SUBJECT: MATHEMATICS **CLASS: SS 3**

WEEK	SCHEME OF WORK
1.	Theory of Logarithms: Laws of Logarithms and application of Logarithmic equations and indices
2.	Surds: Rational and Irrational numbers; basic operations with surds and conjugate of binomial surds
3.	Application of surds to trigonometrical ratios. Draw the graphs of sine and cosine for angles $0^0 < x < 360^0$
4.	Matrices and Determinant: Types, order, Notation, basic operations, transpose, determinants of 2 x 2 and 3 x 3 matrices, Inverse of 2 x 2 matrix and application to simultaneous equation
5.	Linear and Quadratic Equations: Application, one linear-one quadratic, word problems leading to one linear-one quadratic
6.	Surface areas and volume of spheres and hemispheres (solid and hollow sphere and hemisphere)
7.	Longitude and Latitude: Identification of longitude and latitude, North and south, meridian, equator. Calculation of length of parallel of latitude.
8.	Longitude and Latitude: Calculation of distance between two points on the latitude, longitude, time or speed of aircraft
9.	Arithmetic Finance: Simple Interest, Compound Interest, Annuities, Depreciation and Amortization
10.	Revision of the term's work

REFERENCE TEXTS:

- New General Mathematics for SS book 3 by J.B Channon
- Essential Mathematics for SS book 3
- Mathematics Exam Focus
- Waec and Jamb past Questions

WEEK 1
DATE:___________________________

THEORY OF LOGARITHMS AND LAWS OF LOGARITHMS
In general the logarithm of a number is the power to which the base must be raised in order to give that number. i.e if $y=n^x$, then $x = \log_n y$. Thus, logarithms of a number to base ten is the power to which 10 is raised in order to give that number i.e if $y = 10^x$, then $x = \log_{10} y$. With this definition $\log_{10}100 = 3$ since $10^3 = 1000$ and $\log_{10}100 = 2$ since $10^2 = 100$.
Examples:
1. Express the following in logarithmic form
a) $2^{-6} = 1/64$ b) $3^5 = 243$ c) $5^3 = 125$ d) $10^4 = 10,000$

Solutions
1. (a) $2^{-6} = \frac{1}{64}$
   $\therefore \log_2 (1/64) = -6$
   (b) $3^5 = 243$
   $\therefore \log_3 243 = 5$
   (c) $5^3 = 125$
   $\therefore \log_5 125 = 3$
   (d) $10^4 = 10,000$
   $\therefore \log_{10} 10000 = 4$
2. Express the following in index form
a) $\text{Log}_2(1/8) = -3$ (b) $\text{Log}_{10}(1/1000) = -2$ (c) $\text{Log}_4 64$ (d) $\text{Log}_5 625$
(e) $\text{Log}_{10}1000$

Solutions
a) $\text{Log}_2 (1/8) = -3$
   Then $2^{-3} = 1/8$
b) $\text{Log}_{10}(1/100) = -2$
   Then $10^{-2} = 1/100$
c) Let $\text{Log}_4 64 = k$
   Then $4^k = 64$
   Simplify 64; $4^k = 4^3$
   Then $k = 3$
d) Let $\text{Log}_5 625 = m$
   Then $5^m = 625$
   $5^m = 5^4$
   $m = 4$
e) Let $\text{Log}_{10}1000 = p$
   Then $10^p = 1000$
   $10^p = 10^3$
   $P = 3$

Evaluation: Evaluate the following logarithms
1. $\text{Log}_4 8$ 2. $\text{Log}_6 216$ 3. $\text{Log}_8 0.0625$

Basic Laws of Logarithms
1. $\text{Log}\ mn = \text{Log}\ m + \text{Log}\ n$
2. $\text{Log}\ (m/n) = \text{Log}\ m - \text{Log}\ n$
3. $\text{Log}\ m^p = p\text{Log}\ m$
4. $\text{Log}\ 1 = 0$

5. $Log_m m = 1$
6. $Log\ (1/m)^n = Log\ m^{-n} = -nLog\ m$

Change of base

$Log_m n = \frac{Log_a n}{Log_a m}$

Examples:

1. Express as logarithm of a single number 2Log3 + Log6
   solution:
   2log3 + log 6
   $= log3^2 + log\ 6 = log\ 9 + log\ 6$
   = Log 9 x6 = Log 54

2. Simplify Log 8 ÷ Log 4
   Solution:
   $Log\ 8 \div log\ 4 = \frac{log\ 2^3}{log\ 2^2} = \frac{3log2}{2log2} = 3/2$

3. Evaluate 3log2 + log 20 – log 1.6

   Solution
   $= log2^3 + log\ 20 - log(16/10)$
   = log 8 + log 20 – log (8/5)
   = log (8 x 20÷ 8/5)
   = log (8 x 20 x 5 ÷ 8)
   $= log\ 100 = log10^2 = 2log\ 10 = 2$

   Evaluation:
   1. Simplify the following: a. ½ log 25 b. 1 + log 3 c. log 8 + log 4
   2. Evaluate log 45 – log 9 + log 20
   3. Given that log 2 = 0.3010, log 3 = 0.4771 and log 7 = 0.8451, evaluate a. log 42 b. log 35
   4. Solve $2^{2x} - 10 \times 2^x + 16 = 0$

Further Application of Logarithms using tables:

Examples:

Use the tables to find the log of:

(a) 37 (b) 3900 to base ten

Solutions

1. 37 = 3.7 x 10
   $=3.7 \times 10^1$(standard form)
   $=10^{0.5682 + 1} \times 10^1$ (from table)
   $=10^{1.5682}$
   Hence $log_{10}37 = 1.5682$
2. 3900 = 3.9 x 1000
   $=3.9 \times 10^3$ (standard form)
   $=10^{0.5911} \times 10^3$ (from table)
   $=10^{0.5911 + 3}$
   $=10^{3.5911}$
   Therefore $log_{10}3900 = 3.5911$

Evaluate the following using…