



**BREEDING**  
**A R E N A**  
*College*

# THE BREEDER'S GUIDE

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## MATHEMATICS

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YEAR 7

Term Cultivate 2023/2024

# SCHEME OF WORK

MATHEMATICS		
Science & Technology		September 4 – December 9th
WEEK	TOPIC	SUB-TOPICS
1	Whole numbers	<ul style="list-style-type: none"> <li>a. Counting in millions, billions and trillions</li> <li>b. Quantitative reasoning</li> </ul>
2	Lowest Common Multiple and Highest Common Factor	<ul style="list-style-type: none"> <li>a. Concept of LCM and HCF</li> <li>b. LCM and HCF by identification and formulae</li> <li>c. Quantitative reasoning on LCM and HCF</li> </ul>
3	Fractions (I)	<ul style="list-style-type: none"> <li>a. Meaning of Fraction</li> <li>b. Types of Fraction</li> <li>c. Fractions in quantitative reasoning</li> </ul>
4	Fractions (II)	<ul style="list-style-type: none"> <li>a. Equivalent fractions</li> <li>b. Identification of equivalent fraction</li> <li>c. Applying equivalent fractions on commodities</li> </ul>
5	Fraction (III)	<ul style="list-style-type: none"> <li>a. Ordering of Fraction</li> <li>b. Conversion of Fraction to percentages (and vice versa)</li> <li>c. Conversion of fraction to decimal (and vice versa)</li> </ul>
6	Fraction (IV)	<ul style="list-style-type: none"> <li>a. Addition and subtraction of fraction</li> </ul>
7	Midterm test and break	
8	Fraction (V)	<ul style="list-style-type: none"> <li>a. Multiplication and Division of Fraction</li> </ul>
9	Estimation	<ul style="list-style-type: none"> <li>a. Concept of Estimation</li> <li>b. Estimation of dimension</li> <li>c. Estimation of Capacity</li> <li>d. Estimation of Capacity</li> </ul>
10	Project	<ul style="list-style-type: none"> <li>➤ GROUP A – Construct and compute a prime number chart to make a game of your choice</li> <li>➤ GROUP B - Construct and compute an equivalent fraction chart to make a game of your choice</li> </ul>
11	Revision	
12	Examination	
13	Examination	
WEEK	TOPIC	SUB-TOPICS

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## Mathematics

# 1. WHOLE NUMBERS

**Objective:** By the end of this class, each student should be able to (i) Identify Million, Billion and Trillion (ii) State the differences and apply large numbers to real life situations.

**Duration:** 190 mins

**Week:** 1

**Entry Behaviour (How you plan to start your Class):**

### DEVELOPMENT OF NUMBER SYSTEM

There were many ancient ways of writing numbers part of which are the Hindu Arabic system, tally system, Roman system, etc. While so many have gone into extinction, the Roman system is still in use up to date.

### ROMAN NUMBER SYSTEM

The Roman number system was developed about 300BC. The Romans used capital letters of the alphabet for numerals. Table 1.1 shows how to use the letters

ROMAN NUMERALS			
1 I	11 XI	30 XXX	500 D
2 II	12 XII	40 XL	600 DC
3 III	13 XIII	50 L	700 DCC
4 IV	14 XIV	60 LX	800 DCCC
5 V	15 XV	70 LXX	900 CM
6 VI	16 XVI	80 LXXX	1,000 M
7 VII	17 XVII	90 XC	2,000 MM
8 VIII	18 XVIII	100 C	3,000 MMM
9 IX	19 XIX	200 CC	4,000 MV
10 X	20 XX	300 CCC	5,000 V
		400 CD	10,000 X

### EXAMPLE

1: Write these numbers in Roman numerals.

- a) 25      b) 105      c) 49      d) 2011

Solution

- a) 25 = XXV      b) 105 = CV      c) 49 = XLIX      d) 2011 = MMXI

2: What numbers do these Roman numerals represent?

- a) XLVI      b) XCIX      c) MMCMLIV      d) MMMDCI

Solution:

- a) XLIV = 46      b) XCIX = 99      c) MMCMLIV = 2954      d) MMMDCI = 3601

### CLASS ACTIVITY

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## Mathematics

1. Write these numbers in Roman Numerals
2. a) 352 b) 1 257 c) 2456
3. Add the following Roman numerals and give your answers in figures
4. a) XXV and CV b) XXIV and MDCIX.

### What are whole numbers?

Whole Numbers are also called **Integers**. There are positive Integers and negative Integers. Examples of positive integers are 1, 2, 3, 4, 5, etc., while examples of negative integers are  $-1, -2, -3, -4, -5$ , etc.

The figure **0, 1, 2, 3, 4, 5, 6, 7, 8, 9** are called **digits or units which form counting numbers**.

### PLACE VALUES

The value of the position of a digit within a number is called the place value. When any whole number is written, the value of each digit depends on its position in the number. In the common decimal system that we use, the value of a digit increases each time it moves from left to right by ten times, e.g.

4 = 4 units

40 = 4 tens

400 = 4 hundreds

4 000 = 4 thousands

The number 7483 is represented as

THOUSANDS	HUNDREDS	TENS	UNITS
7	4	8	3

**EXAMPLE 1:** What is the place value of 6 in 8643?

Solution: The place value of **6** in **8643** is **six hundreds**.

**EXAMPLE 2:** What is the place value of 3 in

25. a) 25.436? Answer: three hundredths
26. b) 5.368? Answer: three tenths
27. c) 346.12? Answer: three hundreds.

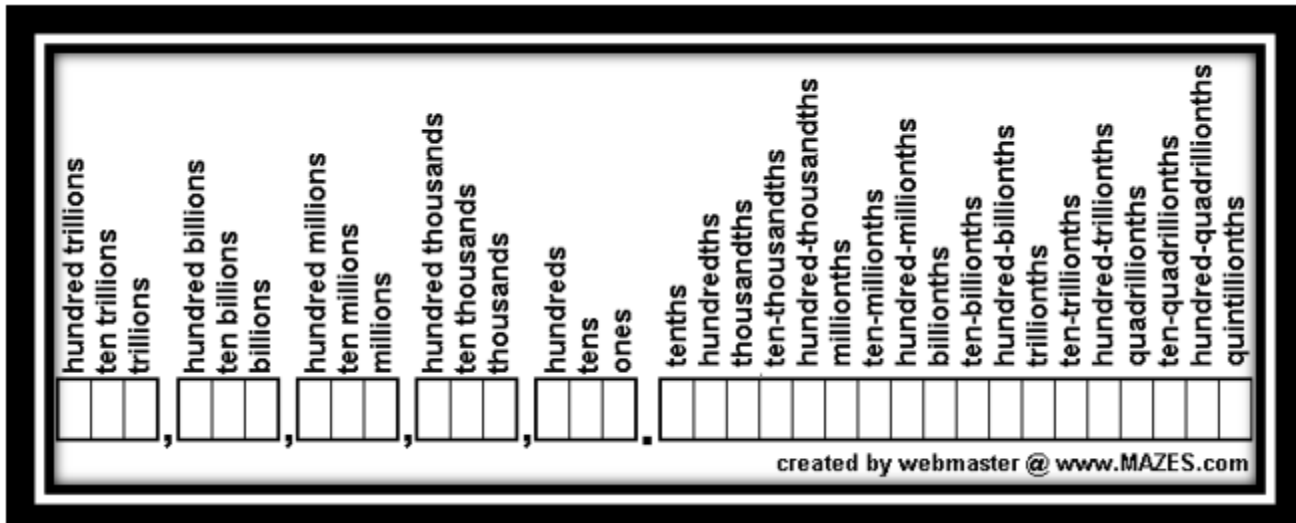
### CLASS ACTIVITY

1. What is the value of 5 in: a) 3572? b) 5372? c) 25347869?

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## Mathematics

### Counting in tens, hundreds, thousands, ten thousands, hundred thousands, millions and billions



- ✓ Numbers written in tens contains 2 digits. Examples: 12, 78, 73 etc.
- ✓ Numbers written in hundreds are always in 3 digits. Examples: 185, 359, 675, etc.
- ✓ Numbers written in thousand contains 4 digits. Examples: 1254, 7566, 9081, etc.
- ✓ Numbers written in ten thousands contains 5 digits.
- ✓ Numbers written in hundred thousand contains 6 digits
- ✓ Numbers written in millions must contain at least 7 digits. The seven digits must have two spaces separating them in “threes” from the right hand side.
- ✓ Numbers written in billions must contain at least **ten** digits with three spaces separating them in “threes” from the right hand side.
- ✓ Numbers written in trillions must contain at least **thirteen** digits with four spaces separating them in “threes” from the right hand side.

**CLASS ACTIVITY:** State what the following numbers stands for

- i) 178 000 000      (ii) 234 000 000 000      (iii) 23 000      (iv) 500 000 000 000      (v) 67 000 000 000 000

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## Mathematics

### TRANSLATION OF NUMBERS WRITTEN IN FIGURES TO WORDS AND VICE-VERSA

Example 1

Write the following numbers in words:

- 51 807 508 051 754

Solution:

51 807 508 051 754 = 51 807 508 051 754 stands for fifty one trillion, eight hundred and seven billion, five hundred and eight million, fifty one thousand, seven hundred and fifty four

- 6 006 006 006

Solution:

- 6006006006 = 6 006 006 006 stands for six billion, six million, six thousand and six

Example 2

Write the following words in numerals

- Three hundred and fifty four thousand, seven hundred and twenty
- Seven billion, two hundred and sixty four million, one hundred and one thousand, two hundred and two

Solution:

- Using expanded form,

$300\,000 + 50\,000 + 4000 + 700 + 20 = 354\,720$

- $7\,000\,000\,000 + 200\,000\,000 + 60\,000\,000 + 4\,000\,000 + 100\,000 + 1000 + 200 + 2$

$= 7\,264\,101\,202$

### CLASS ACTIVITY:

**Question 1.** Write the following figures in words:

(i) 15 284 037    (ii) 789 030 861    (iii) 512 278 374 415

**Question 2.** Express the following in figures:

- Seven hundred and ninety-eight million, one hundred and thirty- two thousand five Hundred and forty- five.
- Twenty-four billion, seventy-eight million, four hundred and thirty-six thousand, one Hundred and forty - eight.
- Thirteen trillion, nine hundred and forty-one billion, three hundred and twenty-four million, forty-seven thousand, one hundred and ninety-eight.

## 2. LOWEST COMMON MULTIPLE AND HIGHEST COMMON FACTOR

**Objective:** By the end of this class, each student should be able to (i) Explain and analyze the terms LCM and HCF (ii) Distinguish between LCM and HCF with the use of formulae

**Duration:** 190mins

**Week:** 2

**Entry Behaviour** (*How you plan to start your Class*):

### Rules of Divisibility

There are some simple rules of divisibility, which enable us to find out whether a certain number is divisible by 2, 3, 4, 5, 6, 8, 9, 10 or 11

Any whole number is exactly divisible by
2 if its last digit is even or zero
3 if the sum of its digits is divisible by 3
4 if its last two digits form a number divisible by 4
5 if its last digit is 5 or 0
6 if its last digit is even and the sum of its digits is divisible by 3
8 if its last three digits form a number divisible by 8
9 if the sum of its digits is divisible by 9
10 if its last digit is 0
11 if the difference between the sum of the digits in the odd places and the sum of the digits in the even places is divisible by 11, or the difference is zero.

### CLASS ACTIVITY

- Using the rules of divisibility, find out which of the following numbers are divisible by 2, 5 and 4  
i) 136      ii) 4 881      iii) 372      iv) 62 784      v) 1010

### DEFINITIONS

**EVEN NUMBERS:** Even numbers are numbers that when divided by two has no remainder. All numbers that end in 0, 2, 4, 6, and 8 are even. Examples include 34, 86, 26890, etc.

**ODD NUMBERS:** These set of numbers has a remainder of one when it is divided by 2. All numbers that end in 1, 3, 5, 7 and 9 are odd numbers. Examples are 81, 1247, 30096, etc.

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**COMPOSITE NUMBERS:** These are numbers that are not prime numbers. They have factors other than 1 and the number itself. All even numbers except 2 are composite numbers.

### FACTORS, MULTIPLES & THEIR RELATIONSHIP

**FACTORS:** When two or more smaller numbers multiply to give a bigger number, these smaller numbers are called **factors** of the bigger number. In another sense we can say a factor is a number which can divide another number exactly without any remainder.

Examples:

- The factors of 24 are 1, 2, 3, 4, 6, 8, 12, and 24.
- The factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60.
- The factors of 50 are 1, 2, 5, 10, 25 and 50.

**MULTIPLES:** This is the product of numbers (factors) that gives other numbers.

Thus, 24 is: a multiple of 1 times 24

a multiple of 2 times 12

a multiple of 3 times 8.

a multiple of 4 times 6.

a multiple of 6 times 4.

a multiple of 8 times 3.

a multiple of 12 times 2.

a multiple of 24 times 1.

This shows the relationship between Factors and Multiples.

### PRIME NUMBERS.

A prime number is a whole number that has only two factors which are 1 and the number itself. In other words, a whole number that has no other factor(s) except 1 and the number itself is referred to as a Prime Number. Number 1 or Integer 1 is **not** considered as a Prime Number.

**Examples of Prime Numbers:**

**2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97** as those prime numbers between 1 and 100.

### CLASS ACTIVITY

1: List the **factors** of (a). 48. (b). 64. (c)105 .

2: 48, 64, 108 are **multiples** of which numbers?

3: Define a Prime Number; find the sum of all the prime numbers between 1 and 30.

### DIFFERENCE BETWEEN FACTORS AND PRIME FACTORS

- The factors of **24** are 1, 2, 3, 4, 6, 8, 12, and 24. However, those factors that are **Prime** among all these are only 2 and 3. Hence, the Prime Factors of **24** are **2** and **3**
- The factors of **60** are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60. However, those factors that are **Prime** among all these are only 2, 3 and 5. Hence, the Prime Factors of **60** are **2, 3** and **5**
- The factors of **50** are 1, 2, 5, 10, 25 and 50. However, those factors which are Prime among all these are only 2 and 5. Hence, the Prime Factors of **50** are **2** and **5**



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## Mathematics

### EXPRESSING NUMBERS AS PRODUCT OF PRIME FACTORS.

Examples:

1. Express 200 as product of prime factors in index form.

Solution:

$$200 =$$

2. Express 180 as product of prime factors in index form.

Solution:

3. Express 510 as product of prime factors in index form.

Solution:

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### CLASS ACTIVITY

- 1: List the factors of **250** and the Prime factors of **250**.
- 2: List the factors and prime factors of **180**.

### COMMON FACTORS AND HIGHEST COMMON FACTOR (H.C.F) OF TWO, THREE OR MORE NUMBERS.

*Worked Examples:*

1. Find the Common factors of 42 and 70.

Solution:

The factors of 42 are 1, 2, 3, 6, 7, 14, 21, 42.

The factors of 70 are 1, 2, 5, 7, 10, 14, 35, 70.

The factors that are common to both numbers or which are found in the two lists are: 1, 2, 7, 14.

The highest of the common factors here is 14. Hence, the Highest Common Factor (H.C.F) of **42** and **70** = 14.

2. Find the Common Factors of **18**, **27** and **36**. What is their Highest Common Factor?

Solution:

The factors of 18 are 1, 2, 3, 6, 9, 18.

The factors of 27 are 1, 3, 7, and 27.

The factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, 36.

Their Common Factors are 1, 3. Thus, their Highest Common Factor (H.C.F) is **3**.

### LEAST COMMON MULTIPLE (L.C.M) OF NUMBERS.

*Worked Examples:*

1. Find the Least Common Multiple (LCM) of **42** and **70**.

Solution:

Write 42 as product of prime numbers as follows:

$$42 = 2 \times 3 \times 7$$

Write 70 as product of prime numbers as follows:

$$70 = 2 \times 5 \times 7$$

Notice those numbers common to both set of prime numbers. The common numbers are **2** and **7**.

The Product of **2** and **7** gives **14**. Thus, in another way and by the way **14** is the Highest Common Factor (H.C.F). But the L.C.M (Lowest Common Multiple) =  $2 \times 3 \times 5 \times 7$

Therefore the L. C. M of 42 and 70 = 210.

### CLASS ACTIVITY

1. Find the Common Factors of 60 and 84. State the Highest Common Factor.
2. What is the Lowest Common Multiple of (L.C.M) of **60** and **84**?
3. Find the L.C.M and H.C.F of **42**, **90** and **105**.

### 3. FRACTION (I)

**Objective:** By the end of this class, all the students should be able to (i) Describe the term 'Fraction' (ii) Analyze the types of fraction

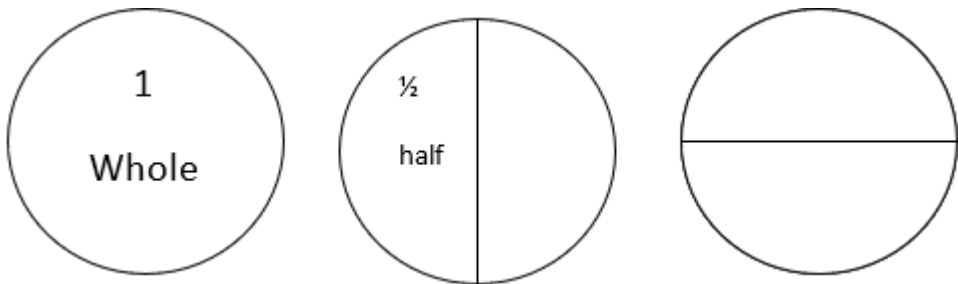
**Duration:** 190mins

**Week:** 3

**Entry Behaviour (How you plan to start your Class):**

**What are fractions?**

Fractions are portion or part of whole number that describes quantities. Consider the shapes below:



**Types of fraction**

Fractions are divided into three basic types:

(i). **A Proper Fraction** – It is a fraction having both numerator and denominator. And such is said to be rational. In a proper fraction, its numerator is smaller in quantity than its denominator. Therefore, it is proper. That is exactly what a **proper fraction** looks like

Examples of **proper fractions** are :  $\frac{4}{19}$  ,  $\frac{1}{13}$  ,  $\frac{12}{13}$  ,  $\frac{43}{81}$  ,  $\frac{34}{43}$  ,  $\frac{122}{123}$  ,  $\frac{72}{144}$  , etc.

(ii). **An Improper Fraction** – It is also a fraction having both numerator and denominator. But or an improper fraction its numerator is bigger in quantity than its denominator. Therefore, an improper fraction has its numerator larger in quantity than its denominator.

Examples of **improper fractions** are :  $\frac{19}{9}$  ,  $\frac{21}{13}$  ,  $\frac{72}{63}$  ,  $\frac{243}{81}$  ,  $\frac{53}{35}$  ,  $\frac{123}{122}$  ,  $\frac{172}{144}$  , etc.

(iii) **Mixed numbers:** It is a type of fraction having two parts merged together. One part is a whole number whole the other part is purely a proper fraction. Therefore, a mixed number is joining a whole number with a proper fraction. Examples of mixed numbers are  $3\frac{1}{2}$ ,  $7\frac{1}{5}$ ,  $2\frac{3}{4}$ ,  $12\frac{3}{5}$ ,  $1\frac{8}{15}$ ,

#### CLASS ACTIVITY

1. What do you understand by word 'fractions'?
2. List or mention 2 types of fractions and give 4 examples of each.

### 4. FRACTION (II)

**Objective:** By the end of this class, all the students should be able to (i) explain the meaning of Equivalent Fraction (ii) Relate one equivalent fraction to another.

**Duration:** 190 mins

**Week:** 4

**Entry Behaviour (How you plan to start your Class):**

#### What are Equivalent Fractions?

Two or more fractions are said to be equivalent or the same if they have the same quantity or have same value. In other words two or more fractions are equivalent if they can be reduced to the same lowest terms.

Examples:

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{7}{14} = \frac{14}{28} = \dots$  These entire fractions are same, as they all have same amount, value or quantity.

#### **Test of Equivalent Fractions.**

If two fractions  $\frac{m}{n}$  and  $\frac{t}{k}$  are equivalent then  $m \times k = n \times t$ . So to test whether or not two fractions are the same we equate them and then cross-multiply. If the two results of cross-multiplying are exactly the same then it shows that the two fractions are equivalent.

Examples:

- If  $\frac{3}{7} = \frac{9}{21}$ , then  $3 \times 21 = 7 \times 9 = 63$
- If  $\frac{5}{10} = \frac{7}{14}$ , then  $10 \times 7 = 5 \times 14 = 70$
- If  $\frac{9}{7} = \frac{18}{14}$ , then  $7 \times 18 = 9 \times 14 = 126$

ALTERNATIVELY: Each of the fractions can be reduced to its lowest term. If the lowest terms are equal to each other or to one another after the reduction, then it shows the equivalence. However, if after reduction the results are not the same, it then means the fractions are not equivalent.

One fraction can be converted to another or to a new one, which is still the original fraction. This is done Multiplying the numerator and denominator of the initial fraction by a fixed number (a fixed amount) or by Dividing the numerator and denominator of the initial fraction by a fixed number (a fixed amount).

#### **Reducing Equivalent Fractions to their lowest forms**

The lowest term of a fraction is obtained when there is no other number (factor) that can uniformly divide or reduce its numerator and its denominator furthermore. For example, among the equivalent fractions  $\frac{4}{5} = \frac{12}{15} =$

$\frac{48}{60} = \frac{96}{120}$ , the lowest term or lowest form is  $\frac{4}{5}$ . It is also called the simplest form

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### CLASS ACTIVITY

1. Show that  $\frac{7}{21}$  and  $\frac{13}{39}$  are equivalent fractions.
2. Reduce  $\frac{99}{264}$  to its simplest / lowest form.
3. Copy and complete the following: a)  $\frac{3}{7} = \frac{\quad}{56}$ . b)  $\frac{6}{15} = \frac{\quad}{180}$ .

### Using equivalent fractions to share commodities (Word Problems).

Examples:

1. A woman shares 30 apples between her two daughters. The first child got  $\frac{6}{10}$  of all the apples.
  - i. How many apples did she get?
  - ii. How many did the other daughter get?

#### Solution

Total number of apples = 30. Fraction of apples to the first child =  $\frac{3}{5}$

$\therefore$  Number of apples =  $\frac{3}{5} \times 30 = 18$  apples. The first daughter gets 18 apples

The second child gets  $\frac{4}{10}$  of the total number of apples. This is equivalent to  $\frac{2}{5}$ .

$\therefore$  The second child gets  $\frac{2}{5} \times 30 = 12$  apples.

The first child gets 18 apples while the second gets 12 apples.

2. Three quarters of the eggs in a basket are good. If the total number of eggs in the basket is 60, how many eggs in the basket are bad?

#### Solution

Total number of eggs = 60.

Number of good eggs  $\frac{3}{4} \times 60 = 45$  eggs.

Hence, number of bad eggs = Total number of eggs — Number of good eggs.  
 $= 60 - 45 = 15$  eggs.

### CLASS ACTIVITY

1. There are 420 students in a school.  $\frac{1}{3}$  of the population is made up of girls.
  - (a). How many boys are in the school ?
  - (b). How many girls are in the school?
  - (c). Express the number of boys as a fraction of all the students.
  - (d). Express the number of girls as a fraction of all the students.

# 5. FRACTION (III)

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**Objective:** By the end of this class, all the students should be able to (i) identify greater and smaller fractions (ii) convert fraction to decimal and percentages and vice versa.

**Duration:** 190 mins

**Week:** 5

**Entry Behaviour** (*How you plan to start your Class*):

**Ordering of fractions.**

Ordering of fractions simply means arranging the fractions either from the least to the greatest or greatest to least. In other words, we arrange the fractions in ascending or descending order. To do this, we find the L.C.M (Least Common Multiple) of the denominators of the fractions we intend to order. In other words we find the equivalent fraction of each of the given fractions so that each equivalent fraction is having its denominator equal to the common L.C.M.

Examples:

1. Arrange the following fractions in ascending order  $\frac{3}{4}$ ,  $\frac{2}{3}$ ,  $\frac{1}{6}$ ,  $\frac{1}{2}$ .

Solution:

Since the L.C.M 12 we write:

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## Mathematics

$$\triangleright \frac{3}{4} \text{ as } \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

$$\triangleright \frac{2}{3} \text{ as } \frac{2 \times 4}{3 \times 4} = \frac{8}{12}$$

$$\triangleright \frac{1}{6} \text{ as } \frac{1 \times 2}{6 \times 2} = \frac{2}{12}$$

$$\triangleright \frac{1}{2} \text{ as } \frac{1 \times 6}{2 \times 6} = \frac{6}{12}$$

We now compare the four results and order them accordingly. Ascending order we have the array as:

$$\frac{2}{12}, \frac{6}{12}, \frac{8}{12}, \frac{9}{12}. \therefore \text{the required ordering is: } \frac{1}{6}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}.$$

1. Arrange these fractions in descending order  $\frac{3}{4}, \frac{1}{2}, \frac{4}{5}$  and  $\frac{7}{10}$ .

ALTERNATIVE METHOD:

The L.C.M of 4, 2, 5 and 10 = 20.

Add the four fractions as follows:  $\frac{3}{4} + \frac{1}{2} + \frac{4}{5} + \frac{7}{10} = \frac{5(3)+10(1)+4(4)+2(7)}{20} = \frac{15+10+16+14}{20}$ .

This is same as  $\frac{15}{20} + \frac{10}{20} + \frac{16}{20} + \frac{14}{20}$ . This shows that  $\frac{3}{4} = \frac{15}{20}$ ,  $\frac{1}{2} = \frac{10}{20}$ ,  $\frac{4}{5} = \frac{16}{20}$ , and  $\frac{7}{10} = \frac{14}{20}$ .

Hence the ordering of  $\frac{3}{4}, \frac{1}{2}, \frac{4}{5}$  and  $\frac{7}{10}$  in descending order is  $\frac{16}{20}, \frac{15}{20}, \frac{14}{20}, \frac{10}{20}$ ; which are  $\frac{4}{5}, \frac{3}{4}, \frac{7}{10}, \frac{1}{2}$  respectively.

CLASS ACTIVITY

1. Arrange the following fractions in descending order:

(i).  $\frac{1}{4}, \frac{2}{5}, \frac{3}{10}, \frac{3}{5}$ . (ii).  $\frac{2}{3}, \frac{1}{4}, \frac{3}{9}, \frac{7}{12}$ . (iii).  $\frac{5}{6}, \frac{7}{12}, \frac{5}{18}, \frac{1}{2}$ . (iv).  $\frac{4}{5}, \frac{1}{3}, \frac{7}{15}, \frac{23}{30}$ .

2. Arrange the above sets of fractions (I - IV) in ascending order.

## CONVERSION OF FRACTION TO DECIMAL

There are two methods of doing this conversion. There is the general method which can be used any time and on any type of fraction; and there is another method when the denominator of the fraction contains power/powers of ten. In this second case the given fraction can first be converted to an equivalent fraction.

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## Mathematics

FRACTIONS, DECIMALS & PERCENTS											
1.00			1 whole						100%		
0.5		$\frac{1}{2}$			50%			0.5		$\frac{1}{2}$	
0.33		$\frac{1}{3}$			33.3%			0.33		$\frac{1}{3}$	
0.25		$\frac{1}{4}$			25%			0.25		$\frac{1}{4}$	
0.20		$\frac{1}{5}$			20%			0.20		$\frac{1}{5}$	
0.16		$\frac{1}{6}$			16.6%			0.16		$\frac{1}{6}$	
$\frac{1}{8}$		$\frac{1}{8}$			0.125 12.5%			$\frac{1}{8}$		$\frac{1}{8}$	
$\frac{1}{10}$		$\frac{1}{10}$			0.1 10%			$\frac{1}{10}$		$\frac{1}{10}$	
$\frac{1}{12}$		$\frac{1}{12}$			0.083 8.3%			$\frac{1}{12}$		$\frac{1}{12}$	

Examples:

- Convert the following common fractions to decimal fractions (decimal numbers).

$$\frac{2}{5}, \quad \frac{3}{4}, \quad \frac{144}{225}$$

Solutions:

First, we can use the equivalent fractions method, before the general method.

- Write  $\frac{2}{5}$  as  $\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0.4$   $\therefore \frac{2}{5} = 0.4$
- Write  $\frac{3}{4}$  as  $\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 0.75$   $\therefore \frac{3}{4} = 0.75$
- Write  $\frac{144}{225}$  as  $\frac{144}{225} = \frac{144 \times 4}{225 \times 4} = \frac{576}{1000} = 0.576$   $\therefore \frac{144}{225} = 0.576$

Second, the general method (for all condition) is used when the denominator of the given fraction does not contain power(s) of 10. This is by dividing the numerator by the denominator mentally or through long-division previously learnt by students in their Primary School days.

Examples:

- Convert 0.65 to a common fraction.

**Solution:**

To do this we simply multiply the given decimal fraction by 100 and at the same time divide it by 100. Write 0.65 as  $0.65 = \frac{0.65 \times 100}{100}$ . If we carefully notice the we will see that what we are doing in essence is just

multiplying 0.65 by unity (1). Because  $\frac{100}{100} = 1$

$$= \frac{0.65 \times 100}{100} = \frac{65}{100} = \frac{13}{20}, \text{ (when further reduced to its lowest term)}$$

$$\therefore 0.65 = \frac{13}{20}$$

# The Breeder's Guide

## Mathematics

2. Convert 0.6 to a common fraction.

### Solution

To do this, we simply multiply the given decimal fraction by 10 and at the same time divide it by 10.

$$\text{Write } 0.6 \text{ as } 0.6 = \frac{0.6 \times 10}{10} = \frac{6}{10} = \frac{3}{5} \quad \therefore 0.6 = \frac{3}{5}.$$

3. Convert 0.125 to a common fraction

### Solution

To do this we multiply the given decimal fraction by 1000 and at the same time divide it by 1000 to have 0.125

$$= \frac{0.125 \times 1000}{1000} = \frac{125}{1000} = \frac{25}{200} = \frac{5}{40} = \frac{1}{8} \quad (\text{When fully simplified to its lowest term})$$

### CLASS ACTIVITY

1. Change the following common fractions to decimal.

$$\frac{9}{15}, \frac{1}{19}, \frac{2}{23}, \frac{17}{3}, \frac{123}{341}$$

2. Change the following decimal numbers to common fractions. s.

0.56, 0.0015, 5.35, 0.222, 1.98.

### Conversion of fractions to percentages.

#### Examples

Express  $\frac{2}{15}$  as percentage

#### Solution:

$$\text{Write } \frac{2}{15} \text{ as } \frac{2}{15} \times 100 = \frac{200}{15} = 13\frac{1}{3}\%$$

### Conversion of percentages to fractions.

#### Examples:

1. Express 65% as fraction

#### Solution

$$\text{Write } 65\% \text{ as } 65\% = \frac{65}{100} = \frac{13}{20}.$$

2. Express 24% as fraction

#### Solution

$$\text{Write } 24\% \text{ as } 24\% = \frac{24}{100} = \frac{6}{25}.$$

3. Express 0.45 as fraction

#### Solution

$$\text{Write } 0.45 \text{ as } 0.45 = \frac{0.45}{100} = \frac{0.45 \times 100}{100} = \frac{45}{10000} = \frac{9}{2000}$$

### CLASS ACTIVITY

1. Express each of the following fractions as percentages

$$\frac{5}{8}, \frac{17}{20}, \frac{9}{25}, \frac{1}{90}$$

2. Express each of the following percentages as fraction.

64%, 45%, 0.125%, 0.17%.



### 6. FRACTION (IV)

---

**Objective:** By the end of this class, all the students should be able to (i) Add and subtract fractions with the same and different denominators

**Duration:** 190 mins

**Week:** 6

**Entry Behaviour (How you plan to start your Class):**

#### Addition Of fractions

##### Examples

1. Add the fractions  $\frac{2}{3}$  and  $\frac{4}{5}$

Solution:

$$\frac{2}{3} + \frac{4}{5} = \frac{5 \times 2 + 3 \times 4}{15} = \frac{10 + 12}{15} = \frac{22}{15} = 1\frac{7}{15}$$

2. Add the fractions  $4\frac{3}{11}$  and  $7\frac{1}{3}$ .

Solution:

$$4\frac{3}{11} + 7\frac{1}{3} = \frac{47}{11} + \frac{22}{3} = \frac{47(3) + 11(22)}{33} = \frac{141 + 242}{33} = \frac{383}{33} = 11\frac{20}{33}$$

(Note: In this method, we first change the mixed fractions to Improper fractions before adding).

3. What is the sum of 21.52, 42.68, 146.5 and 12.27?

Solution:

$$\begin{array}{r} 146.50 \\ + 021.52 \\ + 042.68 \\ + 012.27 \\ \hline 222.97 \end{array}$$

#### Subtraction Of fractions

##### Examples

1. Subtract  $2\frac{3}{4}$  from  $5\frac{3}{5}$

Solution

$$5\frac{3}{5} - 2\frac{3}{4} = \frac{28}{5} - \frac{11}{4} = \frac{4(28) + 5(11)}{20} = \frac{112 + 55}{20} = \frac{57}{20} = 2\frac{17}{20}$$

2. Find the positive difference between 128 and 69.126

Solution

$$128.000$$

# The Breeder's Guide

## Mathematics

$$\begin{array}{r} -069.126 \\ \underline{58.874} \end{array}$$

### CLASS ACTIVITY

1. Add the fractions  $\frac{2}{13}$  from  $\frac{3}{5}$ .
2. Subtract  $4\frac{1}{4}$  from  $7\frac{1}{3}$
3. Obtain the sum of  $1\frac{2}{5}$  and  $3\frac{1}{4}$  and then subtract  $2\frac{1}{3}$
4. A man spent  $\frac{11}{15}$  of his salary on transport, feeding and health. He then saves  $\frac{1}{5}$  of the salary. What fraction of his salary remains?

# 7. MID TERM TEST AND BREAK

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**Objective:** By the end of this class, all the students should be able to participate in the test

**Duration:** 45mins

**Week:** 7

**Entry Behaviour** (*How you plan to start your Class*):

# 8. FRACTION (V)

---

**Objective:** By the end of this class, all the students should be able to (i) solve questions related to multiplication and division of fraction

**Duration:** 190 mins

**Week:** 8

**Entry Behaviour** (*How you plan to start your Class*):

### Multiplication Of fraction

To multiply a fraction by fraction:

- (i) Multiply the numerators to make the numerator of the product
- (ii) Multiply the denominators to make the denominator of the product
- (iii) Always change mixed numbers to improper fraction before multiplying.

**Example 1:**

Simplify  $\frac{3}{5} * \frac{2}{3}$

Solution

$$\frac{3}{5} * \frac{2}{3} = \frac{3 \times 2}{5 \times 3} = \frac{6}{15} \text{ (If you break this down to its simplest term, you get } \frac{2}{5} \text{)}$$

**Example 2:**

Simplify  $2\frac{3}{4} * \frac{4}{5}$

Solution

$$2\frac{3}{4} * \frac{4}{5} = \frac{11}{4} * \frac{4}{5} \\ \frac{11 \times 4}{4 \times 5} = \frac{44}{20} = 2\frac{4}{20}$$

### Division of fraction

To divide by a fraction, simply multiply by its reciprocal.

The reciprocal of a fraction is the same fraction turned upside down.

**Example:**

Simplify  $2\frac{1}{4} * \frac{3}{4}$

Solution:

Change  $2\frac{1}{4}$  to an improper fraction

So you get  $\frac{9}{4} * \frac{3}{4}$

Multiply  $\frac{9}{4}$  by the reciprocal of  $\frac{3}{4}$

$$= \frac{9}{4} * \frac{4}{3} \\ = \frac{9 \times 4}{4 \times 3}$$

# The Breeder's Guide

## Mathematics

$$\begin{aligned} &= \frac{36}{12} \\ &= 3 \end{aligned}$$

### CLASS ACTIVITY

1. Simplify the following:

(i)  $2\frac{3}{4} * \frac{4}{5}$

(ii)  $9\frac{2}{7} \div 3\frac{9}{10}$

2. It takes  $1\frac{3}{4}$  m of cloth to make a skirt. How many skirts can be made from  $10\frac{1}{2}$  of cloth?

# 9. ESTIMATION

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**Objective:** By the end of this class, a student should be able to define opportunity

**Duration:** 190 mins

**Week:** 9

**Entry Behaviour** (*How you plan to start your Class*):

### Estimation of Dimensions and Distances

Estimation is making a guess of the nearly correct calculations and distances, weights, prices or capacity of things without the actual measurements or calculations. Estimations help us to have rough idea of the answer when we add, subtract, multiply or divide any given quantity.

Sometimes rounding off and approximations are used in making an estimation.

Examples of estimations are as follows:

1. The mass of my friend is 200kg
2. The distance of this school from my house is 3 kilometers
3. The weight of our teacher's table is 500 grammes

When physical quantities are measured, they need to be expressed in standard units of measurement.

**A unit is therefore a standard used in the measurement of a physical quantity.** These physical quantities are length, mass, time, capacity and even currency.

### Distances

This is a linear measure of length. The metric system uses multiples of ten to build up its table measurement. The basic unit of length is metre.

10 millimeter (mm) = 1 centimetre

10 centimeters (cm) = 1 decimetre

10 decimeters (dm) = 1 metre

10 meters (m) = 1 decametre

10 decameters (dam) = 1 hectometre

10 hectometers (hm) = 1 kilometre

The frequently used of them is centimeter (cm), metre (m) and kilometer (km)

### **Examples:**

1. Express the following in metre  
(i) 12km (ii) 6hm (iii) 324cm
2. Express the following in kilometre  
(i) 4580m (ii) 144hm

### **Solution**

1. To change a given number from another unit to metre, we first know how many of those quantity makes one metre  
(i) 12km to metre  
First, 1 km = 1000m  
Then, 12km =  $12 \times 1000 = 12000\text{m}$

# The Breeder's Guide

## Mathematics

Therefore,  $12\text{km} = 12000\text{m}$

(ii)  $6\text{hm}$  to metre

But  $1\text{hm} = 100\text{m}$

Then,  $2.6\text{hm} = 2.6 \times 100 = 260$

Therefore,  $2.6\text{hm} = 260\text{m}$

(iii)  $324\text{cm}$  to metre

But  $100\text{cm} = 1\text{m}$

Then,  $324\text{cm} = 324 \div 100 = 3.24$

Therefore,  $324\text{cm} = 3.24\text{m}$

Now, we convert to kilometre

2 (i)  $4850\text{m}$  to kilometre

But  $1000\text{m} = 1\text{ kilometre}$

Then,  $4850\text{m} = 4850 \div 1000 = 4.850$

Therefore,  $4850\text{m} = 4.850\text{km}$

(ii)  $144\text{hm}$  to kilometre

$10\text{hm} = 1\text{ kilometre}$

Then,  $144\text{hm} = 144 \div 10 = 14.4$

Therefore,  $144\text{hm} = 14.4\text{km}$

### **CLASS ACTIVITY:**

1. Express each of the following in centimetre

(i)  $2\text{m}$  (ii)  $5\text{km}$  (iii)  $9\text{km}$  and  $8\text{m}$

2. Express each of the following in metre

(i)  $3800\text{cm}$  (ii)  $3000\text{mm}$  (iii)  $2\text{km}$

3. Express each of the following in kilometre

(i)  $12580\text{m}$  (ii)  $1250\text{dam}$  (iii)  $8420\text{m}$

### **The Capacity and Mass of Objects**

#### **Capacity of Objects**

**Capacity** is the space that is available to hold something. It is closely related to volume because they are both used to measure space. **Volume** is actually the space occupied by an object. A cubic measure is the measure of volume and this is illustrated below:

$1000\text{ cubic millimetre (mm}^3\text{)} = 1\text{ cubic centimetre (cm}^3\text{)}$

$1000\text{ cubic centimetre (cm}^3\text{)} = 1\text{ cubic decimetre (dm}^3\text{)}$

$1000\text{ cubic decimetre (dm}^3\text{)} = 1\text{ cubic metre (m}^3\text{)}$

#### **Example:**

Express the following  $\text{m}^3$ : (i)  $3500000\text{cm}^3$  (ii)  $1450\text{dm}^3$  (iii)  $28000\text{mm}^3$

#### **Solutions:**

(i)  $3500000\text{cm}^3$  to  $\text{m}^3$

But  $1000\text{cm}^3 = 1\text{ dm}^3$  and  $1000\text{dm}^3 = 1\text{m}^3$

Therefore,  $(1000 \times 1000)\text{ cm}^3 = 1000000\text{cm}^3 = 1\text{m}^3$

$3500000\text{cm}^3 = 3500000 \div 1000000 = 3.500000\text{m}^3$

Hence,  $3500000\text{cm}^3 = 3.5\text{m}^3$

(ii)  $1450\text{dm}^3$  to  $\text{m}^3$

But  $1000\text{dm}^3 = 1\text{m}^3$

## The Breeder's Guide

### Mathematics

Then,  $1450\text{dm}^3 = 1450 \div 1000 = 1.450\text{m}^3$

Hence,  $1450\text{dm}^3 = 1.45\text{m}^3$

(iii)  $28000\text{mm}^3$  to  $\text{m}^3$

But  $1000\text{mm}^3 = 1\text{cm}^3$ ,  $1000\text{cm}^3 = 1\text{dm}^3$  and  $1000\text{dm}^3 = 1\text{m}^3$

Therefore,  $(1000 \times 1000 \times 1000) \text{mm}^3 = 1000000000\text{mm}^3 = 1\text{m}^3$

$28000\text{mm}^3 = 28000 \div 1000000000 = 0.000028000\text{m}^3$

Hence,  $28000\text{mm}^3 = 0.000028000\text{m}^3$

**Class Activity:** Express the following in  $\text{m}^3$

(i)  $756000\text{cm}^3$  (ii)  $65400\text{dm}^3$  (iii)  $38500\text{dm}^3$  (iv)  $17500\text{cm}^3$  (v)  $2580\text{dm}^3$

The unit of capacity is Litre (L), which is equal to one cubic decimetre (i.e.  $1000\text{cm}^3 = 1 \text{ litre}$ ). Its table is given below:

10 millilitres (ml) = 1 centilitre (cl)

1000 millilitres = 1 litre (l)

100 centilitres = 1 litre

1000 litres =  $1\text{m}^3$

**Example:**

Express each of the following in litres (i) 75ml (ii) 356cl (iii)  $5.3\text{m}^3$

**Solution:**

(i) 75ml to litre

But  $1000\text{ml} = 1 \text{ litre}$

Therefore,  $75\text{ml} = 75 \div 1000 = 0.075\text{litre}$

Hence,  $75\text{ml} = 0.075\text{litre}$

(ii) 356cl to litre

$100\text{cl} = 1 \text{ litre}$

Therefore,  $356\text{cl} = 356 \div 100 = 3.56\text{litres}$

(iii)  $5.3\text{m}^3$  to litre

But  $1\text{m}^3 = 1000 \text{ litres}$

Therefore,  $5.3\text{m}^3 = 5.3 \times 1000 = 5300\text{litres}$

Hence,  $5.3\text{m}^3 = 5300 \text{ litres}$ .

### The Mass of Objects

**Mass** is the quantity of matter in a body. In the metric system, the kilogram (kg) is the base unit of mass.

The table is given below:

1 decagramme (dg) = 10 grams (g)

1 hectogramme (hg) = 100 g

1 kilogramme (kg) = 1 000 g

1 tonne (t) = 1 000 kg

100 centigramme (cg) = 1 g

200 milligrams (mg) = 1 carat

1000 milligramme (mg) = 1 g



# The Breeder's Guide

## Mathematics

### Example:

Express each of the following in kilograms

(i) 60 carats (ii) 58 mg (iii) 2.5 tonnes

### Solution:

(i) 60 carats to kilogram

1 carat = 200mg =  $200 \times 1\text{mg}$

Now, 60 carats =  $60 \times 200 = 12000\text{mg}$

But  $1000\text{mg} = 1\text{gm}$  and  $1000\text{g} = 1\text{kg}$

$(1000 \times 1000)\text{mg} = 1000000\text{mg} = 1\text{kg}$

Therefore, 60 carats =  $12000 \div 1000000 = 0.012\text{kg}$

Hence, 60 carats = 0.012kg

(ii) 58mg to kilogram

$1000\text{mg} = 1\text{g}$  and  $1\text{g} = 1000\text{kg}$

Therefore,  $(1000 \times 1000)\text{mg} = 1000000\text{mg} = 1\text{kg}$

Now,  $58\text{mg} = 58 \div 1000000 = 0.000058\text{kg}$

Hence,  $58\text{mg} = 0.000058\text{kg}$

(iii) 5 tonnes to kilogram

1 tonne = 1000kg

Therefore, 2.5 tonnes =  $2.5 \times 1000 = 2500\text{kg}$

Hence, 2.5 tonnes = 2500kg

### Class Activity:

1. Express each of the following in litres

(i) 1800ml (ii) 96cl (iii) 880ml (iv)  $4.5\text{m}^3$

2. Express each of the following in kilograms (kg)

(i) 138mg (ii) 2480g (iii) 1.5g (iv) 0.28tonnes

### Estimation of Other Things

#### Time

The base unit of time is second (s). Unlike length and mass, time does not follow the metric system of counting in base ten; but rather, the **sexagesimal** system (base 60) of the ancient Babylonian number system. The illustration is given below:

60 seconds = 1minute

60 minutes = 1 hour

24 hours = 1 day

7 days = 1week

52 weeks = 1 year

$365\frac{1}{4}$  days = 1 year

366 days = 1 leap year

### Examples:

1. Change each of the following to seconds

(i) 5 minutes 45 seconds (ii) 2 hours 4 minutes 15 seconds

### Solutions:

(i) 5 minutes 45 seconds to seconds

But, 1 minute = 60 seconds

# The Breeder's Guide

## Mathematics

Therefore, 5 minutes 45 seconds =  $(5 \times 60\text{secs}) + 45 \text{ secs}$

=  $300 + 45 = 345 \text{ secs}$

(ii) 2 hours 4 minutes 15 seconds

But 1 hour = 60 mins and 2 hours =  $2 \times 60 = 120 \text{ mins}$

Also, 1 minute = 60 secs,

Then 120 mins =  $120 \times 60 = 7200 \text{ secs}$

4 mins =  $4 \times 60 = 240 \text{ secs}$

Therefore, 2 hr 4mins 15 secs =  $7200 + 240 + 15$

= 745 seconds

2. Find the number of minutes in the following:

(i)  $2\frac{1}{2}$  hours (ii) 500 secs

**Solutions:**

(i)  $2\frac{1}{2}$  hours to minutes

1 hour = 60 mins

Therefore,  $2\frac{1}{2} \times 60 \text{ mins}$

$\frac{5}{2} \times 60 = 5 \times 30$

= 150 minutes

(ii) 1200 secs to mins

But 60 secs = 1 min

Therefore, 1200secs =  $1200 \div 60$

= 20 mins.

### Currency

Currency is the system or type of money used by a particular country.

Estimation is often used in market places and shops. People make good estimate of the cost of the article they want to buy while bargaining. The units of the Nigerian currency are Naira (₦) and kobo (k).

#### Example

Estimate and calculate the sum of the following amounts:

₦15.50, ₦1.75, ₦135.20, ₦18.10, and ₦12.20

#### Solution

##### Estimated Value

**First step:** Approximate the amounts to the nearest whole number;

₦16, ₦2, ₦135, ₦18, ₦12

**Second step:** Add them up;

₦16 + ₦2 + ₦135 + ₦18 + ₦12

= ₦183

##### Accurate Calculation

₦15.50k + ₦1.75k + ₦135.20k + ₦18.10k + ₦12.20k = ₦182.75k

### Estimation of Area

The basic unit of area is the square metre (sq. m or  $\text{m}^2$ ). However, smaller spaces are measured in centimetre ( $\text{cm}^2$ ) while larger spaces like states or countries are measured in acres, hectares and square kilometers ( $\text{km}^2$ ). The basic conversions are given below:

1 hectare =  $10\,000\text{m}^2 = 100 \text{ acres}$

# The Breeder's Guide

## Mathematics

$$1\text{m}^2 = 1\text{m} \times 1\text{m} = (100 \times 100)\text{cm}^2$$

$$1\text{m}^2 = 10\,000\text{cm}^2$$

$$1\text{km}^2 = 1\text{km} \times 1\text{km}$$

$$= 1000\text{m} \times 1000\text{m}$$

$$= 1\,000\,000\text{m}^2$$

$$2\,000\text{cm}^2 = 2000 \times 1000\text{m}^2$$

$$= 0.2\text{m}^2$$

### Example

Estimate and calculate the number of tiles of size 15cm by 28cm that is needed for a square room which has an area of  $4.9\text{m}^2$ .

### Solution

Estimated value:

Actual size of tile = 15cm by 28cm

$\cong$  20cm by 30cm

Area of the tiles =  $20 \times 30$

$= 600\text{cm}^2$

Area of square =  $4.9\text{m}^2$

$\cong 5\text{m}^2$

But  $1\text{m} = 100\text{cm}$

$1\text{m}^2 = (100 \times 100)\text{cm}^2$

$= 10\,000\text{cm}^2$

$5\text{m}^2 = 5 \times 10\,000\text{cm}^2$

$= 50\,000\text{cm}^2$

Number of tiles needed

$= \frac{\text{area of square room}}{\text{area of tiles}}$

$= \frac{50000}{600}$

$= 83.33$  tiles

### Accurate Calculation:

Area of tiles =  $15 \times 28 = 420\text{cm}^2$

Area of square room =  $4.9\text{m}^2$  to  $\text{cm}^2$

$= 4.9 \times 10\,000$

$= 49\,000\text{cm}^2$

Number of tiles needed

$= \frac{\text{area of square room}}{\text{area of tiles}}$

$= \frac{49000}{420}$

$= 116.67 \cong 117$  tiles

### CLASS ACTIVITY

1. Convert: (a)  $6\text{km}^2$  to  $\text{m}^2$  (b)  $10\,000\text{m}^2$  to  $\text{km}^2$  (c)  $0.00025\text{m}^2$  to  $\text{cm}^2$ .
2. Estimate and calculate the sum of the following amounts: ₦134.50, ₦1.54, ₦34.10, ₦57.90 and ₦138.20
3. An interior decorator bought a piece of cloth 2.6m by 3m. Estimate how many pieces he will buy to cover a wall of  $195\text{m}^2$ .

# 10. PROJECT

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**Objective:** By the end of this class, all students should participate in a project

**Duration:** 45mins

**Week:** 1

**Entry Behaviour** (*How you plan to start your Class*):

**GROUP A** – Construct and compute a prime number chart to make a game of your choice

**GROUP B** - Construct and compute an equivalent fraction chart to make a game of your choice

# 11. REVISION

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**Objective:** By the end of this class, all the students should be able to recall all they have learnt during the term

**Duration:** 190 mins

**Week:** 11

**Entry Behaviour** (*How you plan to start your Class*):

# 12. EXAMINATION

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