St. AGNES JUNIOR SCHOOL
Rise and Shine
KISUGU

Plot 48 Muwaire Rd (behind IHK Hospital)
P.O.BOX 5337, KAMPALA - UGANDA
Tel: 256783111908
Email: info@stagnes.co.ug <mailto:info@stagnes.co.ug
Website: www.stagnes.co.ug

LESSON ONE **P.7 MATHEMATICS**

TOPIC: OPERATION ON NUMBERS.

SUBTOPIC: LAWS OF INDICES IN MULTIPLICATION.

CONTENT.

For the expression $\mathbf{a^b}$, **a** is the called the **base** and **b** is called **index** or **exponent.**

$\mathbf{a^b} \rightarrow$ index or exponent

$\searrow$ Base.

Writing expressions in power form.

a) $2 \times 2 \times 2 \times 2 = \underline{\mathbf{2^4}}$

b) $3 \times 3 \times 3 \times 5 \times 5 = \underline{\mathbf{3^3 \times 5^2}}$

Note: The index only tell the number of times the base has been multiplied. It does not multiply.

Writing expression powers in expanded form.

a) $2^4 = 2 \times 2 \times 2 \times 2$

b) $5^2 \times 6^3 = (5 \times 5) \times (6 \times 6 \times 6)$

Simplifying powers.

a) $2^4 \text{ X } 2^2 = (2 \times 2 \times 2 \times 2) \times (2 \times 2)$
$= 2 \times 2 \times 2 \times 2 \times 2 \times 2$
$\underline{\mathbf{= 2^6}}$

b) $h^2 \times h^3 = (h \times h) \times (h \times h \times h)$
$= h \times h \times h \times h \times h$
$\underline{\mathbf{= h^5}}$

NOTE: In the above expressions, we note that the index on the answer are simply the sum of the indices of the basses which are multiplied.

Check; $4^3 \times 4^4 = (4 \times 4 \times 4) \times (4 \times 4 \times 4 \times 4)$

$= 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4$

$= \underline{\mathbf{4^7}}$

In short;

$4^3 \times 4^4 = 4^{3+4}$

$\underline{= \mathbf{4^7}}$

Conclusion:
When we multiply powers of the same bases, we simply add the indices and maintain the same base as in the examples above.

ACTIVITY

1. Express the following in powerform.
   a) 2 x 2 x 2 x 2 x 2.
   b) 3 x 3 x 3 x 3 x 3
   c) y x y x y x y.
2. Expand the following.
   a) 3^2
   b) k^5
   c) ab^3
3. Simplify the following by expanding the powers.
   a) $3^2 \times 3^5$
   b) $p^3 \times p^4$
   c) $2^4 \times 2^5$
4. Simplify the following by using the law of multiplication of indices.
   a) $2^5 \times 2^1$
   b) $5^2 \times 5^6$
   c) $m^2 \times m^1 \times m^3$

LESSON TWO

TOPIC: OPERATION ON NUMBERS.
SUBTOPIC: LAW OF INDICES INVOLVING DIVISION AND OTHER OPERATIONS.
CONTENT:

1. simplify; $3^5 \div 3^2$

$$= \frac{3 \times 3 \times 3 \times \cancel{3}^1 \times \cancel{3}^1}{\cancel{3}_1 \times \cancel{3}_1}$$

$= 3 \times 3 \times 3$

$\underline{= \mathbf{3^3}}$

NOTE: In the above expressions, we note that the index on the answer are simply the difference of the indices of the basses which are multiplied.

Check: $3^5 \div 3^2 = 3^{5-2}$

$= \underline{\mathbf{3^3}}$

Conclusion.
When we divide powers of the same bases, we simply maintain the same base and subtract the exponents.

e.g

1. 2. Simplify: $a^b \div a^d$.

$= \underline{\mathbf{a^{(b-d)}}}$

ACTIVITY.

1. Simplify the following expressions.
   a) $a^3 \div a^1$
   b) $3^5 \div 3^2$
   c) $2^9 \div 2^6$
   d) $r^7 \div r^4$
   e) $t^x \div t^y$
   f) $m^a \div m^b$

LESSON THREE

TOPIC: OPERATION ON NUMBERS.
SUBTOPIC: <u>LAW OF ZERO (0) AS AN INDEX</u>.
CONTENT:

1. Simplify; $3^2 \div 3^2$

$$= \frac{3 \times 3}{3 \times 3} = \frac{1}{1} = \mathbf{1}$$

At the same time; $3^2 \div 3^2 = 3^{2-2} = \mathbf{3^0}$

NOTE: Since the same number is giving two different answers, then, any number or expression to the zero power or raised to exponent zero is equal to 1.

2. Simplify: $k^0 \div k^1 = k^{0-1} = \mathbf{k^{-1}}$

At the same time; $k^0 \div k^1. = \frac{k^0}{k^1} = \underline{\mathbf{\frac{1}{k^1}}}$

NOTE: Since the same number is giving two different answers, then, any expression with a negative exponent is the same as 1 divided by that base with its index without a negative and viceversa.

That is to say, $\underline{\mathbf{k^{-1} = \frac{1}{k^1}}}$

Activity:

1. Express the following in a fraction form.
   a) 2^{-2}
   b) 5^{-1}
   c) 2^{-3}

2. Write the following in power form.
   a) $\frac{1}{3^5}$
   b) $\frac{1}{8^3}$
   c) $\frac{1}{10^3}$

3. Simplify the following.

a) $2^{-2} \times 2$

b) $2^0 + (2^3 \times 2^{-2})$

c) $10^4 \div 10^{-2}$

LESSON FOUR

TOPIC: FRACTIONS.
SUBTOPIC: ADDITION AND SUBTRACTION.
CONTENT:

Work out the following

1. $\frac{1}{3} + \frac{1}{2}$ **LCD = 6**

$= \frac{2 + 3}{6}$

$= \mathbf{\frac{5}{6}}$

2. $1\,{}^{3}/_{4} + 1\,{}^{5}/_{6}$

$= \frac{7}{4} + \frac{11}{6}$ **LCD = 12**

$= \frac{21 + 22}{12}$

$= \frac{\cancel{43}^{\,3\text{ r }7}}{\cancel{12}_{1}}$

$= \mathbf{3\,{}^{7}/_{12}}$

3. $\frac{3}{4} - \frac{1}{3}$ **LCD = 12**

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

$= \frac{5}{12}$

4. $3\,{}^{5}/_{6} - 1\,{}^{4}/_{5}$

$= \frac{23}{6} - \frac{9}{5}$ **LCD = 30**

$= \frac{115 - 54}{30}$

$= \frac{\cancel{61}^{\,2\text{ r }1}}{\cancel{30}^{1}}$

$= \mathbf{2\,{}^{1}/_{30}}$

ACTIVITY:

Workout the following:

1. $\frac{1}{3} + \frac{1}{2}$
2. $2\frac{7}{10} + 1\frac{1}{20}$
3. $3\frac{1}{5} + 2\frac{1}{2}$
4. $\frac{3}{4} - \frac{2}{5}$
5. $2\frac{3}{4} - 1\frac{1}{6}$
6. $4\frac{1}{2} - 2\frac{2}{5}$

LESSON FIVE

TOPIC: FRACTIONS.
SUBTOPIC: MULTIPLICATION AND DIVISION.
CONTENT:
Work out the following.

1. $\frac{1}{5} \times 3 = \frac{1}{5} \times \frac{3}{1}$

$$= \frac{1 \times 3}{5 \times 1}$$

$$= \mathbf{\frac{3}{5}}$$

2. $2\frac{1}{4} \times 1\frac{1}{5}$

$$= \frac{9}{4} \times \frac{6}{5}$$

$$= \frac{27}{10}$$

$$= 2\frac{7}{10}$$

3. $\frac{2}{5} \div 2 = \frac{2}{5} \div \frac{2}{1}$

$$= \frac{2}{5} \times \frac{1}{2}$$

$$= \frac{\cancel{2}^1 \times 1}{5 \times \cancel{2}_1}$$

$$= \mathbf{\frac{1}{5}}$$

4. $1\frac{3}{4} \div 2\frac{1}{2} = \frac{3}{4} \div \frac{5}{2}$

$$= \frac{3}{4} \times \frac{2}{5}$$

$$= \frac{3 \times \cancel{2}^1}{{}_2\cancel{4} \times 5}$$

$$= \mathbf{\frac{3}{10}}$$

Workout the following:

1. $\frac{1}{12} \times \frac{4}{6}$
2. $1\frac{3}{8} \times 2\frac{2}{7}$
3. $2\frac{4}{5} \times 3\frac{1}{4}$
4. $\frac{1}{6} \div 4$
5. $2\frac{1}{3} \div 1\frac{1}{2}$
6. $1\frac{4}{8} \div 5\frac{1}{2}$