FIRST TERM E- LEARNING NOTES

SUBJECT: FURTHER MATHEMATICS **CLASS: SS1**

SCHEME OF WORK

WEEK	TOPIC
1	Indices: Basic Laws & Application of indices
2	Indicial and Exponential Equations
3	Logarithms - Laws and application
4	General review of basic concept of set theory
5	Operation of sets and Venn diagrams
6	Review of First Half Terms Lesson & Periodic Test
7	Binary operations and basic laws of binary operations (i) Definition (ii) Solution of simple problems on binary operations (iii) Closure, commutative, associative and distributive laws
8	Binary operations continues: (i) Solution to problems on laws of binary operations (ii) Identity and inverse elements of a given binary operations (iii) Addition and multiplication tables for binary operations
9	Surds: (i) Definition of surds (ii) Rules and manipulation of surds (iii) Rationalization of surds at the denominator and equality of surds.
10	Measures of central tendency: (i) Mean, Median and Mode of grouped and ungrouped data (ii) Estimation of mode from the histogram of a grouped data.
11	Revision
12	Examination

REFERENCE(S)

- **Further Mathematics project 1 by Tuttuh Adegun et al**
- **New General Mathematics for SSS1, SSS 2 and SSS 3 by M. F. Macrae et al**

WEEK ONE
TOPIC: INDICES
CONTENT

- Basic Concept of Laws of Indices
- Application of Laws of Indices

Basic Concept of Laws of Indices

A number of the form a^m where a is a real number, ***a*** is multiplied by itself ***m*** times,
The number **a** is called the **base** and the super script **m** is called the **index** (plural indices) or exponent.

1. $a^m \times a^n = a^{m+n}$ **----------Multiplication law**

Example: $p^3 \times p^2 = (p \times p \times p) \times (p \times p) = p^5$
Or $p^3 \times p^2 = p^{3+2} = p^5$

2. $a^m \div a^n = a^{m-n}$ **----------Division law**
Example: $p^6 \div p^4 = p^{6-4} = p^2$

3. $(a^m)^n = a^{mn}$ **----------Power law**
Example: $(p^3)^2 = p^3 \times p^3 = p^{3+3} = p^6$
Or $p^{3 \times 2} = p^6$

4. $a^m \div a^m = a^{m-m} = a^0 = 1$
$a^m \div a^m = a^m/a^m = a^o = 1$
$a^0 = 1$ .....Zero Index
Note : Any number raised to power of zero is 1

Example: $3^o = 1$, $c^o = 1$, $y^o = 1$

5. $(ab)^m = a^m b^m$ **----------Product power law**
e.g. $(2xy)^2 = 4x^2y^2$

6. $a^{-m} = 1/a^m$ **---------- Negative Index**
Example: $2^{-1} = ½$, and $3^{-2} = 1/3^2 = 1/9$

7. $a^{1/n} = \sqrt[n]{a}$ **---------- Root power law**
Example **:** $9^{½} = \sqrt{9} = 3$
$27^{1/3} = \sqrt[3]{27} = 3$ ie $(3)^3 = 3$

8. $a^{m/n} = (a^{1/n})^m = (\sqrt[n]{a})^m$ **----------Fraction Index**
or $a^{m/n} = (a^m)^{1/n} = (\sqrt[n]{a})^m$

Example: $27^{2/3} = \sqrt[3]{27} = 3^2 = 9$.

Evaluation
1. $27^{5/3}$ 2. 1000000000^0 3. $2^{x-1} \times 2^{2x+2}$

Application of Laws of Indices

Examples
Solve the following…