

11.0 Understand the patterns of a sequence and series.

12.0 Understand mathematical statements using set notation.

PLEASE NOTE: some trade course may run this module for two terms.

PROGRAMME: **NATIONAL VOCATIONAL CERTIFICATE**						
MODULE: NUMBER AND NUMERATION			**MODULE CODE**: VMT011		**CONTACT 36hours**: 2 hrs Lecture 1hrTutorial	
GOAL: **The module is aimed at providing the trainee with adequate mathematic background.**						
COURSE SPECIFICATION: Theoretical Contents:				**Tutorial Contents**:		
	General Objective: 1.0 Know basic arithmetic Operations in different number bases.			**General Objective**:		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Number Bases 1.1 Count in different bases e.g. 2, 5,8, and 10. 1.2 Convert from one base to another. 1.3 Add and subtract in different bases (excluding fractions); 1.4 Multiply and divide in different bases.	Explain with relevant examples.	Text book Chalk board Calculator	The leaner should be able to: 1.1 Count in different bases e.g. 2,5,8, and 10. 1.2 Convert from one base to another. 1.5 Add and subtract in different bases (excluding fractions); Multiply and divide in different bases.	The teacher should supervise and guide the leaner in problem solving.	Text book Chalk board Calculator
	General Objective: 2.0 Know S. I. units of length weight and time and convert from one unit to another.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	S. I. Unit **a)** Explain the difference between S. I. and imperial units of linear measure: b) Convert millimeter (mm)	Explain with Relevant examples. Work out some problems of conversion. E.g.	Text book Calculator Chalk board			

	to meter and meter to kilometer and vice-versa etc. c) Convert S. I. unit of weight, area and volume to imperial units and vice-versa. d) Carry out calculations involving weight, area and volume.	conversion of meters to kilometers etc and solve some problems as examples.				
	General Objective: 3.0 Uderstand arithmetic operations involving Vulgar and decimal fractions.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	3.1 Convert vulgar fractions to decimal fraction and vice-versa. 3.2 Divide, add, multiply and subtract ; (a) Fractions and (b) Decimals to some degree of accuracy (approximation).	Revise L C M and HCF Explain with relevant examples. e.g. ¾ = 0.75	Chalk board Calculator Text book			

	General Objective: 4.0 Understand numbers in standard forms to the required number in significant figures and decimal places.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Numbers: 4.1 Express number in standard forms e.g. 1120 = 1.12×10^3. 4.2 Round off numbers and give answer in the required number of significant figures.	Explain how to solve problems in standard form and significant figures. Explain how to round off numbers.	Chalk board Calculator Text book			
	General Objective: 5.0 Understand values by ratio and proportion.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Ratio & Proportion: 5.1 Explain ratio and proportion. 5.2 Perform calculations on ratio, direct and inverse proportions including representative fractions.	Explain and show how to solve problems of ratio, direct and indirect proportions including fractions.	Text book Calculator Note book	Solve problem involving ratios and proportions.	Supervise and guide the leaner in problem solving.	Text book Calculator Note book

	General Objective: 6.0 Understand the principles of Percentage			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Percentages: 6.1 Convert fraction and decimal to percentages and vice-versa. 6.2 Calculate percentage change. 6.3 Calculate profit and loss.	Solve some problems on converting fractions to percentages. And explain how to calculate percentage changes, profit and loss.	Chalk board Calculator Text book			
	General Objective: 7.0 know how to solve problems involving simple interest.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Interest: 7.1 Calculate principal rate, time, interest using appropriate formulae: 7.2 $I = \frac{PRT}{100}$ Where I = Interest P = Principal R = Rate T = Time	Explain how to calculate principal rate time and interest with the formula I*100=PRT	Chalk board Calculator Text book			

	General Objective: 8.0 Understand the patterns of a sequence and series.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Arithmetic and Geometrical Progression 8.1Define Sequence and Series 8.2 Determine the nth term of a given sequence in A P and G P. 8.3 Solve problems in A P and G P. example Find the sum of AP and GP of the sequences 1,2,3,4,5,6 and 2,4,8,16,32	Define sequence and series. Explain with relevant examples. Solve some problems as example.	Chalkboard Textbook Calculator	Find the sum of AP and GP of a sequence.	Supervise and guide.	
	General Objective: 9.0 Know the laws of indices.			**General Objective**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Indices: 9.1 State the laws of indices i.e. $a^p \times a^q = a^{p+q}$ $a^p \div a^q = a^{p--q}$ $(a^p)^q = a^{pq}$ 9.2 Explain the meaning of a^o, a^{-p} and a^p e.g. by considering $a^p \div a^p$	State the laws of indices. Explain how to apply the laws in solving problems.	Calculator Textbook Chalkboard			

	$a^o \div a^p$ and $a^p \times a^p = a^1 = a$					
	General Objective: 10.0 Understand the basic rules of logarithms.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Logarithms: 10.1 Identify the basic rules of logarithms i.e. 10.2 Solve problems by $\log_{10} pq = \log_{10} p + \log_{10} q$ $\log_{10} \frac{p}{q} = \log_{10} p - \log_{10} q$ $\log_{10} p^n = n \log_{10} p$ applying the basic rules of logarithms e.g. $\log_{10}16 = \log_{10}2^4$ $= 4\log_{10}2$ $= 4 \times 0.3010$ $= 1.2040$ 10.3 Solve problems on compound interest, investments and annuities using logarithm table. 10.4 Explain the relationship between indices and logarithms. 10.5 Prove with examples that indices and logarithms are inverse operations.	Explain basic rules of logarithms. Solve problems by applying these rules Explain the relation ship between logarithms and indices Demonstrate how to draw graph, and how to use it in multiplication and division.	Four figure table Text book Calculator Chalk board			

	10.6 Draw graph of $y = 10^x$ for $0 \leq x \leq 1$ 10.7 Divide and multiply using graph.					
	General Objective: 11.0 Know how to use logarithms, square and square root tables in solving mathematical problems.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Logarithms: 11.1 Divide and multiply powers and roots using log tables. 11.2 Solve squares and square root problems using appropriate tables.	Show how to use log tables and solve problems of square, square root, division multiplication and powers.	Text book Calculator Log table Chalk board			
	General Objective: 12.0 Understand mathematical statements using Set notation.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Sets: 12.1 Explain what is a set, universal set, finite and infinite sets, empty sets and sub-sets. 12.2 Use notations for	Explain with relevant examples. Explain how to use the	Text book Calculator Chalk board	Solve problems involving sets.	Guide and supervise student.	Text book Calculator Chalk board

	union, intersection and compliment of sets and disjoint sets. 12.3 Represent set operations using Venn diagram 12.4 Solve problems involving sets and classification using Venn diagrams.	notations. Explain with examples. Solve some problems as example.				

PLEASE NOTE: some trade course may run this module for two terms.

PROGRAMME : NATIONAL VOCATIONAL CERTIFICATE

MODULE : ALGEBRA AND GEOMETRY

MODULE CODE : VMT012

DURATION : 36 Hours 2hrs. Lecture 1hr. Tutorial

PRE-REQUISISTE : JSS MATHEMATICS OR CMA 10

GOAL : The module is designed to provide the trainee with an understanding of methods of constructing Geometric figures as well as the use of algebra to solve mathematical problems.

GENERAL OBJECTIVES

On completion of this module, the trainee should be able to:

1.0 Understand arithmetic operations with algebraic symbols.

2.0 Understand how to solve problems involving simple equations.

3.0 Know the properties of lines and angles.

4.0 Know the types and properties of triangles and polygons.

5.0 Understand how to use instruments to carry out simple geometric constructions.

6.0 Know Pythagoras theorem and apply its concept in solving problems involving right angled triangles.

7.0 Know the perimeter and areas of simple geometric plane figure.

8.0 Understand how to calculate the surface area and volume of solid figures.

PROGRAMME: **NATIONAL VOCATIONAL CERTIFICATE**						
MODULE: Algebra and Geometry			**MODULE CODE**: VMT012		**CONTACT 36** Hours: 2hrs L 1hr tutorial	
GOAL: The module is designed to provide the trainee with an understanding of methods of constructing geometric figures as well as the use of algebra to solve mathematical problems.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0 Understand arithmetic operations with algebraic symbols.			**General Objective**:		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Arithmetic Operation In Algebra: 1.1 Identify like and unlike terms. 1.2 Add, subtract, multiply, and divide simple algebraic expressions. 1.3 Introduce and remove brackets. 1.4 Interpret literal statements into symbolic forms. 1.5 Solve problem in symbolic forms. 1.6 Construct and	Explain with relevant examples.	Calculator Chalk board Text book			

	evaluate formulae. 1.7 Change the subject of any formulae.					
	General Objective: 2.0 Understand how to solve problems involving simple equations.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Simple Equation: 2.1 Define simple equations. 2.2 Solve simple equations, e.g. 2x +5=10x + 1. 2.3 Form equations from literal statements. 2.4 solve the equations.	Explain with examples Give home work	Text book Calculator Chalk board			
	General Objective: 3.0 Know the properties of lines and angles.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Lines and Angles: 3.1 Define point, line, parallel lines, straight lines, curves, perpendicular and Horizontal lines. 3.2 Identify the different types of angles: e.g.	Explain with examples Give class work.	Protractor Ruler Set square Math set Calculator			

	acute, obtuse, right angle, reflex angles, complimentary and Supplementary, adjacent angles, vertically opposite angles, alternate and corresponding angles.					
	General Objective: 4.0 Know the types and properties of triangles and polygons.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Triangles: 4.1 Identify the various parts of triangle. 4.2 Identify the types of triangle and quadrilateral example isosceles triangles; right angle triangle scalene triangles; obtuse angled triangles; rhombus; parallelogram; squares; kite, etc. 4.3 Apply the sum of an angle of a triangle/polygon to calculate any angle	Explain with relevant examples.	Text book Math set calculator			

	of the triangle. 4.4 Identify types of polygons e.g. pentagon, hexagon, heptagon, octagon, decagon. 4.5 Apply the sum of interior angles of a polygon on n sides to calculate any interior and exterior angle: using a. The formulae: (2n – 4) right angles where n = number of sides of the polygon. b. The sum of the exterior angles of a polygon is 4 right angles.					
	General Objective: 5.0 Understand how to use instrument to carry out simple geometrical constructions.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Construction of Angles and Lines. 5.1 Draw angles of any side, using	Demonstrate how to do the constructions.	Protractors Ruler Board Compass	Carry out 5.1 to 5.6.	Guide and supervise	

	protractors and rulers. 5.2 Bisect straight lines and angles. 5.3 Construct a line parallel or perpendicular to a given line. 5.4 Construct an angle equal to a given angel e.g. 30^0, 45^0, 60^0, 90^0, 1200 etc. 5.5 Divide a line segment into a given number of equal parts or into parts in a given ratio. 5.6 Construct triangles and quadrilaterals using geometrical instruments.					
	General Objective: 6.0 know Pythagoras theorem and apply its concept in solving problems involving right angle triangles.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Theorem of Pythagoras: 6.1 Explain the theorem of Pythagoras. 6.2 Applying the	Explain the theorem and its application in solving problems.	Text book Chalk board			

	Pythagoras theorem. Find any side of a right-angled triangle when two sides are given.					
	General Objective: 7.0 know the perimeter and area of simple geometric plane figure.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Perimeter and Area of Geometrical Plane Figures: 7.1 Differentiate between the following	Explain the terms.	Models of the figures listed Calculator Text book	Carry out 7.3 and 7.4	Guide and supervise	

	geometric plane figures, triangles, rectangles etc. 7.2 Explain the meaning of: (a) perimeter (b) area of a plane figure 7.3 Calculate the perimeter of plane geometric figure, squares, rectangle, circle; 7.4Calculate area of: (a) triangles (b) rectangles (c) rhombus (d) parallelogram (e) squares (f) kite (g) trapezium (h) quadrilateral (i) polygons (j) circles	Work out some calculations, as examples.				
	General Objective: 8.0 know how to calculate the surface area and volume of solid figures.			**General Objective:**		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	8.1 Identify and draw various types of solid figures. e.g. cuboid, cylinder, cone, pyramids,	Demonstrate how to draw these figures.	Text books, chalkboard ruler protractor Chalkboard set squares, Pair of chalk board-dividers chalkboard-	Draw these solid figures. Cuboids,cylinder,cone, Pyramid and, hemisphere.	Guide and supervise	

	prisms, hemisphere, and frustum of cone and pyramid. 8.2 Calculate surface areas of the figures listed in 8.1 above. 8.3 Calculate the volumes of the figures listed in 8.1 above. 8.4 Calculate the volumes of the containers and hollow solids, pipes, and hollow bricks.	Explain and solve some examples.	compasses Mathematical set.	And cone of frustum and pyramid.		

PROGRAMME : NATIONAL VOCATIONAL CERTIFICATE

MODULE : ALGEBRA AND STATISTICS

MODULE CODE : VMT013

DURATION : 24 hrs. 2hr L T

GOAL: This module is aimed at providing the trainee with the knowledge of statistics, linear equation and graphical solution to problems.

GENERAL OBJECTIVES:

On completion of this course, the trainee should be able to:

1.0 Understand linear simultaneous equations in two unknowns.
2.0 Know how to simplify simple algebraic expressions.
3.0 Understand how to factorize simple algebraic expressions.
4.0 Understand how to plot graphs of simple algebraic expressions.
5.0 Understand quadratic equation.
6.0 Understand statistical data in pictorial forms and charts.
7.0 Know statistical averages.
8.0 Understand the term “probability”.

PROGRAMME: NATIONAL VOCATIONAL CERTIFICATE						
MODULE: ALGEBRA AND STATISTICS		**MODULE CODE**: VMT014		**CONTACT 24 HOURS**: 3 HOURS 2 hr. L 1hr. T		
GOAL: This module is aimed at providing the trainee with the knowledge of statistics, linear equation and graphical solution to problems.						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0. Understand linear simultaneous equation in two unknowns			**General Objective**:		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	1.1 Define simultaneous equation 1.2 Solve simple linear simultaneous equations e.g.: x + y = 8 2x + 3y = 4 By elimination and Substitution methods 1.3 Solve simultaneous equations from literature statements.	Explain with examples.	Text book Calculator Chalkboard	Carry out simple calculations on simultaneous equation by; elimination and Substitution methods.	Guide and supervise**.**	Text book Calculator Chalkboard
	General Objective: 2.0 .Know how to simplify simple algebraic expressions					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Evaluation of Algebraic Expressions:	Explain with examples	Text book Calculator			

	2.1 Find the HCF (Highest common multiple) and LCM (Lowest common multiple) of a given algebraic expression 2.2 Simplify algebraic fractions. 2.3 solve simple equation involving fractions.	Give class work	Chalk board			
	General Objective: 3.0 .Understand how tofactorize algebraic expressions					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Equation Expression: 3.1 Identify factorable expressions 3.2 Distinguish between non-quadratic and quadratic expressions 3.3 Factorize non-quadratic expressions ; (a) by introducing brackets (b) by removing common factors 3.4 Recognize Perfect squares e.g. $a^2 + 2ab + b^2 = (a+b)^2$ Difference of two square, e.g.$a^2 - b^2 = (a+b)(a-b)$ And apply them to factorize expressions. 3.5 Factorize simple quadratic expression e.g. $a^2 + a^7 + 12$	Define the terms Explain with examples	chalk board calculator text book			

	(a + 3) (a + 4)					
	General Objective: 4.0 Understand how to plot graphs of simple algebraic expressions					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	4.1 plot points on the Cartesian plane 4.2 construct the tables from an algebraic expression. 4.3 Plot the graph from the set of data obtained from an algebraic expression. 4.4 Read off value from the graph obtained in 4.3 4.5 Solve two simultaneous equations, using graph .	Demonstrate how to plot the graphs and explain with examples.	Chalkboard Calculator Textbook	Plot graph from algebraic expressional data.	Guide and supervise.	
	General Objective 5.0 Understand quadratic equation.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	5.1 Define quadratic equation	Define explain with examples.	Chalk board Text book			

	5.2 solve quadratic equation by: (i) factorization. (iii) completing. (iii) formulae i.e. x = - b± b^2- 4ac\2a 5.3 Form quadratic equation with given roots, e.g. X= 4 X=3 (x-3) (x-4) = 0 X^2 -7^x + 12 = 0 Form and solve quadratic equation from literal statements		Calculator			
	General Objective: 6.0 Understand statistical data in pictorial forms and charts.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	6.1 represent given data in pictorial forms. 6.2 Represent given data in Bar chart, histogram, graph and Pie chart. 4.3 Interpret graphs, charts.	Explain and define the terms.	Text book Chalk board Calculator Ruler	Plot bar chart, pie chart and histogram.	Guide and supervise.	
	General Objective: 7.0.Know statistical averages					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Averages 7.1 compile the frequency	Explain with examples	Text book Calculator			

	distribution with equal and unequal forms 7.2 Find the mode of given data 7.3 Calculate mean and median excluding group data	Give class work	Chalkboard Sample of the frequency distribution table.			
	General Objective: 8.0 Understand the term "probability"					
WEEK	8.1 Explain the term 'probability of an event with an exact measure by experimentation; 8.2 Determine the probability of an event with an exact measure by theory; 8.3 Prove theoretical probability as a limiting value of experimental probability an the number of trials becomes layed; 8.4 Determine the probability of mutually exclusive events in the same population 8.5 Carry out addition and multiplication of probability for mutually exclusive events; 8.6 Interpret 'and', 'or' in probability.	Define and explain with relevant examples. Prove the theory and determine the probability of mutually exclusive event	Chalk board Text book Calculator Log tables			

PROGRAMME : NATIONAL VOCATIONAL CERTIFICATE

MODULE : TRIGONOMETRY

MODULE CODE : VMT 014

DURATION : 24 Hrs. 2hrs. L

GOAL: This module is designed to provide the trainee with the knowledge of Trigonometry and properties of Triangular figures.

GENERAL OBJECTIVES:

On completion of this course, the trainee should be able to:

1. 0 Understand the six trigonometric ratios and their application in solving problems.

2. 0 Know sine and cosine rules.

3. 0 Know the conditions of congruency of triangles.

4. 0 Know the properties of parallelograms and the application of these properties in solving problems involving quadrilaterals.

5. 0 Understand how to calculate distances along lines of latitudes and longitudes.

PROGRAMME: NATIONAL VOCATIONAL CERTIFICATE						
MODULE: TRIGONOMETRY			**MUDULE CODE**: **VMT 014**	**CONTACT HOURS**: 24 HOURS (2 hr lecture: 1 Tutorial)		
GOAL: . **This module is designed to provide the trainee with the knowledge of Trigonometry and properties of Triangular figures. **						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0 Know the six trigonometric ratios and their application in solving problems.			**General Objective**:		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	1.1 Define the trigonometric ratios of: Sine secant, Cosine cosecant, Tangent cotangent. 1.2 Determine the trigonometric ratio of angles greater than 90. 1.3 Find value of trigonometric ratio and vice versa using table. 1.4 Use trigonometric ratios to solve problems relating to (a) heights and distances, angles of elevation and depression;	Define and explain with relevant examples.	Chalk board Text book Calculator Log tables			

	(b) area of a triangle using the formulae ½ sine B; (a) area of polygon					
	General Objective: 2.0. Know sine and cosine rules.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Sin & Cosine Rules: 2.1 State the sine and cosine rules 2.2 Apply the rules to solve problems on triangles; e.g. bearing .	Use the rules to solve some problems Give class work	Chalk board Text book calculator			
	General Objective: 3.0. Know the conditions of congruency of triangles.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Congruent Triangles:	State and	Chalk board			

	3.1 State the four conditions of congruency i.e. (i) side-side-side (SSS) (ii) side-angle-side (SAS) (iii) side-angle-angle (SAA) (iv) right-angle – hypogenous – side (RHS) 3.2 Apply the conditions in 3.1 to solve problems on triangles	Explain with examples. Solve some examples.	Text book Calculator			
	General Objective: 4.0 Know the properties of parallelograms and the application of these properties in solving problems involving quadrilaterals.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Properties of Parallelograms: 4.1 State the properties of parallelogram-rhombus, rectangle and square by their angles, diagonals, sides etc. 4.2 Solve problems involving the properties of parallelogram	State the properties' Explain with examples	Chalkboard Text book Calculator			

	General Objective: 5.0 understand how to calculate distance along lines of latitudes and longitudes.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	5.1 Define latitude, and longitude as angles; 5.2 Define longitudes and latitudes from geo-graphical point of view; 5.3 Relate definitions in 5.1 and 5.2 above; 5.4 Determine distances along lines of latitudes and longitudes; 5.5 Calculate distances on the surface of the earth.	Define and explain with relevant examples Give assignment				

ROGRAMME : NATIONAL VOCATIONAL CERTIFICATE

MODULE : GEOMETRY

MODULE CODE : VMT 015

DURATION : 24 HOURS 2hr.

GOAL : The module is aimed at providing the trainee with knowledge of methods of calculating areas of regular and irregular figures

GENERAL OBJECTIVES:

On completion of this module the trainee should be able to:

1.0 Understand how to solve problems involving areas of segments and sectors of a circle

2.0 Understand how to solve problems involving areas of irregular figures

3.0 Understand and use the mid-point and intercept theorems

4.0 Understand the properties of similar triangle and their application in solving simple problems in geometry

5.0 Understand how to identify and construct locus of a point in two dimensions

6.0 Understand the proofs and applications of the theorems relating to the chords and tangents of a circle.

PROGRAMME: NATIONAL VOCATIONAL CERTIFICATE						
MODULE: GEOMETRY		**MODULE CODE**: VMT015		**CONTACT HOURS**: 24 HOURS 2hrs. L 1hr T		
GOAL: . The module is aimed at providing the trainee with knowledge and methods of calculating regular and irregular figures						
COURSE SPECIFICATION: Theoretical Contents:				**Practical Contents**:		
	General Objective: 1.0 Understand how to solve problems involving of areas of segments and sectors of a circle			**General Objective**:		
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	1.1 Distinguish between sector and segment. 1.2 Calculate the area of a sector. 1.3 Calculate the area of segment, area of sector minus area of the triangles, e.g. rise and span of a segmental area.	Distinguish the two. Solve some problems as examples	Calculator Text book chalk board Compass –chalk board chalk board ruler			
	General Objective: 2.0 Understand how to solve problems involving areas of irregular figure					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	2.1 Distinguish between regular and irregular figures. 2.2 Calculate the area of irregular plane figures using mid-ordinate and trapezoidal rules.	Distinguish the t Solve some problems as examples	Calculator Text book chalk board Compass –chalk board Chalkboard-ruler			

	General Objective: 3.0 . Understand and use the mid-point and intercept theorems					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Mid-point and Intercept theorems 3.1 Explain with annotated diagrams: (a) the mid-point theorem. (b) The intercept theorem. 3.2 Apply the theorems in item 3.1 to solve problems relating to proportional division of lines.	Explain with relevant examples Solve some problems as examples	Calculator Text book chalk board Compass –chalk board Chalkboard-ruler			
	General Objective: 4.0 .know the properties of similar triangle and their application in solving simple problems in geometry					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	Similar Triangles: 4.1 State the properties of similar triangles: (i) all angles are equal. (ii) Ratio of corresponding sides is equal. 4.2 Apply the properties of similar triangles in 4.1 to solve simple problems on areas and volumes of similar	Explain with relevant examples. Solve some problems as examples	Calculator Text book chalk board chalkboard-ruler			

	plane geometrical shapes and solids respectively. 4.3 Show that the bisector of an angle on a triangle divides the opposite side in the ratio of the side containing the angles.					
	General Objective: 5.0 Understand how to identify and construct locus of a point in two dimensions					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	5.1 Define locus. 5.2 Construct the locus of points which are: (i) at a given distance from a given point. (ii) At a given distance from a given straight line. (iii) Equidistant from two given points. (iv) At a given segment of a straight line subtend a given angle (constant angle locus).	Define and explain. Demonstrate how to construct locus of a point as in 5.2	Calculator Text book Chalkboard Chalkboard-ruler Math set Board compasses Board protractor Board set square	Construct locus as in 5.2	Guide and supervise	Calculator Text book Chalkboard Chalkboard-ruler Math set Board compasses Board protractor Board set square

	General Objective: 6.0 . Understand the proofs and applications of the theorems relating to the chords and tangents of a circle.					
WEEK	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**	**Specific Learning Objective**	**Teachers Activities**	**Learning Resources**
	6.1Explain with practical examples the following theorem associated with the chord and tangent of a circle: (i) Equal chord subtends equal angle at the circumference; (ii) The angle which an area subtends at the centre in twice that it subtends at the circumference; (iii) Angles in the same segment are equal; (iv) An angle in a major segment is acute and angle in minor segment is obtuse; (v) The rectangle contained by the segment of one equal to the rectangle contained by the other (both internally and externally); (vi) A tangent is perpendicular to the radius of a circle; if two circles touch, the point of contact is on the line of centre; (vii) The tangents of circle	Explain with relevant examples Explain the application of this theorem to construction of chain belts gears and sprockets.	Calculator Text book chalk board Rule chalk Board Set square Mathematical set			

	from an extended point are equal; (viii) The direct and transverse common tangents to two circles are equal. 6.2 Apply the theorems in 6.1 above to the construction of chain, belts, gears and sprockets, etc.					

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