**MATHEMATICS JSS 2**

**FIRST TERM**

## SCHEME OF WORK

**WEEK TOPIC**

1. Basic Operation of Integers
2. Whole Numbers and Decimal Numbers, Multiples and Factors
3. LCM & HCF and Perfect Squares
4. Fractions as Ratios, Decimals and Percentages
5. Household Arithmetic Relating to Profit, Interest, Discount and Commission
6. Approximation of Numbers Rounding off to Decimal Places, Significant Figures
7. Multiplication and Division of Directed and Non Directed Numbers
8. Algebraic Expressions
9. Algebraic Fractions (Addition and Subtraction)
10. Simple Algebraic Equations
11. Revision of First Term Lessons
12. Examination

**WEEK ONE**

**BASIC OPERATION OF INTEGERS**

* Definition
* Indices
* Laws of Indices

**Definition of Integer**

An integer is any positive or negative whole number

**Example:**

Simplify the following

(+8) + (+3) (ii) (+9) - (+4)

Solution

(+8) + (+3) = +11 (ii) (+9) - (+4) = 9-4 = +5 or 5

**Evaluation**

Simplify the following

(+12) –(+7) (ii) 7-(-3)-(-2)

**Indices**

The plural of index is indices

10 x 10 x 10= 103 in index form, where 3 is the index or power of 10. P5=p x pxpxpxp. 5 is the power or index of p in the expression P5.

**Laws of Indices**

1. Multiplication law:

ax x ay = ax+y

E.g. a5xa3=a x a x a x a x a x a x a x a =a8

y1 x y4=y 1+4

= y5

a3 x a5 = a3 + 5 = a8

4c4 x 3c2

= 4 x 3 x c4 x c2 =12 x c4+2=12c6

**Class work**

Simplify the following

(a) 103 x 104 (b) 3 x 106 x 4 x 102 (c) p3 x p (d) 4f3 x 5f7

**Division law**

(1) ax ÷ ay = ax ÷ ay = ax-y

**Example**

Simplify the following

1. a7÷a3=a x a x a x a x a x a x a ÷ a x a x a

a7-3=a4

(2) 106÷103=106÷103=106-3=103

(3) 10a7÷2a2=10a7÷2a2=5a7-2=5a5

**Class work**

Simplify the following

1. 105÷103  2. 51m9÷3m (3) 8x109÷4x106

**Zero indexes**

ax ÷ ax =1

**By division law** ax-x=a0

a0=1

E.g. 1000 =1

500=1

**Negative index**

a0 ÷ ax = 1/ax

But by division law, a0-x=a-x

Therefore, a-x=1/ax

**Example**

1. Simplify (i) b-2 (ii) 2-3

**Solution**

b-2 = 1/ b2  (ii) 2-3 = 1/23 = 1/2x2x2 = 1/8

**Class work**

(1) 10-2 (2) d0 x d4 x d-2 (3) a-3÷a-5 (4)  (1/4)-2

(5) [am]n = amxn = amn.

[Power of index]

E.g. [a2]4=x a2 x a2 x a2 = a x a x a x a x a x a x a x a=a8

Therefore. a2x4=a8.

(6) [mn] a=m ax na = mana. e.g. [4+2x] 2=42+22xx2=

16+4x2=4[4+1xx2] =4[4+x2].

7 Fractional indexes

am/n =a1/n xm=n√ am

Example

(a1/2)2 =a2/2=a1=a

(√a)2=√a x √a =√a x a=√a2=ae.g321/5=5

√321

1. 323/5 = 5√25x3 = 23 =2x2x2 = 8

2. 272/3=3√272 = 32 = 3x3x3 = 9

3. 4-3/2 = √1/43= 1/23

4. (0001)3

=1x10-3

=(10-3)3=10-3x3=10-9

= 1 .

1000000000

=0.000000001

8. (am)p/q=amp=√(a)p

e.g. (162)3/4=√ (162)3

= (22)3

(4)3=4x4x4 = 64

9. Equator of power for equal base

Ax=Ay That is x = y

**WEEKEND ASSIGNMENT**

1. Simplify (+13) – (+6)

(a)7 (b) -7(c) 19 (d) 8

2. Simplify (+11) – (+6)- (-3)

(a)7 (b)8 (c)9 (d)10

3. Simplify 5x3 x 4x7  (a) 20x4  (b) 20x10  (c) 20x7 (d) 57x10

4. Simplify 10a8 ÷ 5a6 (a) 2a2 (b) 50a2  (c) 2a14  (d) 2a48

5. Simplify r7 ÷ r7 (a) 0 (b) 1 (c) r14  (d) 2r7

**THEORY**

1. **Simplify**

1. 5y5 x 3y3
2. 24x8

6x

2. **Simplify** (1/2)-3

**WEEK TWO**

**WHOLE NUMBERS AND DECIMAL NUMBERS**

* Whole Difference between Whole Numbers and Decimal Numbers
* Whole numbers in Standard Form and Decimal Numbers in Standard Form
* Factors, Multiples and Prime Numbers

**Difference between Whole Numbers and Decimal Numbers**

Whole number is a number without fraction. For example 1, 2, 3, 4…1000, 38888 are examples of whole numbers.71/2 is not a whole number. A decimal number is a fractional number less than 1. It is smaller to a whole number. Examples - 0.1,0.01,0.001etc

**Whole Numbers in Standard Form and Decimal Numbers in Standard Form**

Whole numbers in standard form are expressed in the form of A x 10n such that A is a number between 1 and 10, n is a whole number.

Example

Express the following in standard form (a) 200 (b) 4100 (c) 300000

Solution

1. 200 = 2 x 100 = 2x102
2. 4100 = 4.1 x 1000 = 4.1 x 103
3. 300000 = 3 x 100000 = 3 x 105

**Evaluation**

Express the following in standard form (a) 500 (b) 36000 (c) 7200000

Decimal fractions such as 0.00 and 0.000001 can be expressed as powers of 10 e.g. 0.0001 = 1/10000 = 1/104 = 10-4

Thus, any decimal fraction can be expressed in a standard form e.g. 0.008=8/1000=8/103 =8x1/103=8x10-3

Therefore, the number 8x10-3 is in standard form ax10and n is a negative integer while A is a number between1 and 10

Example

Express the following in standard form (a) 0.0023 (b) 0.00034 (c) 0.125

Solution

1. 0.023 = 23/1000 = 2.3/102 = 2.3 x 10-3
2. 0.00034 34/100000= 3.4/104 = 3.4x 10-4
3. 0.125 = 125/1000 = 1.25/101 = 1.25x10-1

**Evaluation**

Express the following in standard form (a) 0.0067 (b) 0.00082 (c) 0.012

**READING ASSIGNMENT**

New General Mathematics, UBE Edition, chapter 1, pages 27-28

Essential Mathematics by A J S Oluwasanmi, Chapter 1, pages 1-4

**FACTORS, MULTIPLES AND PRIME NUMBERS**

The factors of a number are the whole numbers that divide the number exactly. For example the factors of 10 are 1, 2 and 5.

A prime number has only two factors, itself and 1. The following are examples of prime numbers 2, 3, 5, 7, 11,13…. However, 1 is not a prime number.

A multiple of a whole number is obtained by multiplying it by any whole number.

**Example**

1. Write down all the factors of 18.
2. State which of theses factors are prime numbers
3. Write the first three multiples of 18
4. Express 18 as a product of its prime factors in index form

**Solution:**

1. Factors of 18:1, 2,3,6,9 and 18.
2. Prime numbers of the factors of 18:2 and3
3. The first three multiples of 18 are 1x18 = 18, 2x18=36, 3x18=54 => 18, 36 and 54.
4. 18 = 2x3x3 = 2 x 32 in index form

**Example 2:**

1. Write down all the factors of 22.
2. State which of theses factors are prime numbers
3. Write the first three multiples of 22

**Solution:**

1. Factors of 22:1, 2, and 11.
2. Prime numbers of the factors of 22: 2 and11
3. The first three multiples of 22 are 1x22 = 22, 2x22=44, 3x22=66 => 22, 44 and 66.

**Evaluation**

1. Write down all the factors
2. State which of theses factors are prime numbers
3. Write the first three multiples of each of the following numbers below
4. Express each as a product of its prime factors in index form
5. 12 (2) 30 (3) 39 (4) 48

**WEEKEND ASSIGNMENT**

1. Which of these is not a prime number (a) 2 (b) 5 (c) 7 ( d) 1

2. Express 360000 in standard form (a) 3.6 x 105 (b) 3.6 x 106 (c) 3.6 x 103 ( d) 3.6 x 104

3. Express 0.000045 in standard form (a) 4.5 x 10-2 (b) 4.5x 103 (c) 4.5 x 10-5 (d) 4.5 x 10-6

4. Which of these is not a factor of 42 (a) 9 (b) 6 (c) 7 (d) 2

5. Express 50 is product of its prime factor (a) 2 x 52 (b) 2 x 5 (c) 22 x 52 (d) 2 x 5

**THEORY**

1. For each number 42,45,48,50

a. Write down all its factors.

b. State which factors are prime numbers?

c. Express the number as a product of its prime factors.

2. Express the following in standard form (a) 345000 (b) 0.00034 (c) 0.125

**WEEK THREE**

**H.C.F & L.C.M AND PERFECT SQUARES**

**Highest Common Factors**

Highest common factor is the greatest number which will divide exactly into two or more numbers. For example 4 is the highest common factor (HCF) of 20 & 24.

i.e. 20 = 1, 2, (4), 5, 10, 20

24= 1, 2, 3, (4), 6, 8, 12, 24

**Example 1:**

Find the H.C.F of 24 & 78

**Method 1**

Express each number as a product of its prime factors

Workings

2 24 2 78

2 12 2 36

2 6 2 18

3 3 3 9

3 3

24=23x3

78=(23 x 3) x 3

The H.C.F. is the product of the common prime factors.

HCF=23x3

=8x3=24

**Method II**

24=2x2x2x3

78=2x2x2x3x3

Common factor=2x2x2x3

HCF=24

**LCM: Lowest Common Multiple**

Multiples of 2 are =2,4,6,8,10,12,14,16,18,20,22,24…

Multiples of 5 are 5,10,15,20,25,30,35,40

Notice that 10 is the lowest number which is a multiple of 2 & 5.10 is the lowest common multiple of 2& 5

Find the LCM of 20, 32, and 40

**Method 1**

Express each number as a product of its prime factors

20=22x5

32=25

40=22x2x5

The prime factors of 20, 32 and 40 are 2 & 5 .The highest power of each prime factor must be in the LCM

These are25 and 5

Thus LCM =25 x5

=160

**Method II**

2 20 32 40

2 10 16 20

2 5 8 10

4 5 4 5

5 5 1 5

1 1 1

LCM =2 x 2 x 2 x 4 x 5 = 160

**Class work**

Find the HCF of:

(1) 28 and 42

(2) 504 and 588

(3) Find the LCM of 84 & 210

## PERFECT SQUARES

A perfect square is a whole number whose square root is also a whole number .It is always possible to express a perfect square in factors with even indices.

9 = 3x3

25= 5x5

225 = 15x15

= 3x5x3x5

= 32 x 52

9216 =96 2

=32 x 32 2

=32 x 42 X 82

=32x24 x26

=32 x2 10

**Workings**

2 9216

2 4608

2 2304

2 1152

2 576

2 288

2 144

2 72

2 36

2 18

3 9

3 3

 9216= 32x210

Example

Find the smallest number by which the following must be multiplied so that their products are perfect square

a. 540

b. 252

**Solution**

2 540

2 270

3 135

3 45

3 15 54=22 x 33x 5

5 5

1

The index of 2 even. The index of 3 and 5 are odd .One more 3 and one more 5 will make all the indices even. The product will then be a perfect square .The number required is 3x5 =**15**

**b.** 2 252

2 126

3 63

3 21

7 7

1

252= 22x32x7

Index of 7 is odd, one more “7” will make it even.

Indices i.e. 22x 32x 72

**Therefore 7 is the smallest numbers required**

**WEEKEND ASSIGNMENT**

1. The lowest common multiple of 4, 6 and 8 is (a) 24 (b) 48 (c) 12 (d) 40
2. Find the smallest number by which 72 must be multiplied so that its products will give a perfect square (a) 3 (b) 2 (c) 1 (d) 5
3. The lowest common multiple of 4, 6 and 8 is (a) 24 (b) 48 (c) 12 (d) 40
4. The H.C.F. of 8, 24 and 36 is \_\_\_ (a) 6 (b) 4 (c) 18 (d) 20
5. The L.C.M. of 12, 16 and 24 is \_\_\_ (a) 96 (b) 48 (c) 108 (d) 24

**THEORY**

1. Find the smallest number by which 162 must be multiplied so that its product will give a perfect square.
2. Find the HCF and L.C.M. of the following figures

30 & 42

64 & 210

**WEEK FOUR**

**FRACTIONS, RATIOS, DECIMALS AND PERCENTAGES**

* Fractions and Percentages
* Proportion
* Ratio
* Rate

**Fractions and percentages**

A fraction can be converted to decimal by dividing the numerator by its denominator. It can be changed to percentage by simply multiplying by 100.

**Example 5.1**

1. Change 3/8 into a decimal and percentage
2. Convert 0.145 to percentage

**Solution**

1) 3/8 = 0.375 in decimal

3/8 x 100% = 37.5%

2) 0.145x100=14.5%

**Example 5.2**

To change percentage to decimal fraction, simply divide by 100 and then convert to decimal fraction. E.g. convert 92% to decimal

**Solution**

92

100

920

900

200

200 =0.92

**Example 5.3**

1. Change the following to percentages

(a) 0.125 (b) 0.002

**Solution**

**(a**) 0.125x100% = 12.5%

**(b)** 0.002 = 0.002x100% = 0.2%

2. Change the following to decimal fractions

(A) 45 % ( b) 8/3%

**Solution**

* 1. 45/100=0.45
  2. 8/3= 8/3 ÷100/1= 8/3 x 1/100 = 8/300 = 4/150 = 2/75

0.02666

75 200

150

500

450

500

450

500

**=0.0267**

**Class work**

1. Change the following to percentage

(a) 0.264 (b) 0.875

2. Change the following to decimal fractions

(A) 60% (b) 52/3%

**APPLICATION OF DECIMAL FRACTIONS AND PERCENTAGES**

Consider the following examples.

* 1. Find 15% of 2.8kg
  2. Express 3.3 mass a percentage of 7.5
  3. Find 331/3 % of8.16litres

**Solution**

**a.** 15/100 of 2.8kg

15/100 x 2.8 x 1000g

15/100 x 2800

=420g

=420/1000

=0.420kg

**b**. 3.3/7.5 x 100/1

33/75 x 100/1

11x4 = 44%

**c**. 331/3% of 8.16litres

100/3 of 8.16litres

100/3 of 8.16litres

100/3 x 8.16litres

100/3 x 8.16 x 1000 (1litre=1000cm3)

100/3 x 8160

100/3 ÷100/1 x 8160

100/3 x 1/100 x 8160

=2700/1000= **2.720litres**

**Class work**

1. Express1.5 as a percentage of 2.5 m

2. Find 662/3 % of2.4m

**Proportion**

Proportion can be solved either by unitary method or inverse method. When solving by unitary method, always

* write in sentence the quantity to be found at the end.
* decide whether the problem is either an example of direct or inverse method
* find the rate for one unit before answering the problem.

**Examples**

1. A worker gets N 900 for 10 days of work, find the amount for (a) 3 days (b) 24 days (c) x days

**Solution**

For 1 day = N 900

1 day = 900/10 = N90

a. For 3 days =3 x 90 = 270

b. For 24 days = 24x90 = N 2,160

c. For x days =X x 90 = N 90 x

**Inverse Proportion**

Example

1. Seven workers dig a piece of ground in 10 days. How long will five workers take?

**Solution**

For 7 workers =10 days

For 1 worker =7x10=70 days

For 5 workers=70/5 =14 days

1. 5 people took 8 days to plant 1,200 trees, How long will it take 10 people to plant the same number of trees

**Solution**

For 5 people =8 days

For 1 person =8x5=40 days

For 10 people =40/10 =4 days

**Class Work**

1. A woman is paid N 750 for 5 days, Find her pay for (a) 1 day (b) 22 days
2. A piece of land has enough grass to feed 15 cows for x days. How long will it last (a) 1 cow (b) y cows
3. A bag of rice feeds 15 students for 7 days .How long would the same bag feed 10 students

Note on direct proportion: this is an example of direct proportion .The less time worked (3 days) the less money paid (#270) the more time worked (24 days) the more money paid (N N 2,160)

**Ratio**

Ratio behaves the same way as fraction. Ratios are often used when sharing quantities..

**Example**

600/800=600/800=3/4

300-400=600-800=1200-1600=3=4

**Example**

1. Express the ratio of 96 c: 120c as simple as possible

Solution 96c: 120c=96/120=4/5=4.5

2. Fill in the gap in the ratio of 2:7=28

**Solution** let the gap be X

2/7 = X/28

7X =2 x 28

X=2 x 28/7

X=2 x 4

X = 8

1. Two students shared 36 mangoes in the ratio 2:3 How many mangoes does each student get?

**Solution**

Total ratio =2+3=5

First share=2/5x35/1=21 mangoes

**Rate**

Rate is the change in one quantity to the other. Examples are 45km/hr, a km, 1 litre etc

Worked examples

1. A car goes 160 km in 2 hrs what is the rate in km/hr?

**Solution**

In 2 hrs the car travels 160 km

In 1 hr the car travels 160/2=80km

Therefore the rate of the car is 80km/hr

1. A car uses 10 litres of petrol to travel 74 km. Express its petrol consumption as a rate in km per litre.

**Solution**

10 litres =74 km

1 litres = 74/10 km

=7.4 km

**Class work**

1. A car factory made 375 cars in 5 days, Find its rate in cars per day.
2. A car travels 126 km in 11/2 hrs. Find the rate in km per hr.

**WEEKEND ASSIGNMENT**

1. 5 men build in 10 days, how long would it take 25 men?

(a) 3 days (b) 2 days (c) 5 days (d) 10 days

1. A girl buys 7 pens for N 210. How would ten pens cost? (a)#300(b)#30(c)#3(d)#200
2. Fill in the gap in m: a =16:24 (a) 10 (b) 12 (c) 4 (d) 6
3. Express 90km /hr: 120km /hr as simple as possible (a) 4:3 (b) 3:4 (c) 2:3 (d) 3:2
4. A factory makes N 2000 pencils in 10 days, Find its production rate of pencils per day (a) N 20 per day (b) N 100 per day(c) N 50 per day (d) N 200 per day

**THEORY**

1. Find 50% of 3.5m

2. A bag of corn can feed 100 chicks for 12 days. How long would the same bag feed 80

chickens?

**WEEK FIVE**

**SIMPLE INTEREST**

Interest is the money paid for saving a particular amount of money.

Simple interest can be calculated using the formula

Simple interest I = PRT

100

Where P= principal, R=rate & T= time

Also total amount =principal +interest

**Example 1**

Find the simple interest on N60, 000 for 5 years at 9% per annum

Solution

Applying I=PRT P= N 60,000 R=9% T=5 years

100

I = 60,000x9x5

100

= N 27,000

**Example 2**

A man borrows N 1,600,000 to buy a house .He is charged interest at the rate of 11% per annum. In the first year, he paid the interest on the loan. He also paid back N 100,000 of the money borrowed. How much did he pay back altogether? If he paid this money by monthly instalment, how much did he pay per month?

**Solution**

P= N 1,600,000 R=11% T=1 year

Interest on N 1,600,000 I =PRT =1’600,000 x11x1 = N 176,000

100 = 100

The total amount paid in the first year= N 100,000 + N 176,000 = N 276,000

Monthly payment =276.000 = N 23,000

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**Class work**

1. Find the simple interest on the following:

a. N 10,000 for 31/2 years at 4% per annum

b. N 20,000 for 4 years at 4% per annum

2. A man got N 1,800,000 loan to buy a house .He paid interest at a rate of 9% per annum. In the first year, he paid the interest on the loan. He also paid back N 140,000 of the money he borrowed. (a) How much did he pay in the first year altogether.

**Profit and loss percent**

Profit means gain, while loss is the inverse of profit.

% Profit is the percentage of the gain made from a particular product or item

% Profit = profit x 100

Cost price

To find the selling price of an article

At loss = cost price – loss

At gain= cost price + profit

**Example**

1. A trader buys a kettle for N 800 and sells at a profit of 15%. Find the actual profit and the selling price

**Solution**

Profit =15 of N 800

=15 x800

= N 120

Selling price = C. + profit

= 800+120

= N 920

2. A hat is bought for N 250 and sold for N 220, what is the loss percent

**Solution**

Cost price C.P = N 250

Selling price = N 220

Lost= N 250- N 220 = N **30**

**% Loss =loss x100%**

C.P

=30/250 x100%

=300/25 =12%

**Class work**

1. Find the actual profit and the selling price of a material which cost #1000 sold at a profit of 15%
2. A farmer buys a land for #40,000 and sells it for N 33,000 what is the percentage loss?
3. A car that cost N 336,000 was sold at a loss of 17½%. What is the selling price

**Discount and Commission**

A discount is a reduction in price of goods or items. Discount are often given for paying in cash

Commission: this is the payment for selling an item.

**Examples**

1. Find the discount price, if a discount of 25% is given on a market price of #9,200

**Solution**

Discount =25% of N 9,200

=25/100 x9, 200=2,300

1. A radio cost N 5,400 .A 12½% discount is given for cash. What is the cash price

**Solution**

Discount =12 ½% of N 5,400

= 25/2x100 x 5400

=25/2x100 x5400=675

Cash price = N 5,400-675 = N 4725

1. A bank charges **2**½ % commission for issuing a bank draft to its customers, if a customer obtained a bank draft for N 84,000 from the bank, calculates the total cost of the bank draft.

**Solution**

Commission =22% of N 84,000

5/2/100 x 84,000

=5/2x100 x84, 000

= N 2,100

Total cost of bank draft =84,000+ N 2,000 = N 86,100

**Class work**

1. Find the discount price if a discount of 20% is given on a market of N 2,915
2. The selling price of a table is N 14,000, the trader gives a 25% discount for cash, what is the cash price
3. An insurance agent sells N 284,000 worth of insurance, his commission is 20% .How much money does he get

**WEEKEND ASSIGNMENT**

1. Calculate the simple interest on N 200 in 2 years at 4% per annum (a) N 160n (b) N 240 (c) N 16 (d) N 260
2. Calculate the simple interest on N 20,000 for 21/2 years at 2% per annum (a) N 10 (b) N10, 000 (c) N 1000 (d) N 2000
3. Find the simple interest on N 40,000 for 1 year at 5% per annum (a) N 100 (b) N 250 (c) N 2,590 (d) N 50
4. What is the simple interest on #70,000 for 1 year at 4% per annum (a) N 2,800 (b) N 2,000 (c) N 2,400 (d) N 2,300
5. Find the simple interest on N 10,000 for 3 years at 6% per annum (a) N 1,800 (b) N 1000 (c) N 1,850 (d) N 1,200

**THEORY**

* + 1. Find the simple interest on the following

1. N 55,000 for 4 years at 60% per annum
2. N 25,000 for 3 years at 5% per annum

**WEEK SIX**

**APPROXIMATION OF NUMBERS ROUNDING OFF TO DECIMAL PLACES**

Digits 1,2,34 are rounded down to Zero, while digits 5, 6, 7, 8, and 9 are rounded up to 1 e.g. 126=130 to 2 digits

A significant figure begins from the first non-zero digit at the left of a number. Digit should be written with their correct place values.

Worked example

1. Round off the following to the nearest

i. Thousand (ii) hundred (ii) ten

(a) 8615 (b) 16,560

**Solution**

**a**.

i) 8615 ≈ 9000 {to the nearest thousand}

ii) 8615 ≈8600 {to the nearest hundred}

iii) 8615 ≈8620 {to the nearest ten}

**b**.

(i) 16560≈17000 {to the nearest thousand}

(ii) 1660≈16, 600 {to the nearest hundred}

(iii) 16560 ≈16560 {to the nearest ten}

2. Round off the following to the nearest (i) whole number (ii) tenth (iii) hundred

(a) 3.125 (b) 0.493

**Solution**

**a.**

(I) 3.125≈3 {to the nearest whole number}

(ii) 3.125≈3.1{to the nearest tenth}

(iii) 3.125≈3.13{to the nearest hundredth}

**b.**

(i) 3.125≈3 {to the nearest whole number}

(ii) 3.125≈3.1{to the nearest tenth}

(iii) 3.125≈3.13{to the nearest hundredth

**Evaluation**

Round off the following to

a) 1d.p. (b) 2 d.p. (c) 3 d.p.

(1) 12.9348 (2) 5.0725 (3) 0.9002

**Square Roots of Numbers**

The symbol ‘√’ means “square root of”. To find the square root of a number, first find its factors.

**Examples**

1. Find the square root of 11025

**Solution**

(a) √11025

3 11025

3 3675

5 1225

5 245

7 49

7 7

√11025= √(32 x 52 x 72)= 3 X 5 X 7=105

**Example**

Find the square roots of √54/9

**Solution:**

√54/9=√49/9=√49/√9=7/3=**2** 1/3

**WEEKEND ASSIGNMENT**

1. What is 0.003867 to 3 significant figure (a)0.004 (b)0.00386 (c)0.00387 (d)386
2. The square root of 121/2 is \_\_\_\_(a)1 3/4 (b)3 1/2 (c)3 3/4 (d)6 1/4
3. 9852 to 3 S.F. is \_\_\_\_\_(a)990 (b) 9850 (c) 9580 (d) 986
4. 7.0354 to 2 d.p is \_\_\_\_\_(a) 7.03(b) 7.04 (c) 7.40 (d)7.13
5. 59094 to the nearest hundred is \_\_\_\_(a) 59100(b)59104 (c) 60094 (d) 60194

**THEORY**

1. Find the square root of 1296

2. a. What is 0.046783 to 3 significant figure

b. 45.34672 to 2 d.p. is \_\_\_\_\_\_

**WEEK SEVEN**

**DIRECTED NUMBERS**

**CONTENT**

(i) Addition and subtraction of directed numbers

(ii) Multiplication of directed numbers

(iii) Division of directed numbers

**ADDITION AND SUBTRACTION OF DIRECTED NUMBERS**

Directed numbers are the positive and negative numbers in any given number line e.g

-4 -3 -2 -1 0 1 2 3 4

The (+) and (-) signs show the direction from the origin (o). To add a positive number move to the right on the number line

Addition

-2 -1 0 +1 +2 +3 +4

To subtract a positive number, move to the left on the number line

Subtraction

-2 -1 0 +1 +2 +3 +4

**Worked examples**

Simplify the following

i.                    (-2\_+(-4)

ii.                  (-6)+(+6)+0

iii.                6-(-3)-(-4)

**Solution**

1. 1)     (-2)+(-4)=2+4=-6

-6 -5 -4 -3 -2 -1 +1 +2

1. (-6)+(-6)+0= 6+6+0 =- 0

-6 -5 -4 -3 -2 -1 0 +1 +2 +3

1. -(-3)-(-4)= 6+3+4 =- 13

-1 0 +1 +2 +4 +5 +6 +7 +8 +9 +10 +11 +12 +13

**EVALUATION**

Simplify the following

1. (+6)-(+10)
2. 12-(+3)-8
3. (-5)+(-5)+(-5)
4. (-8)-(-2)+(-2)

**MULTIPLICATION OF DIRECTED NUMBERS**

Multiplication is a short way of writing repeated addition e.g. 3x4=4+4+4 =12.

When directed numbers are multiplied together, two like signs give a positive result, while two unlike signs give a negative result in general

(i) (+a) x (-b) =+ab

(ii) (-a) x (-b) =+ab

(iii) (+a) x(-b)=-ab

(iv) (-a) x (+b) =-ab

**Worked examples**

Simplify the following

(a) (+1/2) x (+1/4) = +1/8

(b) (+17) x (-3) = -51

(c ) (- 91/3) x (+2/5) = -56/15 = -311/15

**DIVISION OF DIRECTED NUMBERS**

The rules of multiplication of directed numbers also apply to the division of directed numbers

i. (+a) ÷ (+b)=+(a/b)

ii. (-a) ÷ (-b)=+(a/b)

iii. (+a) ÷ (-b) = -(a/b)

iv.     (-a)÷(+b) = -(a/b)

**Class work**

1. Simplify the following

1. (-36) ÷ (+4)
2. (-4) ÷(-12)
3. (-6) x (-5)

-10 x 3

2. Complete the following

a. (+6) + (5) =

b. (+6) + (9) =

c. (-6) + (=5) =

d. (+7) + (=4) =

e. (+8) - (+6) =

**WEEKEND ASSIGNMENT**

1. Simplify 12 - (+3) - 8= \_\_\_\_ a) -1 (b) +1 (c)-2 (d)+2

2. Simplify (-3) – (-1)= \_\_\_\_ a) -2 (b) -1 (c)+1 (d) +2

3. Simplify (+15) x (-4)= \_\_\_\_ a) -20 (b) -60 (c)+20 (d) +60

4. Divide -18 by -3 = \_\_\_\_ a) -6 (b) +6 (c)-21 (d) +15

5. Divide -5 by -15 = \_\_\_\_ a) +1/3 (b) -1/3 (c) +1/5 (d) -1/5

**THEORY**

1a). Simplify 4/9 of (-2 4)

b) Simplify (-2) + (-7) using number lines.

2 Simplify

a) 7 x (-6.2)

b) -112 ÷ -4

**WEEK EIGHT**

**ALGEBRAIC EXPRESSION**

Definition with examples

Expansion of algebraic expression

Factorization of simple algebraic expressions

Definition with examples

In algebra, letters stand for numbers. The numbers can be whole or fractional, positive or negative.

Example

Simplify the following

* 1. -5 x 2y
  2. -3a x -6b
  3. -14a/7
  4. -1/3 of 36x2

**Solution**

1) -5 x 2y = -5 x (+2) x y

= -(5 x 2) x y = -10y

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

= (-3) x (-6) x a x b = 18ab

1. -14a/7 = (-14) x a = (-14/7) x a

**+7**

**=** -2 x a = -2a

4) -1/3 of 36x2 = (+36) x x2 = - (36/3) x x2

(-3)

= -12x2

**Evaluation**

Simplify the following

1.-16x/8

2. (-1/10) of 100z

3. (-2x) x (-9y)

Removing brackets

Example

Remove brackets from the following

a.8 (2c + 3d) (b) 4y (3x-5) (c) (7a-2b) 3a

Solution

8(2c+3d) = 8 x 2c + 8 x 3d

= 16c + 24d

b.4y(3x-5) = 4y x 3x – 4y x 5

= 12xy – 20y

c.(7a-2b)3a = 7a x 3a – 2b x 3a

=21a2 – 6ab

**Evaluation**

Remove brackets from the following

1.-5x(11x – 2y)

2.-p(p – 5q)

3.(2c + 8d)(-2)

Expanding algebraic expressions

The expression (a+b)(b-5) means (a+2) x (b-5)

The terms in the first bracket, (a+2), multiply each term in the second bracket, b-5.

Example

Expand the following

* 1. (a+b) (c+d)
  2. (6-x) (3+y)
  3. (2p-3q) (5p-4)

Solution

a.(a+b)(c+d) = c(a+b) + d(a+b)

= ac+bc+ad+bd

b.(6-x)(3+y) = 3(6-x) + y (6-x)

= 18 -3x +6y – xy

c.(2p-3q)(5p-4) = 5p(2p – 3q)-4(2p-3q)

**=** 10p2 – 15pq – 8p + 12q

**Evaluation**

Expand the following

1. (3+d)(2+d) (b) (3x+4)(x-2) (c) (2h-k)(3h+2k) (d) (7m-5n)(5m+3n)

**Factorization of algebraic expression**

Example:

Factorize the following

1. 12y + 8z (b) 4n2 – 2n (c) 24pq – 16p2

**Solution**

1. 12y +8z

The HCF of 12y and 8z is 4

12y +8z = 4(12y/4 + 8z/4)

= 4(3y + 2z)

1. 4n2 – 2n

The HCF of 4n2 and 2n is 2n

4n2 – 2n = 2n(4n2/2n – 2n/2n)

= 2n (2n-1)

1. 24pq – 16p2

The HCF of 24pq and 16p2 is 8p

24pq – 16p2 = 8p(24pq/8p - 16p2/8p)

= 8p(3q – 2p)

**Evaluation**

Factorize the following:

1. 2abx + 7acx (b) 3d2e + 5d2
2. 12ax + 8bx

**READING ASSIGNMENT**

New General Mathematics, UBE Edition, Chapter 1, pages 20-21

Essential Mathematics by A J S Oluwasanmi, Chapter 1, pages 1-4

**WEEKEND ASSIGNMENT**

1. Simplify (-6x) x (-x) =\_\_\_\_\_ a) 6x ( b) 6x2 (c) -6x (d) -6x2

2.Remove brackets from -3(12a – 5) a) 15-36a b) 15a-36 c) 15a + 36 d) 36a – 15

3. Expand (a+3)(a+4) (a) a2+7a+12 (b) a2+12a+7 (c) a2+12a-7 (d) a2+7a-12

4. Factorize abc + abd (a) ab(c+d) (b) ac(b+d) (c) ad(b+c) (d)abc(c+d)

5. Factorize 5a2 + 2ax (a) a(5a+2x) (b) 5(2a2+2x) (c) a(5x+2ax) (d)a2(5+2x)

**THEORY**

1. Expand the following:

a. (p+2q)(p+3q)

b. (5r+2s)(3r+4s)

2. Factorize the following

a. -18fg – 12g

b. -5xy + 10y

**WEEK NINE**

**ALGEBRAIC FRACTIONS (ADDITION AND SUBTRACTION)**

- Equivalent Fractions

- Addition and Subtraction of algebraic fraction

- Fractions with brackets

**Equivalent Fraction**

Equivalent fractions can be made by multiplying or dividing the numerator and denominator of a fraction by the same quantity.

For Example:

Multiplication

3 = 3 x 2b - 6b

d d x 2b 2bd

Division.

4x = 4x ÷ 2 = 2x

6y ÷ 2 3y

Complete the boxes in the following :

(a) 3a = (b) 5ab =

2 10 12a 12

Solution>

3a =

1. 10.

Compare the two denomination

2 x 5 = 10

The denominator of the first has been multiplied by 5. The numerator must also be multiplied by 5.

3a x 3a x 5 = 15a

2 2 x 5 a0

(b) 5ab =

12a 12

The denominator of the first has been divided by a. Therefore, divide the numerator by a .

5ab = 5ab ÷ a = 5b

12a 12a ÷a 12.

Evaluation

1. 8b =

5 15

2. 9ah = 3h

6ak

3.

= 3x

8yz sy.

**Addition and subtraction of algebraic fractions**

Algebraic fraction must have common denominator before they can be added or subtracted

Example:

1. + 7 (b) 4 + b ( c) 1 + 1 (d) 5 - 4

2a 2a a u v 4c 3d

Solution

(a) 5 + 7 = 5+7 = 12÷2 = 6

2a 2a 2a 2a ÷2 a

(b) 4 + b = 4 + b

a a 1

The L.C. M of a and 1 is a

4 + b = a x b = 4 + ab

a 1 a a a

= 4 + ab

a

(c) 1 + 1

u v

The L. C. M of u and v uuv

1 + 1 = 1 x v + 1 x u 1 x v + 1 x u

u v uv uv uv.

= v + v = u + v

uv uv uv.

(d) 5 - 4

4c 3d.

The L. C. M. of 4c and 3d is 12cd

5 - 4 = 5 x 3d - 4 x 4c

4c 3d 12cd 12cd

= 15d - 16c

12cd 12cd

= 15d - 16c

12cd.

**Evaluation**

Simplify the following :

(a) 4 - 1 (b) 5 - 2 ( c ) 2b + 3

3a 3a 4a 3b 4.

**Fraction with brackets**

**Examples**

Simplify.

(a) x + 3 + 4x – 2

5 5

(b) 7a – 3 - 3a + 5

6 4.

Solution

(a) x + 3 + 4x – 2 = ( x + 3 ) + ( 4x – 2 )

5 5 5

= x + 3 + 4x – 2

5

= 5x + 1

5

(b) 7a – 3 - 3a + 5

6 4

The L. C. M of 6 and 4 is 12

7a -3 - 3a + 5 = 2 (7a – 3) - 3 ( 3a + 5 )

6 4 2 x 6 3 x 4

removing = 2 (7a – 3) - 3 ( 3a + 5)

1. 12.

= 14 a – 6 - 9a – 15

12.

collecting the like terms = 5a – 21

12

**EVALUATION**

Simplify the following

(a) 2a – 3 + a + 4

2 2

( b) 3x – 2d + 2c – 3d

1. 15

( c ) 2a + 3b + a – 4b

a 6.

**READING ASSIGNMENT**

New General Mathematics pg 100-101 Ex. 11g 1 & 2 pg 101.

**WEEKEND ASSIGNMENT**

1. If 3 = ? find ? ( a ) 0 (b) 1 ( c ) C

12a 4

2. Simplify 1 - 1 ( a) x + y (b) y – x ( c) x – y ( d ) y + x

x y xy xy xy xy

3. if 2c = 6C2 find ? (a) 3c (b) 3ac ( c ) 3a (d) 2c

a ?

4. Simplify 4x + 8x (a) 32x ( b) 4x ( c ) 12x (d) 4x

a a a 3 18 a

5 7 + 9 ( a ) y (b) 8y ( c ) y (d ) 2

8y 8y 2 3 8 y.

**THEORY**

1. Simplify 5 - 2

4a 3b.

2. Simplify 2a + 3b + 9 – 4b

7 6.

**WEEK TEN**

**SOLUTION OF PROBLEMS ON SIMPLE ALGEBRAIC EQUATION**

**CONTENT**

Solving equation by balance method

Equation with bracket

Equation with fraction.

Solving Equation by Balance Method

To solve an equation means to find the values of the unknown in the equation that makes it true.

For example: 2x – 9 = 15.

2x – 9 is on the left hand side (LHS) and 15 is on the right hand side (RHS) of the equals signs.

Worked examples

1. solve 3x = 12
2. 2x – 9 = 15.

Solution

1.3x = 12

Divide both sides by 3

3x = 12

3 3

x = 4.

2. 2x – 9 = 5

add 9 to both sides since +9 is the additive inverse of (-9)

2x – 9 + 9 = 15 + 9

2x = 24

x = 24/2 = 12

**EVALUATION**

Use the balance method to solve the following

(a) 3x – 8 = 10 (b) 20 = 9x + 11 (c ) 10y – 7 = 27 (d) 9 + 2x = 16.

Equation with bracket

Worked example

1. solve 3(3x – 1) = 4 ( x + 3)

2. Solve 5 ( x + 11) + 2 ( 2x – 5) = 0

Soluton

1. 3 (3x – 1) = 4 ( x + 3)

9x - 3 = 4x + 12

Collect like terms:

9x – 4x = 12 + 3

5x = 15

x = 15/3

x = 3

2. 5 (x + 11) + 2 ( 2x – 5) = 0

5x + 55 + 4x – 10 = 0

collect like terms

5x + 5x = 10 – 55

9x = -45

x = -45/9

x = -5.

**EVALUATION**

Solve the following :

1. 2 (x + 5) = 18 2. 6 (2s – 7) = 5s 3. 3x + 1 = 2(3x+5)

4. 8 (2d – 3) = 3 (4d – 7) 5. (y + 8 ) + 2 (y + 1) = 0.

**Equation with Fraction**

Before collecting like terms in a equation always clear the fraction. To clear fraction, multiply both sides of the equation by the L.C. M. of the denominators of the fraction.

Worked examples

Solve the equations.

1. 4m - 2m = 4

5 3

2. 3x – 2 - 2x + 7 = 0

6 9

Solution

1. 4m - 2m = 4

5 3

LCM of 5 and 3 is 15. Multiply both sides by 15

15 x 4m - 15 x 2m = 15 x 4

5 3

3 x 4m - 5 x 2m = 60

12m – 10m = 60

2m = 60

m =60

2

m = 30.

2. 3x – 2 - 2x + 7 = 0

6 9

The LCM of 6 & 9 is 18. multiply both sides by 18

18 x (3x – 2) - 18 (2x + 7 ) = 0

6 9

3(3x – 2) - 2 (2x + 7) = 0

9x – 6 - 4x – 14 = 0

9x – 4x = 14+ 6

5x = 20

x =20/5

x = 4.

**EVALUATION**

Solve the following equation

1. 7a - 21 = 0 2. x – 2 = 4

2 3

3. 6m – 3 = 2m+ 1 4. x - x = 2

7 7 2 3

**READING ASSIGNMENT**

New General Mathematics chapt. 13 Ex 13d nos 1-20.

**WEEKEND ASSIGNMENT**

1. Solve 3x + 9 = 117

(a) 38 (b) 36 (c) -36 (d) -38

2. If -2r = 18 what is 4?

(a) -9 (b) 20 (c) 9 (d) -20

3. solve 2 (x + 5) = 16

(a) 13 (b) 10 (c) 8 (d) 3

4. Solve x = 5 (a) -15 (b) 15 (c) 10 (d) -10

3

5. If = ½ What is x? (a) 2 ½ (b) 2 2/3 (c) -2 ½ (d ) 2.

**THEORY**

1. Solve the following (a) 4 (x + 2) = 2 (3x – 1) (b) 19y -2 (6y + 1) = 8

2. Solve the following:

(a) 5e – 1 - 7e + 4 = 0

4 8

(b) 2a – 1 - a + 5 = ½

3 4