MR OSHO
TUTORS
Researcher || Educator || Career coach
Content builder || Mathematician
08135056422
Mroshotutors@gmail.com

SECOND TERM E-LEARNING NOTE

SUBJECT: MATHEMATICS **CLASS: JSS1**

SCHEME OF WORK

WEEK	TOPIC
1.	**Revision**
2.	**Approximation:** (a) Degree of Accuracy of Numbers (B) Rounding up of Numbers (Significant Figures, Decimal Places, Nearest Whole Numbers, Tens, Hundreds and Thousands)
3.	**Approximation Cont'd:** (a)Approximating Values of Addition, Subtraction, Multiplication and Division (B) Quantitative Reasoning (QR)(C) Application of Approximation to our Everyday Activities.
4.	**Number Base:** (a) Number Bases/Expansion of Base Numbers (b) Counting in Base 2 (c) Addition and Subtraction of Two or Three Digits Binary Numbers
5.	**Number Base (Cont'd):** (a)Multiplication of Number in Base 2 Problem Solving on (QR) Related to Conversion and Application.
6.	**Basic Operations:** (a) Addition and Subtraction of Numbers with Emphasis on place Values using Spike or Abacus
7.	Review of first half term's work and periodic test
8.	**Basic Operations (Cont'd):** (a) Addition and Subtraction of Positive and Negative Integers Using Number Line and Collection of Terms (b) Solving Problems on Quantitative Reasoning and Application
9.	**Algebraic Processes:** (a) Use Of Symbols (i) Open Sentence and Authentic Operation (ii) Word Problems Involving Use of Symbols (b) Identification of Coefficient of Terms; Basic Authentic Operation Applied to Algebraic Expression (c) Collection and SimplificationOf Like Terms and the Use of Brackets.
10.	**Algebraic Process (Cont'd):** (a) Problem Solving on Basic Arithmetic Operations in Algebraic Processes (b) Solving Quantitative Aptitude Problems on the Use of Symbols and Brackets
11.	Revision of the Second Term's Work and Preparation for Examination
12.	Examination

REFERENCE BOOKS

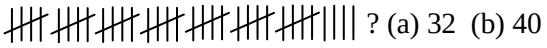
New General Mathematics, Junior Secondary Schools Book 1
Essential Mathematics for Junior Secondary Schools Book 1

WEEK ONE

Topic: Revision

1. The value of 8 in 18214 is (a) 8 units (b) 8 tens (c) 8 hundreds (d) 8 thousands (e) 8 ten thousands
2. The Roman numerals CXCIV represents the number (a) 194 (b) 186 (c) 214 (d) 215 (e) 216.

MR OSHO
TUTORS
Researcher || Educator || Career coach
Content builder || Mathematician
08135056422
Mroshotutors@gmail.com

3. What is the number represented by  ? (a) 32 (b) 40 (c) 28 (d) 39
4. The value of 7 in 3.673 is (a) 7tenths (b) 7 hundredths (c) 7 units (d) 7 hundredth.
5. Three million and four in figures is (a) 300004 (b) 300040 (c) 30000004 (d) 3000004
6. What is the value of 1.2 km in metres? (a) 120m (b) 1 200m (c) 12 000m (d) 120 000m
7. Which of the following numbers is the largest?(a) 727345565 (b) 727245565 (c)727445565 (d) 726778876.
8. $\$1\frac{1}{4}$ million in digits only is (a) $1 200 000 (b) $1 140 000 (c) $1 250 000 (d) $125 000
9. Le 5 600 000 in digits and words is (a) Le 56 million (b) Le 5.6 billion (c) Le 0.56 billion (d) Le 5.6 million
10. 13 500 000mm in km is (a) 13.5 km (b) 1.35 km (c) 1350 km (d) 13500 km
11. The value of 23 x 32 is (a) 1291(b) 658 (c) 729 (d)7 36
12. The LCM of 12 and 15 is (a) 90 (b) 60 (c) 30 (d) 120
13. The HCF of 63and 90 is (a) 9 (b) 3 (c) 12 (d) 6
14. The first three common multiples of 3 and 11 are (a) 3, 33, 66 (b) 11, 33, 66 (c) 33, 66, 99 (d) 33, 44, 55
15. Which of the following is not a proper fraction?(a) ¼ (b) ¾ (c) $^3/_2$ (d) $^5/_8$
16. Express $3\ ^1/_7$ as an improper fraction is (a) $^{11}/7$ (b)$\frac{21}{7}$ (c) $^7/_{22}$ (d) $^{22}/\ 7$
17. Express $^{99}/_5$ as a mixed fraction (a) $19\ ^4/_5$ (b) $18\ ^4/_5$ (c) $19\ ^5/_4$ (d) $18\ ^5/_4$
18. Which of the following is not equivalent to ½ ? (a)$^9/_{18}$ (b)$^{11}/_{22}$ (c)$^{15}/_{30}$ (d)$^{24}/_{42}$
19. To express the fraction 30/48 in its lowest term, divide the numerator and demominator by (a) 2 (b) 3 (c)5 (d) 6
20. 3.45 minutes , expressed as a fraction of one hour is (a) 1/60 (b) 1/45 (c) ¾ (d) 4/5
21. The missing number in the fraction $\frac{3}{4} = \frac{?}{20}$ is (a) 6 (b) 9 (c) 12 (d)15
22. A woman bought 2 crates of eggs. ¼ of them are bad. How many of the eggs are good? (a) 36 (b) 24 (c) 48 (d)12
23. Simplify 2 ½ + ¼ (a) 3 ¾ (b). 2 1/8 (c) 1 ¾ (d) 2 ¾.
24. Simplify 4 2/5 – 3 ¼ (a) 1 3/20 (b) 3 2/5 (c) 1 7/20 (d) 1 5/8
25. The common denominator of the fractions 3 1/6 – 2 ½ = 2 2/3 is (a) 8 (b) 12 (c) 6 (d) 15
26. Simplify 2 2/5 – 3 7/9 + 2 1/3 (a) 1 43/45 (b) 43/45 (c) 2 37/45 1 41/45
27. What is the sum of 1 ¾, 2 3/5 and 5 ¾(a) 3 1/30 (b) 5 1/60 (c) 7 1/60 (d) 8 1/50.
28. Find the length of a rectangle whose breadth and area are $^7/_{20}$m and $8\ ^1/_5 m^2$ (a) $23\ ^3/_7$ (b) $21\ ^2/_7$ (c) $1\ ^7/_{20}$ (d) $8\ ^{11}/_{20}$.
29. Simplify $5\ ¼ + 1\ ^1/_6 – 3\ ^2/_3$ (a) $5\ ^{11}/_4$ (b) 2 ¾ (c) $3\ ^1/_{12}$ (d) 1 ¾
30. Simplify $^{11}/_{25}$ x $1\ ^4/_{11}$ (a) $^2/_3$(b) $^3/_5$(c) $^2/_5$ (d) $^4/_5$

Section B

1. Change this Roman figure to natural numbers (i)MMCDLXXI (ii) MMMCLIV
2. Write the following in figures: (a) fifteen trillion, six hundred and seventy one billion, three hundred and ninety one million, eighty eight thousand, five hundred and fifty five(b) three hundred and twenty-nine billion, five hundred and sixty two million, eight hundred and one thousand, four hundred and thirty three
3. Write these numbers in digits only: (a) Le 0.5 billion (b) $ 9.1 million

4. A drum holds 2 ½ litres of water when itsis ¾ full. How many litres of water can it hold when it is (a) full, b, two-third (c)empty.
5. Simplify the following: (a) $3^{7}/8 + 2\ ¾$ (b) $2\ ^{5}/6 + 5\ ^{7}/8$(c) 2 4/5+ 71/2 -83/10
6. Mr. Hope spends 1/3 of his earnings on food and ¼ on clothes. He then saves the rest. What fraction does he (a) spend altogether(b) save?

WEEK TWO
Topic: Approximation
Content

- **Degree of Accuracy**
- **Rounding Up of Numbers**

I. **Degree of Accuracy**
Many calculations involve measurements. The degree of accuracy of the results of the calculations depends therefore on the degree of accuracy of the measurements. It therefore means that the degree of accuracy of measurement in a calculation must be taken into consideration when determining the answer to the calculation.

Rounded –of values are sometimes used in calculations for example, pi(π) is often taken as 3.14 or 3.14 2.

II. **Rounding –up of Numbers**
It is not cost effective to give exact number of certain things due to the difficulty that may be encountered in the course of carrying out such task. E.g. Number of vehicles plying a particular road, spectators in a stadium, population of a town etc. What is usually done is to round the number or approximate it to the nearest 10, 100,1000 and so on.

Example 1
Round the following numbers to the nearest ten
(a) 34 (b) 127 (c) 43678
Solution
(a) 34
:. To the nearest 10 = 30
(b) 127
:. To the nearest 10 =130.
(c) 43678
:. To the nearest 10 = 43680.

Evaluation:
1. Round these numbers to the nearest hundred
(a) 231 (b) 87345 (c) 567
2. The number of people at the cinema yesterday was 2576. Give this number to the nearest
(a) 10 (b) 100 (c) 1000

Decimal Places

See the illustration below
3. 5 7 8 6

From the illustration above, 3.5786 is divided into two parts by a decimal points to the right decimal to the left (whole number).

Example 1
Give each of the following correct to 1d.p and 2 d.p
(a) 3.4567 (b) 35. 4782 (c) 4.2071
Solution

(a) 3.4567
i. 3.5 (1 d.p)
ii. 3.46 (2d.p)
(b) 35. 4782
i. 35.5 (1d.p)
ii. 35.48 (2d.p)
(c) 4.2071
i. 4.2 (1 d.p)
ii. 4.21 (2d.p)

Evaluation
Give each number correct to 2.d.p and 3d.p
(a) 5.7804 (b) 0.007992 (c) 16.869 (d) 28.0099.

Significant Figures
The word significant means important. In mathematics, we need to study it in two aspects
i. whole numbers
3 8 0 6 9
ii. decimal numbers
0. 0 0 5 0 8 6
From the two illustrations above, we can conclude that zeros in the middle of a whole number are significant whilezeros at the end are not significant (insignificant)

Example 2
Give 45775 correct to (a) 1 s.f (b) 2s.f (c) 3 s.f
Solution
(a) 50000 (1s.f)
(b)46000 (2 s.f)
(c) 45 800 (3.s.f)

Example 3
Give each of the following numbers correct to 2 s.f
(a) 5.781 (b) 0.00244 (c) 0.0507

Solution
(a) 5.781 = 5.8 (2 s.f)
(b) 0.00244 = 0.0024 (2 s.f)
(c) 0.0507 = 0.051 (2 s.f)

Evaluation:
Give each number correct to 3 significant figures
(a) 57045 (b) 4540 (c) 456.56 (d) 0.5002 (e)34.0061 (f) 0.001011

Nearest Whole Number
To round a decimal number to the nearest whole number, check the number in the 1st d.p, if it is 5 or more than round the number up but if it is less than 5 do not change the number.

Example 1
Give the following correct to

i. the nearest hundredth
ii. the nearest thousandth
(a) 7.3425 (b) 0.00692 (c) 7.0149 (d) 42.4739.

Solution
(a) 7.3425
i. 7.34 (nearest hundredth)
ii. 7.343 (nearest thousandth)

(b) 0.0069
i. 0.01 (nearest hundredth)
ii. 0.007 (nearest thousandth)
(c) 7.0149
i. 7.01 (nearest hundredth)
ii. 7.015 (nearest thousandth)

(d) 42.4739
i. 4.47 (nearest hundredth)
ii. 42.474 (nearest thousandth)

Example 2
Give each number correct to the nearest whole number
(a) 8.22 (b) 134.674
Solution
(a) 8.22 = 8 (nearest whole number)
(b) 134.674 = 135 (nearest whole number)

Evaluation:
Round off each of the following:

a. 34.8cm to the nearest cm
b. 67.1cm to the nearest cm
c. 24.6kg to the nearest kg.

Reference material:

i. Essential mathematics for Jss I (UBE Edition) by AJS Oluwasanmipg 85 – 91
ii. New General Mathematics for JSS I (UBE edition) by MF Macrae et al pg 178-179.

Reading Assignment
Read about quantitative reasoning and application of approximation to our everydayactivities .

Weekend Assignment
1. Give 3.9998 to 2 s.f. (a) 3.9 (b) 3.0 (c) 4.0 (d) 4. 99
2. Give 0.00057891 to2 s.f(a) 0.00 (b) 0.00058 (c) 0.58 (d) 0.0
3. Give 37.0567 to 2 d.p (a) 37 (b) 37.06 (c) 37.05 (d) 37.1
4. Round 26 to the nearest ten (a) 5 (b) 20 (c) 30 (d) 40.
5. Round 7.586 to the nearest whole number (a) 8 (b) 7 (c) 6 (d) 7.6.

Theory
1. The number of road accident in Lagos –Ibadan Expressway of Nigeria in a decade was 1294594. Give this number to the nearest (a) 100 (b) 1000
2. Express each number correct to 1 d.p and 1 s.f (a) 23.0036 (b) 6.7887.

WEEK THREE **Date: ……**
Topic:APPROXIMATION
Content

- **Quantitative Reasoning (QR)**
- **Approximation in our everyday activities**

A. **Quantitative Reasoning (QR)**
Example
Calculate the value of the following and give your answer correct to the number of significant figures stated:
(a) 46 x 34 correct to 2.f.
(b) 346 x 24 correct to 3 s.f
(c)5.766 + 81.34 correct to 1 s.f
(d) 72.63 – 8.35 correct to 3 s.f

Solution
(a) 46 x 34

$$\begin{array}{r} 4\ 6 \\ \times\ 3\ 6 \\ \hline 1\ 8\ 4 \end{array}$$

(c) 5.766 + 81. 34

$$\begin{array}{r} 5.\ 7\ 66 \\ +\ 81.\ 35 \\ \hline 87.106 \end{array}$$

+1 3 8 :. 87. 106 = 90 to 1 s.f
1 5 6 4
1564 = 1600 (to 2 s.f)

(b) 3 4 6 x 24

3 4 6
x 2 4 -
1 3 8 4
+ 6 9 2
8 3 0 4
8304 = 8300 (3.s.f)

(d) 72.63 – 8.23

7 2 . 6 3
6 4. 2 8

:. 64.28 = 64.3(to 3 s.f)

Evaluation:
Evaluate the following and give your answers correct to two significant figures.
(a) $\frac{0.46 \times 0.35}{20}$

(b) $\frac{12.3 \times 32.0}{16}$

(c) $0.052 + \frac{0.045}{4}$

(d) $3.07 + \frac{0.97}{5}$

II. **Approximation in Our Everyday Activities**
Approximation is a way of using rounded numbers to estimate answers to a calculation. Approximation can help us decide whether an answer to a calculation is of right size or not. To find an approximate answer to a calculation, round the numbers to easy numbers, usually 1 s.f., or 2.s.f. or to the nearest whole number. Then work out the approximated answer using these easy numbers.
Example 1
A boy was asked to calculate the cost of 82 oranges at N 5.80 each
Solution
Rough calculation
82 = 80 and 5. 80 = 6
:. Approximated cost = 80 x 6
= N 480.
Actual calculation
82 x 5. 80
= N 475. 60
comparing the rough calculation with the actual calculation, you will discover that the two answers N 480 and N 475.60 are very close.

Example 2
A box full of exercise books weighs 12kg. if one exercise book weighs 10.2g.find the approximate number of exercise books in the box.

Solution
By approximate answer, we mean the rough calculation.
Weight (total) = 12kg
12kg = 10kg
one exercise book = 10.2g
10.2g = 10g
approximate number of exercise books.
$= \frac{10kg}{10g}$
but, 1000g = 1kg

$= \frac{10 \times 1000g}{10\ g}$
= 1000 books

Example 3
In 2008 the value of a plot of land was N 238000. Its value rises by about 110% each year. Estimate its value in2009 to the nearest N 1000.

Solution
In 2008,
Cost = N238000
Rise = 10%
$= \frac{10}{100} \times 238000$
N23800
Value in 2009,
= N 238000
N 23800
N 261800

. N 261800 = N262000

Example 4
The population of five towns are 15600, 17300,62800, 74000 and 34400, each to the nearest hundred. Find the total population of the 5 towns to the nearest thousand.

Solution
Total population of the 5 towns

1 5 6 0 0
1 7 3 0 0

6 2 8 0 0
7 4 0 0 0
3 4 4 0 0
2 0 4 1 0 0

= 204100 = 204000 (to the nearest thousand)

Example 5

An aeroplane flies 2783km in 5 ¾ hours. First approximate, then calculate the average distance it flies in 1 hour.

Solution
Distance = 2783km
2783km = 3000km
time = 5 ¾ hours
5 ¾ = 6 hours

Approximate distance = 3000km
Approximate time = 6 hours

Average speed = $\frac{3000}{6}$ = 500km/hr
Average distance in 1hr = 500km

Evaluation:

1. A farmer has N 200,000 to spend on cattle. He wants to buy 9 calves. Each calf costs N18500. Check, by approximation, that the farmer has enough money. Find, accurately how much change he will get after buying the calves.

2. A bucket holds 10.5 litres. A cup holds about 320ml. Estimated the number of cups of water that the bucket holds.

Reading Assignment

Read about Base Numbers.

i. Essential mathematics
ii. New General Mathematics pg 183 – 186.

Weekend Assignment

1. Find the approximate answer to 0. 41 x 0. 92 (a) 0.6 (b) 0.36 (c) 0.3 (d) 0.04.
2. Find the rough value of 4 ½ x 1 7/8 (a) 8 (b) 7 (c) 10 (d) 9
3. x = 0. 876 – 0.326. By doing a rough calculation, decide which of the following is the value of x
   (a) 0.18 (b) 0.21 (c)0.3 (d) 0.55.
4. A cup has a capacity of 290ml. It takes 63 cups to fill a bucket. Find the approximate capacity of the bucket in litres. (a) 9 litres (b) 10 litres (c) 1800 litres (d) 18 litres,

5. A sum of N 236000 is divided equally among 54 members of a club.Approximately how much does each member get? (a) N 4000 (b)N2000 (c) N 20000 (d) N40000.

Theory

1. The table below shows the number of different sizes of shirts sold by a company in a certain month.

Size	Number sold
Small	1243
Medium	4132
Large	3967
Extra large	1985

a. How many shirts were sold altogether?
b. How many more large shirts than small shirts were sold?
c. Check each answer by rounding the numbers to the nearest hundred.

2. Use approximation to find the following
a. 35. 8 – 8.99
b. 7.784 x 97 .5

WEEK FOUR **Date :…….**

Topic:BASE NUMBERS

Content

- **Number Bases (Expansion of Base Numbers)**
- **Counting in Base Two**
- **Addition in Base Two**
- **Subtraction in Base Two**

Number Bases (Expansion of Base Numbers)

When counting days in a week, we count in 7's, but when counting seconds in a minute, we count in 60's. However, for most purposes, people count in 10's.

The digits 0, 1,2, 3, 4, 5,6, 7, 8, 9 are used to represent numbers. The placing of the digits shows their value . For example,

7 8 0 9 means

- 7 thousands
- 8 hundred
- 0 tens
- 9 units

$7809 = 7 \times 1000 + 8 \times 100 + 0 \times 10 + 9 \times 1$

$= 7 \times 10^3 + 8 \times 10^2 + 0 \times 10^1 + 9 \times 10^0$

(Note : Any number raised to the power zero = 1) since the illustration above is based on the power of 10, It is called base 10. We can write it as 7809_{ten}
Other number systems are sometimes used. For instance 145_{eight}, means

- 1 eight squared
- 4 eights
- 5 units

$145_{eight} = 1 \times 8^2 + 4 \times 8^1 + 5 \times 8^0$
$= 1 \times 8^2 + 4 \times 8^1 + 5 \times 1$

Example 1
Expand the following in the powers of their bases

a. 2389ten
b. 1001 two
c. 647eight

Solution
Using the model provided above
a) $2\ 3\ 8\ 9_{ten}$
$= 2 \times 10^3 + 3 \times 10^2 + 8 \times 10^1 + 9 \times 10^0$
$= 2 \times 10^3 + 3 \times 10^2 + 8 \times 10^1 + 9 \times 1$

b) $= 1\ 0\ 0\ 1_{two}$
$= 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$
$= 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 1$

c) $6\ 4\ 7_{eight}$
$= 6 \times 8^2 + 4 \times 8^1 + 7 \times 8^0$
$= 6 \times 8^2 + 4 \times 8^1 + 7 \times 1$

Evaluation :
Expand the following base numbers in the powers of their bases.

a) $8\ 1\ 0\ 6\ 2_{nine}$
b) $1\ 0\ 1\ 1\ 0\ 1_{two}$

II. **Counting in Base Two**
From the example above, (b) was 1001 two, this means 1001 in base two. The first thing to notice is their base two number or BINARY NUMBER, is made up of only two digits 0 and 1(just as in base ten there are ten digits:), 1, 2, 3, 4, 5,6,7,8,9,)
In summary

Base two _____ 0, 1
Base three _____ 0, 1,2,
Base four _____ 0, 1,2, 3. etc

The place value of the digits in the binary number 1111_{two} is as shown below:

Eight (2^3)

Fours(2^2)

Two(2^1)

Units(2^0)

Class Activity

Work in pairs. Get a collection of about 25 counters (e.g. matchsticks, bottle tops, smooth pebbles) Make a paper abacus and use it to answer the following questions.

(a) count out nine counters
(b) group them in twos.
(c) Now group the pairs in eights, fours, twos and units as far as possible .

You will discover that nine is made up of

- 1 eight
- 0 fours
- twos, and
- 1 unit.

(d) Represent the binary number for 9 n your paper abacus.

IMPORTANCE OF BINARY SYSTEM

The binary system is second in importance to our usual base ten system. It is important because it is used in computer programs. Binary numbers are made up of only two digits, 1 and 0. A computer contains a large number of stitches.

Each switch in either 'on' or 'off'. An 'on' switch represents 1; and 'off' switch represents 0.

See the table below for the first ten binary numbers

Base ten number	Binary number
1	1
2	10
3	11
4	100
5	101
6	110
7	111
8	1000
9	1001
10	1010

III. Addition in Base Two

Remember the following :

0 + 0 = 0
0 + 1 = 1
1 + 0 = 1
1 + 1 = 10

Example 1.

Calculate in base two
1 0 1 + 1 0 1
Solution
1 0 1
+ 1 0 1
1 0 1 0

Note: 1st column : 1 + 1 = 0, write down 0 carry 1
2nd column : 0 + 0 + 1 carried
= 1, write down 1 carry 0
3rd column: 1 + 1 + 0 carried = 10

Example 2
Simplify the following in base two
a) 1 0 1 0 1
+ 1 1 1

b) 1 1 1
+ 1

c) 1 0 1
+ 1 1 0

Solution
a) 1 0 1 0 1
+ 1 1 1

11 1 0 0
Note:
1st column :1 + 1 = 10, write 0 carry 1
2nd column: 0 + 1 + 1 carried = 10, write 0 carry 1
3rd column: 1 + 1 + 1 carried = 11, write 1 carry 1
4th column: 0 + 1 carried = 1, write 1 carry 0
5th column: 1 + 0 carried = 1
= 11100_{two}
Using the above explanation try out the examples worked by your teacher below:
b) 1 1 1
+ 1

1 0 0 0

(c)
```
    1  0  1
+   1  1  0
-----------
1  0  1  1
```

Evaluation:
Simplify the following in base two
a)
```
    1  1  1  1
    1  1  0  1
+   1  0  1
-------------
```

b)
```
    1  0  1
    1  0  1
+ 1  1  1
-----------
```

Note: You may also need to listen to teacher's other approach in the class to see the one you will prefer.
For instance:
```
    4  8  9
+ 3  8  2
-----------
  8  7  1
```

This is because it is in base ten. Once, it is 10 or more than your teacher told you in addition of whole numbers that we carry. When it is less than 10 you write down the number.

The same thing is happening in base two. Once it is or more you must carry when it is 2 you write down 0 carry 1. i.e

$$\frac{2}{2} = 1 \text{ remainder } 0$$

Usually, we write the remainder and carry the quotient.
See illustration
```
    1  1  1
+   1  1
-----------
1  0  1  1
```

1 + 1 = 2 (2/2 = 1 r0)
1 + 1 + 1 carried = 3 (3/2 = 1 r 1)
1 + 1 carried = 2 (2/2 = 1 r 0)
the answer = $1\ 0\ 1\ 0_{two}$

Subtraction in Base two

Example 1

Simplify in base two

Solution

```
    1  1   1
-   1  1   0
    ________ 1
```

Ans = 1_{two}

Example 2

Simplify in base two

```
    1  1  1  1  0
-   1  1  0  1
    1  0  0  0  1
    ______________
```

Ans = 10001_{two}

Example 3

Simplify in base two

```
    1  0 0  1 1
-      1  1 0
    ____________
```

Solution

```
    1  0  0  1  1
-      1  1  0
    ____________
       1 1   0  1
```

Ans = 1101 two

Note, the same method we used when we were subtracting whole numbers is still the method we have used. The only difference is their bases. The whole number was in base 10.

e.g 4 8 3 - 2 9 6

```
    4  8  3
-   2  9  6
  1  8  7
```

In the above example, when the number we are to subtract is larger, we borrow from the next digit. For instance, we borrowed 1 from 8 reducing it to 7 and increasing 3 to 13. Each 1 borrowed is equal to 10 which represents the base.

In our own case, any 1 borrowed is equal to two representing the base.

Try your self in base eight and 1 borrowed is equal to_____

Evaluation

Simplify the following in base two

a) 1 0 1 1 1
- 1 0 1 1 1

b) 1 1 1 0 0
- 1 1 1 1

c) 1 1 1
- 1 1

Reading Assignment
i.Multiplication in base two
ii. Conversion

Weekend Assignment
1. Binary numbers means _____ numbers(a) base two (b) base ten (c) base four (d) base eight
2. Base two numbers are made up of two digits _____ and _____
(a) 0 and 1 (b)) and 2 (c) 1 and 3 (d) 0, 1 and 2
3. simplify in base two (1 1 1 + 1 1 1) (a)1 1 0 1 (b) 1 1 1 0 (c) 1 0 0 1 (d) 1 0 0 0
4. Simplify in base two (110 - 11) (a) 11 (b) 101 (c) 100 (d) 1
5. Expand 586_{nine}
(a) $5 \times 9^2 + 9 \times 8^1 + 6 \times 9^0$
(b) $5 \times 9^3 + 8 \times 9^1 + 6 \times 1$
(c) $5 \times 9^3 + 8 \times 9^2 + 6 \times 9^1$
(d) $5 \times 9^2 + 8 \times 9^1 + 6 \times 9^0$

Theory
Simplify the following in base two
1a 1 1 1 0
+ 1 0 0 1

b) 1 0 1 0 1
+ 1 1 1

c). $1\ 1\ 0\ 1_{two} + 1\ 1\ 0\ 0\ 1_{two} + 1\ 0\ 1\ 1_{two}$
2a) 1 1 0 1 1
- 1 0 1 1 1

b) 1 0 1 1 1
- 1 0 1 1 1

WEEK FIVE **Date:…….**
Topic:BASE NUMBERS
Content

- **Multiplication in Base Two**
- **Conversion from (i) other bases to base ten (ii) ten to other bases**

Multiplication in Base Two

Some method used in carrying out the long multiplication is still the same method used here.Where the conventional method is in base ten the one we want to work out now is strictly to base two. See the examples below:

Example 1
Findthe product of 1101_{two} X 111_{two}
Solution

```
      1 1 0 1
x     1 1 1
      1 1 0 1
    1 1 0 1
1 1 0 1
1 01 1 0 1 1
```

Ans : 1011011_{two}
Examples 2
Calculate the following binary numbers.
a) $(110\ two)^2$
b) $(1011\ two)^3$

Solution
a) $(110_{two})^2$
$(110\ two)^2 = 110_{two}$ X 110_{two}

```
      1 1 0
x     1 1 0
        0 0 0
      1 1 0
+ 1 1 0
    1 0 0 1 0 0
```

:. (110 two) ^{2} = 100100 $_{two}$

b (1011_{two})^{3}
(10 1 1 $_{two}$) = 1011_{two} x 1011_{two} X 1011_{two}

```
                1 0  11
      x 1 0 1 1
                  1  0  1  1
                 1 0  1   1
                0 0 0 0
   1 0  1 1
```

The result above will finally be multiplied by 1011 two

```
                1  1  1  1  0  0  1
x         1  0  1  1
                1  1  1  1  0  0  1
               1 1 1  1  0  0  1
             0 0 0 0  0  0  0
          1 1 1 1 0  0  1
1 0 10 01 1  0  0  1  1
```

Ans : 10100110011_{two}

Evaluation:
1. multiply 1110 two by 111 two
2. Calculate the following binary numbers
a) (10 1 $_{two}$)^{2} (b) (111_{two})^{2}

II. Conversion
A **From other Bases to Base Ten**
Here, expansion method is applied. Refer to the previous work of last weeks
Example 1
Convert 11011_{two} to base ten.
Solution

11011 $_{two}$ ------ ten

= (1 x 24) + (1 x 23) + (0 x 22) + (1 x 21) + (1 x 20)
= 1 x 24 + 1 x 23 + 0 x 22 + 1 x 21 + 1 x 1
= 1 x 16 + 1 x 8 + 0 x 4 + 1 x 2 + 1 x 1
= 16 + 8 + 0 + 2 + 1
= 16 + 11
= 27ten
:.11011two = 27 ten

Example 2

convert 451_{eight} to ten
Solution
451_{eight} ------ ten
$(4x\ 8^2) + (5 \times 8^1) + (1 \times 8^0)$
$4 \times 8^2 + 5 \times 8^1 + 1 \times 1$
$4 \times 64 + 5 \times 8 + 1$
$256 + 40 + 1$
$= 297_{ten}$

Evaluation:
Convert the following to base ten
(a) 3032_{four} (b) 30021_{five}

From Base Ten To Other Bases
Here, we apply the division rule

Example 1
Convert 27_{ten} to a number in base two

Solution

2	**27**
2	13 r 1
2	6 r 1
2	3 r 0
2	1 r 1
	0 r 1

$27_{ten} = 11011_{two}$

Example 2
Convert 403 ten to a number in base two

Solution

2	403
2	201 r 1
2	100 r 1
2	50 r 0
2	25 r 0
2	12 r 1
2	6 r 0
2	3 x r 0
2	1 r 1
	0 r 1

$403\ ten = 110010011_{two}$

Note: We have been converting from other bases to base ten and vice versa. Let us try to convert from other bases to other bases other than ten.
The rule is simple. First convert to base ten and then to the required base.

Example
Convert 134 eight to base five

Solution
1 3 4 eight _____ ten

$(1 \times 8^2) + (3 \times 8^1) + (4 \times 8^0)$
$1 \times 8^2 + 3 \times 8^1 + 4 \times 1$
$1x\ 64 + 3 \times 8 + 4 \times 1$
$64 + 24 + 4 = 92$ten
Then convert 92 ten ____ five using division
92ten _____ five

5	18 r 2
5	3 r 3
	0 r 3

:. $92_{ten} = 332_{five}$

Evaluation
1. Calculate the following :
a) $(111)^2$ (b) $(100)^2$
2. Convert:
a) 403_5 to ten
b)145_{ten} to binary number
c) 256_{eight} to base two

Reading Assignment
Basic operations, Addition and Subtraction of numbers based on their place value and the use of number line.

Weekend Assignment
1.Change 321_{four} to base eight (a) 71 (b) 81 (c) 62 (d) 75.
2.Change 101110_{two} to octal number (a) 67 (b) 57 (c) 56 (d) 54
3. Change 35471_{eight} to base ten(a) 15097 (b) 16081 (c) 17097 (d) 16097
4. Simplify in base two $(1101)^2$ (a) 1011011(b) 10101001 (c) 1101101 (d) 1110111
5. The missing number in the expansion below is:
4983 ten = $4 \times 10^3 + 9 \times$ --- $+ 8 \times 10^1 + 3 \times 1$(a) 10^4 (b) 10^3 (c) 10^2 (d) 10^1

Theory
1. Convert the following to binary number (a) 234_{five} (b) 403_{five}
2. Calculate the following binary numbers
(a) 10001 x 11

(b) 110111 x 111

WEEK SIX **Date:…….**

Topic: BASIC OPERATIONS

CONTENT:

- Addition of Numbers (Place Values)
- Subtraction of Numbers (Place Values)

Addition of Numbers

The easiest method of adding or subtracting numbers is by having the knowledge of place value system. By this system of arrangement, all units (U), Tens (T), Hundreds (H), Thousands (T), and so, are vertically arranged in line. Note that numbers are written from right to left by their place values.

Example 1

Add the following numbers: 1092, 84, 8, 183.

Solution

Th	H	T	U
1	9	9	2
		8	4
+			8
	1	8	3
2	2	6	7

Method

U = 2 + 4+ 8+ 3 = 17 (write 7 under U and carry 1 to the T column)

T = 9 + 8 + 8 + (1) = 26 (write 4 and carry 2 to the H column)

H = 0 + 1 + (1) = 2 (write 2 under H and carry 1 to Th)

Th = 1 + (1) = 2 (write 2 under the Th)

Example 2

Ukachi has 1578 apples, jide has 682 apples and victor has 88 apples. How many apples do they have all together?

Solution

TH	H	T	U
1	5	7	8
+	6	8	2
		8	8
2	3	4	8

Example 3

A man spent #2500 on housing, #1245 on savings, #3480 on feeding and #248 on the children's education. How much did he spend altogether?

Solution

TH	H	T	U
2	5	0	0
1	2	4	5
3	4	8	0
	2	4	8
7	4	7	3

Evaluation:
1. Find the sum of 76,721, 2393, 184 and 96.
2. A man earned ₦73485.00 three years ago ₦ 98472.00 a year ago and ₦124390.00 this year. How much altogether did he earn for the three years?

Subtraction of Numbers
Example 1
The sum of two numbers is equal to 67512. If one of the numbers is 24351, what is the second number?
Solution

TTH	TH	H	T	U
6	7	5	1	2
- 2	4	3	5	1
4	3	1	6	1

Evaluation:
1. There are 24 students in a class which comprises of 14 girls and 10 boys. If 5 girls and 3 boys were absent, how many students are present in the class?
2. Find the difference between 10342 and 2015

General Evaluation
1. A man borrowed ₦120 from a friend and borrowed ₦350 from his brother. How much is his total debt?
2. The temperature inside a room was recorded at 20^{o}C and the temperature outside was measured as -8^{o}C. How many degrees warmer was the room temperature more than the outside temperature?

Reading Assignment:
Essential Mathematics for JSS1, pages 8 and 9

Weekend Assignment
1.By how many is 29 greater than 17? (a)12 (b)18 (c)19 (d)17
2. Simplify 79001- 73776 (a)105225 (b)5335 (c)5225 (d)5221
3. When you increase the sum of 345 and 1276 by 1453, the result will give (a)2074 (b)5023 (c)1453 (d)3074
4.There are 816 boys and 658 girls in a school. How many students are there altogether in the school? (a)1356 (b)1474 (c)1744 (d)1074
5.Find the difference between 8074 and 5729(a)2345 (b)5432 (c)5745 (d)4365

Theory

(1)The difference between two numbers is 603904.If the first number is 21432, what is the second number?

(2)Find the sum of the following numbers: 95,3, 2134, 93627, 18, and 543.

WEEK SEVEN

BASIC OPERATIONS

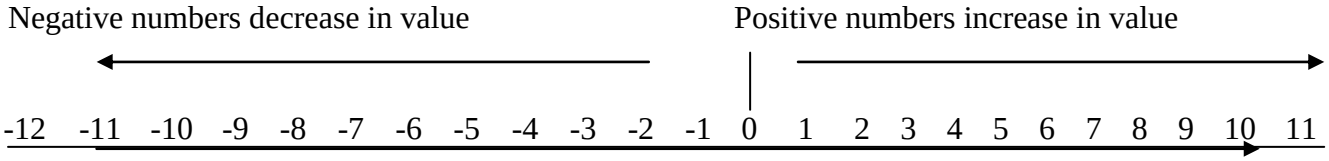
Content

- Addition and subtraction of positive(+ve)and negative(-ve)integers on the number line
- Solving problems on quantitative reasoning in basic operations

Addition and subtraction of Positive and Negative integers on the number line

Integers are positive and negative numbers including zero. Directed numbers are positive numbers greater than zero and negative numbers less than zero.

Number line: This is a picture that shows the arrangement of numbers according to their values, zero being the starting point.Numbers arranged to the left of zero are negatives (-ve)and decrease in value while numbers to the right of zero are positive(+ve)and increase in value.



The values of numbers increase from left to right.

Considering the number line, -12 is to the left of 0 while +12 is to right of 0. Therefore,-12 is less than +2

Inother words, +2 is greater than -12. Mathematically, symbol (<)and (>)are respectively used to denote “less than”and “greater than” respectively. It should be noted that the ADDITIVE INVERSE of a number add up with the number to zero. For instance, +1 is the additive inverse of -1,+2 is the additive inverse of -2, etc.

Example 1

Replace the sign between the following pairs of numbers with any of the signs(<)and(>).

(a)-18… +8 (b)-20… -50 (c)23… 15

Solution

(a)-18<8 (-18 is to the left of zero and 8 is to the right of zero)

(b)-20>-50

(c)23>15

Example 2

Arrange the following in ascending order (a)0,1,-2,-1,-9,-18,-5,2.

Solution

Arranging these numbers on a number line will make the number easier.

-18 -17 -16 -15 -14 -13 -12 -11 -10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3

Since the numbers increase from left to right on the number line,we have the answer thus:
-18,-9,-5,-2,-1.0.+1,+2

Example 3

Use the number line to find the values of the following. (a)5+3 (b)-5+3(c)5-3(d)3-5 (e)-3-5 (f)-4-5+12

Solution

(a) 5+3

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Method: Start from + 5, move three times in the positive (+ve) direction. This gives 8.

(b) – 5 + 3 = -2

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Method: Start from -5 , move 3 times in the positive direction and this gives 2

(c) 5- 3 = 2

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Method: Start from 5 and move 3 times in the negative direction, this gives 2

(d) 3 – 5 = -2

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Method: Start from 3 and move 5 times in the negative direction, this gives -2

(e) - 3 – 5 = - 8

-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Method: Start from -3 and move 5 times in the negative direction, this gives – 8

(f) – 4 -5 + 12 = 3

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

Method: Start from – 4 and move 5 times in the negative direction, then move 12 times in the positive direction, this gives 3.

Rules for addition and subtraction of positive and negative integers

1. If the same sign appear together, then replace them by a positive sign.

Also, (+8) – (-6) = + 8 +6 = +14

2. If different signs appear together, replace them by a negative (-ve) sign.

For instance, (+4) +(-7) = -3.

(Note, 7 cannot be subtracted from 4. So, subtract 4 from 7 and place the –ve sign of 7)

3. When there is a combination of positive and negative integers, the easiest way to simplify them is to add all positive together and also add all negative number together. For instance, 8-7+5-3+2 = 8+5+2-7-3 =5.

Evaluation

1. Simplify the following the number line: (a) (+6) (-4) (b) (+6) + (-13) (c) -3 +7-10
2. A man can withdraw N 2500.00 more than what he has in his account as overdraft. If he takes this amount from his account instead of N 350.00 which he has in his account, what is the balance in his account?

3. What number must be subtracted from -7 to obtain 12.
4. Work out 15-7-5-6+6-10

Solving problems on quantitative reasoning in basic operation

(a) What sign is attached to numbers which are to the left of zero on the number line?
(b) In solving -3-7, which of the numbers will I start counting from and how many times will I move and to which direction?
(c) When two numbers have different signs, what would you do to simplify them?
(d) When two similar signs are together, they should be replaced by what sign?
(e) When there is a combination of both positive and negative numbers, what method could be used to simplify them?

Reading Assignment

Essential Mathematics for JSS1 pages 112 – 120
NGM for West Africa JSS1 pages 72-79

General Evaluation

Work out the following:

(1) (a) +3 + (-3) (b) +10 + (-10)
(2) Draw a suitable horizontal number line to help answer these questions
  (a) -4 -5+4
  (b) – 3 + 8- 5
(3) Put the following numbers in order with the smallest first:
  (a) -12, 4, 0, -15, 0.5, -5, 10.
  (b) 14, -20, 42, -12, -8, 1, 5.

Weekend Assignment

1. Simplify (+7) –(-3) (a) 7 (b) 3 (c) 4 (d) 10
2. Simplify -8- (-3) + (+5) + (-8) (a) 8 (b) 16 (c) -8 (d) -24
3. What is the additive inverse of -8? (a) +4 (b) + 2 (c) +8 (d) +7
4. Two students were seen entering an empty classroom by an observer. A few minutes later, three students were seen coming out. If one more student should enter the classroom again, how many students would be left in the class? (a) 0 (b) 1 (c) 2 (d) 3
5. Simplify (+5) + (-7)-4. (a) 2 (b) -2 (c) -6 (d) 8

Theory

1. Use the number line to add the following: (a) -3+7 (b) -4 -3 (c) – 5 + 8 – 2
2. Work out – (+7) – (6) – (-8) + 6- (+5)

WEEK EIGHT
Topic: ALGEBRAIC PROCESSES
CONTENT

(i) Use of symbols open sentences with two arithmetic operators
(ii) Word problems involving the use of symbols

<u>Use of symbols, solving open sentences with two arithmetic operators</u>

MR OSHO
TUTORS
Researcher || Educator || Career coach
Content builder || Mathematician
08135056422
Mroshotutors@gmail.com

Algebra is a branch of mathematics where alphabets and symbols are used to represent numbers.

The Use of Symbols

Consider the following mathematical expression.

(i) 4 + 5 = 9. This statement is true
(ii) 5 – 6 = 15. This statement is not true
(iii) 4 x 5 = 20. This statement is true.

If the number 5 in (i), (ii) and (iii) is replaced by a symbol ¥, we will have the following: 4 + ¥ = 9.
The following value of the symbol ¥ can be obtained by subtracting 4 from 9, ¥ = 9- 4 = 5.
¥ - 6 = 15.
The value of the symbol can be obtained by adding 6 to both sides: ¥ = 15 + 6 =21.
4 x ¥= 20.
The value of the symbol ¥ can be obtained by dividing both sides by 4; ¥ = 20/4 = 5

Evaluation:
Find the value of the symbol ¥ in the following:

(a) ¥ + 7 = 14
(b) 4 x ¥ = 44
(c) ¥ + 6 = 8
(d) 80 + ¥ + 5 = 15

The use of letters

It should be noted that in representing numbers with letters in algebra, small letters of alphabets are used. For instance, x + 8 = 14; subtracting 8 from both sides of the equation, we have, x = 14 – 8 = 6.

WORD PROBLEMS INVOLVING THE USE OF SYMBOLS.

Consider the following mathematical statements:

(i) Add 5 to a certain number, 'if the certain'for instance is represented by x, then this statement can be interpreted to be x+5
(ii) ''Add a certain number to 8. If the certain number is represented by a letter y,then this can be interpreted as 8+y.
(iii) 'p years ago' can be interpreted as 'minus p'(-p)years.
(iv) 'x years to come or x years time can be interpreted as plus x(+x)years time.
(v) The word 'is', 'gives', 'result to', are interpreted to mean equals
(vi) 'Double' means 2 times or (x2)and thrice' means (x3).
(vii) 'the difference'means addition
(viii) 'The sum means addition
(ix) 'The product'means multiplication

Example 1

A man is x years old and his son is 10 years old.(a)what is their total age? (b)if the difference between their ages is 22 years,what is the value of x?

Solution:

(a)The man's age=x years
The son's age=10 years.
The sum (addition)of their ages=x years +10 years=(x+10)years

(b)The difference between their ages, (x-10).

'is'means equal to

X-10=22.

Add 10 to both sides of the equation.

X=22+10=32years

Example 2

Think of a number'add 5 to it, the result is 15.What is the number?

Solution:

Let the number be y.

'add 5 to it' means y+5.

'the result is 15 means '=15'.

Therefore y +5=15, subtract 5 from both sides of the equation .y=15-5=10.

Example 3

A woman is three times as old as her daughter. If the woman is x years old, (a) how old is her daughter? (b) How old were they 7 years ago? (c) How old would the girl be in 15 years time?

Solution:

(a) If the woman's age is x years and she is three times the age of her daughter, then her daughter's age will be $\frac{x}{3}$ years.

(b) '7 years ago' means minus 7 or (- 7) years, the woman's age be (x -7) while daughter's age will be (x-7)/ 3

(c) (x+15) years while the daughter's age would be $\frac{x-7}{3}$+ 15 years.

Evaluation:

1. Think of a number, double it, the result is 14. What is the number?
2. A man is three times old as his son. If the man's age is x years, (a) How old is the son? (b) How old were they 3 years ago? (c) How old will the son be in y years time? (d) How old will the man be in 5 years' time?

Reading Assignment

Essential Mathematics for JSS 1 Pages 68- 72

General Evaluation:

(1) Find the value of each letter that will make the following sentences true.
(a) 17 – 6 = x (b) n x n = 49 (c) 12 – x = 9 (d) x + x = 24.

(2) Find the value of each of the following when x = 3.
(a) x + 7 (b) x + 9 (c) $\frac{x}{3}$ - 32

Weekend Assignment

1. Three subtracted from double a certain number divided by 6 can be interpreted as (a) $\frac{(3-2x)}{6}$ (b) $\frac{(3x-3)}{6}$ (c) $\frac{(2x-3)}{6}$ (d)) $\frac{(2-3x)}{6}$
2. What is the value of x in the equation x – 14 = 2? (a) 20 (b) 16 (c) 9 (d) 24
3. Find the value of 'a' if 3 x a = 27 (a) 20 (b) 16 (c) 9 (d) 24

4. Find the value of x if 7 + x = 9. (a) 16 (b) 4 (c) 10 (d) 2
5. An SS3 student told a JSS1 student that he is the senior to him in age by 8 years. If the junior student is x years old, how old is the senior student? (a) 8x (b) x + 8 (c) 8 –x (d) 16

Theory

(1) A man earns N 5000.00 in a month and his wife earns N z. If the couple earns N 9500 altogether in a month, what is the value of z?
(2) Think of a number that when 10 is subtracted from it, the result is 8.

WEEK NINE
ALGEBRAIC PROCESSES
Content

1. Identification of coefficient of terms
2. Collection and simplification of like terms
3. Multiplication and division of algebra
4. Use of brackets in algebra.

(A) Identification of Coefficients of Terms

Consider the following algebraic expression: 8x + 2y – 4p. The letter x, y, and p are called variables while the numbers 8, +2 and -4 are called coefficients.

Variables: a variable is a letter used to represent a number.

Coefficient: A coefficient is a number place before a variable or a group of variables.

Example:
Write out the variables and coefficients of the following:

(a) $-\frac{1}{2}x + 5y - z$ $-\frac{1}{2}x$ ($-\frac{1}{2}$ is the coefficient, x is the variable)
+ 5y (+5 is the coefficient, y is the variable)
-z (-1 is the coefficient, z is the variable)

(b) $-p^3 + q^2r - 7$ $-p^3$ (-1 is the coefficient, p^3 is the variable)
$+q^2r$ (q^2r are variables)
-7 (no variables and therefore no coefficient, -7 is a constant)

(B) Collection and simplification of like terms

Like terms are terms that have same letter or arrangement of letters. For instance, a + 3a – 2a are like terms.

Unlike terms are terms which do not have the same letter or arrangement of letters, for instance, 2a + 3b are unlike terms.

Example
Simplify the following (a) 12b – 5b (b) 16x + x +x +2x (c) 20x -6x-x- 3x + 2x
Solution

(a) 12b – 5b

Subtract the coefficients: 12 – 5 = 7
Therefore, 12b – 5b = 7b

(b) 16x + x + x +2x
Add all their coefficients: 16 + 1 + 1 + 2 = 20
Therefore, 16x +x +x + 2x = 20x

(c) 20x – 6x – x – 3x + 2x

(d) Rearrange: 20x + 2x – 6x -3x –x
Rearrange: 20x – 10x = 12x

Evaluation:
Simplify the following:
(1) 7x + 4x + 3x + 6x (2) 3w -6w – w + 18w (3) – 18b – 2b + 40b + 10b – 5b

MULTIPLICATION AND DIVISION OF ALGEBRA
Example

(a) 2pqr = 2 x p x q x r

(b) 2 x 3a = 2 x 3 x a = 6 x a = 6a

(c) 3p x 5q x 2r = 3 x p x 5 x q x 2 x r = 3 x 5 x 2 x p x q x r = 30pqr

(d) 16ab ÷ 2ab = $\frac{16ab}{2ab} = \frac{16\times a\times b}{2\times a\times b} = 8$

(e) $25pqr^2 \div 5qr = \frac{25\times p\times q\times r2}{2\times a\times b} = 5pr$

Evaluation
Simplify the following: (a) $3y^3z \div y^2z$ (b) $5x^2m \div x^2n$ (c) $\frac{2}{7}$ of $21xy^2$ (d) 7abc ÷ 14ab

Use the brackets in Algebra
BODMAS
B- Brackets ( )
O- of
D- Division (÷)
M- Multiplication (x)
A- Addition (+)
S- Subtraction (-)

Examples: Simplify the following using bodmas

(a) 18a + 12a – 8a – (15a -2a)

(b) $\frac{1}{2}$ of (9-5) + 7 – 3 x 6

(c) 28x ÷ 2 + (8x + 4x) + 6

Solution

(a) 18a + 12a – 8a – (15a – 2a)
Applying bodmas, let's solve the terms in the bracket. (15a – 2a) = 13a
18a + 4a – 13a
Since there is no 'of ', the next is addition 18a + 4a = 22a
Therefore, 22a – 13a = 9a

(b) $\frac{1}{2}$ of (9-5) + 7 – 3 x 6

Using BODMAS

$\frac{1}{2}$ of 4 + 7 – 18

2 + 7 – 18 = -9

(c) 28x ÷ 2 + (8x + 4x) + 6

Solve the terms in the bracket, 8x + 4x = 12x

28x ÷ 2 + 12x ÷ 6

Solve the division

14x + 2x = 16x

Evaluation

1. 6 + (7x – 3x) ÷ 2
2. 0.5x + x ÷ 2
3. $6 \times 5x - 3x \times 0 + 6x \div 2$

REMOVING BRACKETS

There are cases where the terms in a bracket cannot be simplified immediately until the bracket is removed. The sign rule is applied in such a situation.

RULES:

(1) If a positive sign comes before the bracket, the signs in the bracket remain the same when the bracket is removed. For instance, 2p + (8p – 3z) = 2p + 8p – 3z = 10p – 3z

(2) If a negative sign comes before the bracket, the signs in the bracket will change as the bracket is being removed. For instance, 12x – (- 6x + 2y) = 12x + 6x – 2y = 18x – 2y. Note that the negative sign (-) before the bracket multiplies everything in the bracket; (-) x (-6x) = +6x and (-) x (+2y) = -2y

Reading Assignment

Essential Mathematics JSS1 pages 156 – 159

General Evaluation

1. Olu bought x number of exercise books yesterday. Today he bought 5 more. How many exercise books has Olu now?
2. A man is x years old and his son is 10 years. (a) What is their total age? (b) If the difference between their ages is 22 years, what is the value of x?
3. A boy gave 5 seeds to a friend from a certain number of seeds. How many seeds did he have now?
4. Dele is x years old. How old was he 7 years ago?

Weekend Assignment

1. What is the coefficient of the variable x in the equation 4x – 3y + z (a) 1 (b) -3 (c) 4 (d) 5
2. Simplify $6x^2y \div 2y^2x$. (a) 6xy (b) $\frac{3x}{y}$ (c) 3xy (d) 3y
3. Simplify $5x \times 2y \times z$ (a) 7xyz (b) 10xyz (c) 10xy (d) 5xyz
4. Simplify 2 x 9x + 12x ÷ 3. (a) 18x (b) 22x (c) 6x (d) 15

5. Simplify 7x – 6 – (2- x) (a) 8x – 8 (b) 7x -8 (c) 7x + 12 (d) 8x – 4

Theory

1. A girl is x years old and her brother is 5 years older than her. (a) find the sum of their ages (b) if their father is 25 years older than the girl, what is the difference between the sum of the children's ages and their father's age?
2. The greater of two consecutive numbers ix x + 5. (a) find the sum of the two numbers (b) Find their difference (c) subtract their sum from x + 12

WEEK TEN
SOLVING QUANTITATIVE APTITUDE PROBLEMS ON THE USE OF SYMBOLS AND BRACKETS

CONTENT:

- Substitution in algebra
- Inserting brackets
- Simplifying algebraic expression containing brackets.

SUBTRACTION IN ALGEBRA

If a = -2, b = -5, c = ½ , x = 8 and y = 0, evaluate the following:

(a) x + y + c
(b) 5yc – c + a
(c) 7x + c

Solution

(a) x + y + c = 8 + 0 + ½ = 8½
(b) 5yc-c + a = 5 x 0 x ½ - ½ + (-2) = -2½
(c) 7x + 5c = 7 x 8 + 5 x ½ = 58½

EVALUATION

If x = 8, y = 5, z = 10. Simplify the following:

(a) $\frac{5y^2-10x}{2z}$ (b) – (x+ y) + 2z (c) (zy –xy) – z (d) 2y x (-zy)

Simplify expressions containing brackets.

Step 1: Remove the brackets by using the number (if any) outside the bracket to multiply each term in the bracket.
Step 2 : Collect like terms and simplify.

Example 1

Remove bracket and simplify this expression 5 (x -6) + (2x – 8)

Solution

5 (x -6) + (2x – 8) = 5x – 30 + 2x – 8
Collect like terms
5x + 2x – 30 – 8
7x – 38 (38 cannot be subtracted from 7x because 38 does not have x and so, they are not like terms)

The answer is 7x – 38

Example 2
Remove the bracket and simplify: 4 (x -1) – (x – 4)
Solution
4 (x -1) – (x – 4)
4x – 4 – x + 4
Collect like terms
4x – x – 4 + 4
3x

Evaluation:
Expand the brackets and simplify

1. 2(x + y) + 3 (x + y)
2. 5y- (-6x – 3y)
3. 5k + (7t – k)(5t + 4k)
4. (2x + 5)- (3x – 1)- (3x + 2) + 5x

Reading Assignment
Essential Mathematics for JSS1 pages 158 – 161

General Evaluation

1. Simplify the following
   (i) 4s – 4y + p – 2p + 7s + 5p + 8y
   (ii) 6x – 3y – 5y + 9y – 4x-y
2. Simplify the following
   (i) 3a + 5b –a – 2b
   (ii) 4d + 7e – 3d + 6e
3. Simplify the following expressions
   (a) 2z x 5zb
   (b) 5xy × xy × 2x
   (c) 4y × xy

Weekend Assignment

1. The length of a rectangle is 2x metres and its width is 2m shorter than its length. What is the area of the rectangle? (a) ($4x^2$ + 8)m^2 (b) ($4x^2$ – 6)m^2 (c) ($4x^2$ – 4x) m^2 (d) ($2x^2$ – 4) m^2
2. If x= -2, y= -4 and z = 0, what is the value of 2x – (2xz – 4y)? (a) 12 (b) -12 (c) -20 (d) 16
3. Subtract x -7 from x + 9 (a) 16 (b) 2x + 16 (c) 6 (d) 2
4. Simplify 4y – (6- y). (a) 5y – 6 (b) 3y – 6 (c) 4y – 6 (d) $24y^2$
5. The smaller of two consecutive numbers is x – 5. What is the sum of the two numbers? (a) 2x – 9 (b) 2x + 11 (c) – 9 (d) 1

Theory

1. Simplify (2x – y- y) – (5x – 3y) + 5

2. The parallel sides of a trapezium are (3x + 2)m and (2x-1)m and they are 4m apart. Calculate the area of the trapezium.