Teacher's Guide

Part B:
Teaching Mathematics (P 1-3)

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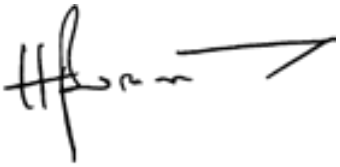
Foreword

One of the biggest challenges Nigeria faces is how to ensure that the tuition provided in schools is of good quality such that pupils' learning outcomes improves significantly and those who complete primary school possess the requisite competences prescribed in the national curriculum. The current situation in which pupils' mean score in English, Mathematics, and Life Skills is only 30%-40% is a matter of concern to UBEC and all stakeholders.

To improve mean scores in the core subjects requires significant changes in the way teachers plan and deliver their lessons. It means building the capacity of teachers to make the transition from teacher centred methods to activity-based learner centred approaches. Teacher's Guide on Pedagogy, Literacy, Numeracy and Science & Technolgy has been developed by the Teacher Development Programme (TDP) seek to facilitate the adoption and use of active learning approaches in our classrooms.

UBEC is delighted to collaborate with TDP to make the Teacher's Guide available to schools in all parts of the country. Our expectation is that teachers will adapt and contextualise the Teacher's Guide to their local situation and use them to enhance the quality of teaching and learning in the classrooms. As soon as the Teacher's Guides are distributed to schools, teachers will be trained to use them as part of the UBEC-funded Teacher Professional Development programme.

I must thank DFID/UKAid and TDP for collaborating with us to improve the quality of teaching and learning in primary schools.



Dr Hamidu Bobboyi

Executive Secretary,

Universal Basic Education Commission,

Abuja.

6th March 2017

Contents

Acronym Table

Acronym	Full Title
AV	Audio-Visual
CM	Cluster Meeting
DFID	Department for International Development
ESSPIN	Education Sector Support Programme in Nigeria
HT	Head Teacher
LP	Lesson Plans
TDP	Teacher Development Programme
TDT/SSIT	Teacher Development Team/State School Improvement Team
TF/SSOs	Teacher Facilitators/School Support Officers
TG	Teacher's Guide

Welcome and Introduction

Welcome to Teacher Guide Part B.

Teacher Guide (Part A) focused on general pedagogy in your classroom. Part B is an extension of the Teacher Guide and focuses on teaching mathematics for Primary 1-3 pupils. There are four modules in this guide: Numbers & Numeration, Algebraic Process, Measurement and Geometry.

These modules include activities and exercises for teachers, audio-visual clips, questions to reflect upon and suggestions for classroom activities. We strongly encourage you to study this material together with your partner in school and try out different activities suggested in the modules when you teach.

Do not hesitate to ask your LGA Trainer or Teacher Facilitator (TF) questions about the module contents during school support visits or cluster training.

All the best with the study!

Module 3: Numbers and Numeration

Module 3:
Numbers and Numeration

Can you think of a situation where we do not need to use numbers? Numbers are important in our everyday life. When you go to the market you need to know how many cups of rice you want to buy. When you buy material to sew clothes you need to know how many yards are needed to sew the cloth. Do you know there is a difference between numbers and numeration? Numbers are figures, like – 1, 2, 3, 4 … and used to count how many of something there is (*Lambobi kamar 1,2,3,4 ana amfani da su wajen kirgen yawan abu*).For example, if we put five apples on the table we can count how many there are. Numbers can be expressed in different forms:

- Decimal numbers (*Gurbin lamba)* -1.5, 2.4,5.6, 7.8
- Improper and proper fractions (*Dacewa da rashin dacewar lambobi*) - 3/4,12/5,1/2
- Mixed numbers (*Lambobi a garwaye*) - 2 ¼
- Percentages 25%, 67%.

Notice that all of these forms start with the basic numbers 0, 1, 2, 3, 4, 5 up to 9.

The process by which we add, subtract, divide or multiply these numbers is known as numeration (*hanyar da mu ke bi wajen hadawa, cirewa, rabawa, da tara lamba, ana kiransa kidaya*).

Objectives

By the end of this module, teachers will be able to guide pupils to:

- Identify number of objects in a group leading to the development of number concepts 1-5
- Sort and classify numbers 1-5
- Find three quarters
- Perform multiplication using repeated addition.
- Add and subtract 3-digit numbers without renaming.

Key words

- sort
- classify
- multiplication
- subtraction
- repeated addition
- concrete objects
- three quarters
- game board
- renaming
- number cards

Section 1:
Identification of Numbers 1-5

Do you understand what the identification of a number (*yadda za a gano lamba*) is? Identification is one of the concepts that pupils need to learn about numbers. At primary one, pupils are introduced to numbers by counting, but counting alone is not enough. A pupil may be able to count from 1-10 but not able to identify (*a gano*) the numbers individually (*daya-daya*). This makes the concept of identification of numbers important, as pupils need to recognise (*fahimta*) the numbers individually as they count along. Do the following activities below:

Practice3.1a: Look at the numbers below and circle all the numbers 1 and 5.

7	2	1	5
1	5	1	9
3	10	6	1
5	1	1	5

Practice3.1b: Look at the boxes below and circle the ones that have 20.

11111111 11111111 1111	11111111 111111111	1111111 111111 1111111 11111111 11111111	11111111 1111111 1111111

In both activities above you have looked at identification of numbers. There are two ways by which you can identify numbers. The first is by recognising the numbers; you were able to pick out the numbers 1 and 5 just by recognising them. What did you do in the second activity in order to know which squares had 20? You had to count. It will be very difficult to look at the squares and know which ones have 20 without counting. Therefore, another way you can identify numbers is by counting.

When pupils come into contact with numbers, one of the first things they learn to do is the identification of each number. Identification, as already mentioned above, can be done by recognising the number or by counting. You can do similar activities with your pupils in the class to help them to identify the numbers. You can do similar activities with your pupils to help them identify the numbers.

Think

1. How do you teach identification of numbers in your class?
2. Is it a topic you are confident (*karfin gwaiwa*) teaching? Why or why not?

Watch the video clip MM3 V1and think about the following questions as you watch:

Put a circle around the correct answer.

1. Teacher gave out instructional materials:
   a) By calling the pupils to the front of the class and giving them.
   b) By handing them out in bags.
   c) By handing them out individually.

2. The pupils worked in:
    a) Groups
    b) Pairs
    c) Individually
3. The pupils had:
    a) A variety of materials and no number cards.
    b) The same materials and number cards.
    c) A variety of materials and number cards.
4. The teacher gave:
    a) No instructions on how to do the activity.
    b) Clear instructions on how to do the activity.
    c) Some instructions on how to do the activity.

Reflect

1. Fill in the table below:

Write two things you liked about the video	Write one thing you will improve about the video

Tick the activities below which you can use to teach identification of numbers. Explain why you have chosen them (*ciro aikinda za ka yi amfani da shi wajen fahimtar lambbobi, yi bayani akan dalilin da ya sa ka zabe su*).

a) ___ Give pupil number cards and randomly call out numbers that pupils will show you.

b) ___ Write numbers on the chalkboard and call pupils to the front to circle them.

c) ___ Put objects on the table and ask pupils to sort out and put the right number next to each object.

d) ___ Ask pupils to draw number of objects in their exercise books e.g. draw 2 balls, 3 trees etc.

Work with Your Partner in School

1. Plan a lesson using a different activity from the one you saw in the video.
2. Practice the following game with your partner. You can do the same game with your pupils in the class.

   Materials:

   2 game boards, 10 counters and a dice

   Directions:

   - **Step 1**: Players each choose a game-board.
   - **Step 2:** They take turns (*daukan himma*)to roll a dice (*cankicanka*) and place a counter on this number on their board.
   - **Step 3:** If there is more than one square with the same number they must choose one square to place a counter on.
   - **Step 4:** Players continue to take turns until one player has three counters in a row and calls out “Bingo!” (Alternative: Play until the whole board is cover.

Game Boards:

1	5	3
2	1	6
4	3	5

2	4	6
1	3	5
6	2	4

Use numeracy lesson plans primary 1 Week 1 Days 2-4 with this lesson.
For other practical examples open to: MacMillan New Primary Mathematics Book 1 page 3 or New Method Mathematics book 1 page 6.

Section 2:
Sorting and Classification of Numbers 1-5

Counting and recognising numbers are important for our pupils to learn well. Once our pupils are confident at counting and recognising numbers, it builds a foundation (*tushi*) for them to start thinking. Sorting and classifying objects helps children begin to notice how items are alike and different.Sorting means grouping objects according to the same type such as colour, shape or size. Classifying requires giving a title to each sorted group (*Zabo yana nufin karkasa abubuwa ne bi sa ga launukansu, alamunsu, ko girmansu. Karkasawa rukuni-rukuni yana bukatar a bada suna wa azuzuwan da aka tantance*). Do the following activity below:

Think

- Have you taught sorting and classification of numbers before? How?

Practice 3.2a: What are two ways to sort the following numbers?

1	1	3	3
4	4	2	1
2	4	2	4
3	1	3	2

Which method did you use to sort the numbers? Was it by colour or by same numbers or both? Now try classifying the numbers by giving them names and putting them into groups. If you sort them by numbers then they can be classified as even and odd number (*Lambobi wadanda za a iya rabasu gida biyu su kasance dai-dai, da wadanda idan aka rabasu dole a samu rabi*). If you sort them by colour, you can classify them into red, blue, orange and black. Sorting takes place when you arrange objects according to the same colour, shape or size. After objects have been sorted,they are given a name and put them into various groups leading to classification.

Watch the video clip MM3 V2and think about the following questions as you watch:

1. What resources did the teacher use for sorting?
2. Write true or false in front of each of the following statements below:
   a) _____ Objects can be sorted according to colour, size and shape.
   b) _____ Objects can be classify into even and odd numbers
   c) _____ This lesson is taught best as a whole class.
   d) _____ This lesson is best taught in groups.
   e) _____ To teach this lesson I need lots of materials?

Reflect

1. Do you think the objective of the lesson was achieved? State two reasons from the video:
   a)
   b)

Practice 3.2b: Below is a table of numbers. How will you classify them? Write your heading in each of the first row

5	2	10
15	4	30
35	8	50
45	12	60

Work with Your Partner in School

1. Together with your partner, think and plan an activity where you can use size for sorting and classifying.

2. The following two teachers have just taught a lesson on sorting and classification. Do a role play with your partner. One of you act as teacher A and the other as teacher B. In pair, discuss the dialogues below and suggest how you can support each teacher.

Teacher A: **I put my pupils into groups during the lesson but they kept fighting over materials. What should I do next time?**

Teacher B: **I had a very large class that grouping them was just impossible. What should I do next time?**.

Use numeracy lesson plans primary 1 Week 1 Days 2 - 4 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 1 page 3 or New Method Mathematics book 1 page 6

Section 3:
Addition of Three Digit Numbers Without Renaming

Addition is one of the four basic operations used in mathematics. The pupils are introduced to addition from an early stage. It can be with or without renaming. Addition with renaming means adding a value from one column to another to help solve the problem e.g. 13 + 9 = 22 *(Hadawa yana nufin kawo lambobi tare a saukake, misali 13 + 9 = 22).* In this sum, a value is taken from the units and added to the tens column to complete the sum. On the other hand, addition without renaming is that the sum is completed without moving values from the units to the tens *(hadawa ba tare da rabawa ba, yana nufin bin wani ka'ida daban na hadawa).* In this section we will do addition of three digit numbers without renaming. You can also do it with your pupils who have already learnt to do addition with two digits.

Think

1. Write three key steps that you used when you taught addition of three digit numbers in the past without renaming.

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Watch the video clip MM3 V5 and think about the following questions as you watch:

1. How did the teacher engage pupils (*a sa dalibai su yi aikin*) in the activity?
2. What did the teacher do to check pupils' work when they were given a task?

Reflect

1. Do you think doing the expansion *(fadadawa)* of the number was necessary? Why?
2. Write down two good things about the video and one thing you will do differently.

Practice 3.5a

1. Expand the following numbers:

   a) 110 c) 386

   b) 504 d) 960

2. Circle the following sums that are without renaming:

146	725	628	850
+ 593	+ 461	+ 371	+129

Work with Your Partner in School

1. Discuss how you can use number cards to develop a lesson on 3-digit numbers.
2. Play the following game with your partner.

Directions

- **Step 1:** Write any six numbers in your jotter from the numbers below:

  425, 689, 123, 764, 654, 324, 703, 892, 422, 651, 322, 563

- **Step 2:** Make cards with each of the numbers above.
- **Step 3:** Put the number cards in a pile on your table.
- **Step 4:** Take one number card at a time.Take turns with your partner.
- **Step 5:** If the card you picked up matches a number you wrote, cross it off on your sheet. If you don't have the number put it at the bottom of the pile.
- **Step 6:** Continue until you cross off all six numbers. The first person to cross off all 6 numbers is the winner.

Use numeracy lesson plans primary 3 Week 8 Day 1 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics 3 page 25 or New Method Mathematics 3 page 29

Section 4:
Subtraction of Three Digit Numbers Without Renaming

Do you remember how you learnt to subtract while you were growing up? You probably started off using your fingers to subtract numbers between 1 and 10. As the numbers got bigger you learnt how to represent them with straight lines on a piece of paper and cross them off. There are different methods that pupils can use to subtract. Subtraction, like addition, can be without renaming or with renaming.

Subtraction involving renaming means that some or all of the numbers on top of the sum are smaller than the ones below (*cirewa wanda ke dauke da raguwa yana nufin wassu lambobi a sama sun fi na kasa*). In this case, the numbers on top of the sum need to be made bigger by borrowing values from the hundred or tens. Can you give an example of a 3-digit sum with renaming? _____.

Subtraction without renaming means that all the numbers on top are bigger than the ones below and they can be taken away from each other (c*irewa wanda baya dauke da raguwa, yana nufin wassu lambbobi a sama sun fi na kasa, kuma za a iya kawas da su*). Can you write a 3-digit subtraction sum without renaming? _____

This section focuses on subtraction of three digit numbers without renaming and is building on what pupils already know about subtraction.

Think

1. How do you involve your pupils in the activity when you are teaching subtraction?

2. What materials have you used for teaching subtraction?

Watch the video clip MM3 V6 and think about the following questions as you watch:

1. What was one of the first things the pupils needed to know before they could do the activity in the video?
2. What did the teacher do in the video at the end to assess the pupils?

Reflect

1. Write down one thing you would do differently from what you have seen in the video.
2. Why did the teacher ask the pupils to come and do the math on the board?

Practice 3.6a:

1. Use the numbers 1-9 to make up two different three digit subtraction sums without renaming
2. Write true or false in front of each statement. Subtraction sums without renaming:

   a) _____ have all bigger numbers on top.

   b) _____ have all smaller numbers on top.

   c) _____ have all smaller numbers on the bottom.

   d) _____have all bigger numbers on the bottom.

   e) _____ have some bigger numbers on the bottom.

   f) _____ have some bigger numbers on top

Work with Your Partner in School

1. Discuss the group work activity in the clip with your partner. Can you try this in your classroom?
2. Discuss what part you enjoyed most about the lesson and why?

Use numeracy lesson plans primary 3 Term 2 Week 11 Days 1-3 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 3 page 42 or New Method Mathematics book 3 page 41.

Section 5:
Multiplication of Numbers Using Repeated Addition

Multiplication is one of the four basic operations used in mathematics. The basic idea of multiplication is repeated addition. Do you know what repeated addition is? Let us use the example below to explain.

A pupil is asked to solve 3x5 but can't multiply, so what can the pupil do? They can add 3 five times such that 3 + 3 + 3 + 3 + 3 =15. This is known as repeated addition. Most pupils find it easier to solve multiplication using this method as it builds on their knowledge of addition. Repeated addition is better for adding single digit numbers like1-9.Once the numbers become two digits it is more difficult for the pupils to add and other methods are used.

Practice 3.4a: Take a few minutes to practise changing these multiplication problems into repeated addition.

3 x 4 =

2 x 6 =

8 x 4 =

Think

1. Have you ever used repeated addition to solve multiplication problems?
2. Which other way have you taught multiplication in your class?

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Watch the video clip MM3 V4 and put true or false in front of each statement.

- Repeated addition is another way of multiplying.
- Repeated addition is adding the same number over and over again.
- Repeated addition is another way of subtracting.
- Repeated addition is multiplying two numbers together.
- Repeated addition is knowing how to add.

Practice 3.4b:

1. Circle all the right answers to each of the questions below:
   - 3 x 4 means:
     a) 4 + 4 + 4
     b) 3 + 3 + 3 + 3
     c) 4 + 4 + 4 + 4
     d) 3 + 3 + 3
   - 6 x 2 means:
     a) 2 + 2 + 2 + 2 + 2 + 2
     b) 6 + 6 + 6 + 6 + 6 + 6
     c) 6 + 6
     d) 2 + 2
   - 7 x 5 means:
     a) 7 + 7+ 7 + 7 + 7
     b) 5 + 5 + 5 + 5 + 5 + 5 + 5
     c) 7 + 7 + 7 + 7 + 7 + 7 + 7
     d) 5 + 5 + 5 + 5 + 5

2. This is a picture representing 2 x 3 or 2 + 2 + 2

   OO OO OO

3. Use this example to fill in the table below:

Multiply	Pictures	Repeated Addition
3 x 3		
		5 + 5 + 5 + 5 + 5
	OO OO OO OO OO	

Reflect

1. How can you get the pupils to participate (*kowane dalibi ya gwada*), more in class?
2. How will you organise pupils in your class when teaching repeated addition?

3. Tick which of the following materials will be useful when teaching repeated addition and explain why.

   a) ___ concrete objects

   b) ___ number cards

   c) ___ multiplication table

   d) ___ pupils

Work with Your Partner in School

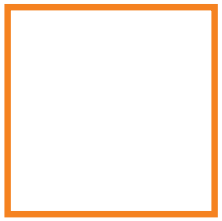
1. From your lesson plan and textbook, find a lesson where you teach your pupils to do multiplication by repeated addition.

2. Discuss the lesson plan with your partner and prepare the stages together. Include a pair or group activity in your plan. After teaching the lesson, write down two things that went well and two things you would like to improve upon.

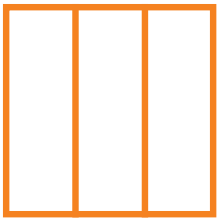
Use numeracy lesson plans primary 3 Term 1 Week 2 Day 1 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 3 page 60 or New Method Mathematics book 3 page 53

Section 6:
Finding Three Quarters

A fraction shows how a whole object can be divided into equal parts (*Kalmar fraction ya nuna yadda abu zai jya rabuwa dai-dai*). Each of those equal parts are known as fractions. Let's look at an example below.



Here is a whole shape



Here is the same shape divided into equal parts known as fractions.

When a shape (*alamu*) is divided into four equal parts like the one above, it is said to be divided into quarters (*kwata-kwata*). Each part is said to be a quarter. Quarters and halves are one of the first common fractions pupils learn in primary school.

When you were growing up do you remember how you were taught fractions? You were given an explanation (*bayani*) of how to do it and that's how you did it. Pupils can learn fractions through hands on activities using concrete objects (*abubuwa na zahiri*). Concrete objects ensure that pupils have a good understanding of the concept or skill they are being taught. It allows them to be more actively engaged in their learning.

Think

1. What materials do you normally use when teaching fractions?
2. Which two key challenges (*kalubalai*) have you faced when you taught fractions before?

Watch video MM3 V3 on a step-by-step method of how to use concrete objects to teach fractions (three quarters) in the classroom. You can write down the steps as you watch the video.

Reflect

1. List three objects you can use to teach fractions.
2. Here are the steps listed in the video on how to use concrete objects to teach fractions.Put them in the right order by putting 1,2,3 or 4 in front of each statement (*A saka su bisa tsarin da ya dace, ta wurin amfani da 1,2,3 ko 4 a gaban duk bayanin da aka yi*).

   a) ____ Teacher asks pupils to take 3 parts out of the 4 parts.

   b) ____ Teacher put counters on the table.

   c) ____ Pupils count how many counters are in the 3 parts.

   d) ____ Teacher asks pupils to divide counters into 4 parts

Work with Your Partner in School

1. How will you use the same method in the video to teach fifths?
2. Identify a lesson on teaching fraction from your lesson plan and discuss about it with your partner. Is there anything you would change in the lesson plan? Why?

Summary of the Module

Numbers and numeration is the foundation to learning mathematics. Pupils use it every day at home, at school and in the market. We need numbers to live in the world. Many people in the society have problems with numbers because of the poor foundation they have had in the past. Many pupils dislike mathematics and hate teachers of mathematics simply because of the way they are taught. To make learning numbers and numeration interesting, teachers will need to use relevant and a variety of no or low cost teaching materials. Pupils must use the materials themselves and have group discussions to help them learn. This will make learning numbers and numeration funand help pupils remember what they have learnt.

This module provides teachers an opportunity to prepare their pupils to be productive citizens of our society. The module provides a set of meaningful activities and strategies to teach concepts to our pupils. Each section builds on previous sections. For example after a careful treatment of addition of 3-digit numbers, a connection is established with a treatment of subtraction of 3-digit numbers without renaming. These concepts are carefully built to use pupils' previous knowledge such as addition of two digit numbers in previous grades.

Ideas to Try in the Classroom

Below are some activities that you can practice in your classroom with your students. Once you try these activities, we encourage (*karfafawa*) you to write a note about your experiences: what worked well, what were the challenges, what did you do to overcome the challenges and what difference did it make in your classroom/lesson? Hand over your notes in the next cluster meeting.

Try in the classroom 1

Topic: Multiplication using repeated addition

Duration: 35 minutes

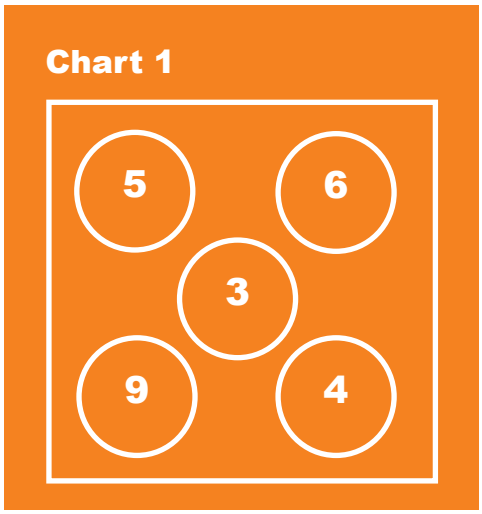
Learning Outcomes: By the end of the lesson, pupils will be able to:

- Solve multiplication using repeated addition.

Teaching Aids:

- Sets of 0-9 number cards (per pair).

- Collect 20 counters (per pair).
- Make a “Target throw” Chart 1 (pictured below) containing single digit numbers (per group). You can write different numbers for each group in the circles.



Step 1: (5 mins)

- Divided the students up into pairs
- Give each pair counters and number cards from 0-9.
- Ask one pupil to pick a number card.
- Ask them to look at the number and make that number of piles of counters on their table, e.g. 5 piles.
- Ask the other pupil to pick another card and put that number of counters in each pile, e.g. 5 piles of 4.
- Ask each pair: “How many counters do you have altogether?”
- Ask them to write what they have just done as a sum using repeated addition or multiplication, e.g.: $5 + 5 + 5 + 5 = 20$ or $5 \times 4 = 20$ (both ways of writing this are correct).
- Ask them to repeat the process until they have written ten different sums.

Step 2: (25 mins)

- Ask each pair to play the “Target throw” game, as described in step 1.
- Give each pair a different target to throw their objects at.
- Ask the pupils to record the sums they made, e.g. a first throw that lands on 7 and a second throw that lands on 4 can be written as:
  $7 \times 4 =$ or $7 + 7 + 7 + 7 =$
- Ask them to change the numbers around so they make 7 groups of 4,

and then write the sum and its answer.

- Ask the pupils to play this six or seven times, each time making two sums with the numbers.

Step 3: (5mins)

- Ask several pupils to come and explain how they worked out their multiplication sums to the whole class.
- Ask them if they can tell you anything interesting when they used the same numbers to make the sum, e.g. the answers are the same whichever order you put the numbers in.

Try in the Classroom 2

Topic: Subtraction of 3-digit numbers without renaming

Duration: 35 minutes

Learning outcomes: By the end of the lesson, pupils will be able to:

- Subtract 3-digit numbers using a number line.

Teaching Aids:

- Look at the weekly words, particularly the different terms for subtraction

Step 1: (5 mins)

- Ask the pupils to list some of the terms used for subtraction, e.g.: How many more than? take away, what is different?

Step 2: (15 mins)

- Write the following sum on the chalk board, 245 – 123 =
- Ask them what you do first (draw a number line, writing the biggest number on the left hand end).
- Ask them the next step (expand the smallest number)

  123= 100 +20 +3
- Ask them what they do next (use the number line to do the sum):

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122 125 145 245

Step 3: (10 mins)

Give pupils the following sums one at a time to complete in pairs:

1. 756 – 222 =
2. 874 – 343 =
3. 654 – 531 =

Step 4: (5 mins)

Ask four pupils to share what they have learned with the rest of the class.

Experiencing Change in Your Classroom

Experiencing Change in Your Classroom is very important that as a teacher you always notice what students liked, what technique worked well with them, what were the challenges, if the pupils learned what you wanted them to learn etc. Often, even if we notice these things, we don't spend time thinking about them or keeping a record. Your Teacher Journal is there to help you! You can now write all your notes in the journal. However, in every module, there is a specific section on "Experiencing Change" in the journal where you can write about your major experiences of trying out new techniques in your classrooms. Questions that might guide your writing about your experiences are:

1. Which activities did you try out in your classroom?
2. Which ones went well? Why?
3. Which ones were less successful? Why?
4. If you tried these activities again, what changes/adaptations would you make?

Suggestions for the Next Cluster Meeting (CM)

In the empty space below note down any topic that you wish to discuss or share with your TFs or other fellow teachers in the cluster meeting. These topics can be anything, for example – an experience of trialing out a new activity, a challenge that you want to discuss and find solution for, a question or simply a comment.

Use numeracy lesson plans 3 Term 2 Weeks 11 Days 1-3 with this lesson.
For more practical examples open to:
Macmillan New Primary Mathematics book 3 page 42 or
New Method Mathematics book 3 page 41

Module 4:
Algebraic Process

Module 4:
Algebraic Process

Have you ever heard of the word “Algebra”? Algebra is the part of mathematics that uses boxes in place of unknown numbers (*Algebra wani fanni ne na lissafi wanda ake amfani da alamar a maimakon lamba*). For example the box in this sum ☐ + 5 = 12 is representing an unknown number. Algebra can involve addition, subtraction, division or multiplication. Let us look at some examples below involving all four basic operations.

6 + ☐ = 14(addition)

14 - ☐ = 9 (subtraction)

4 x ☐ = 12 (multiplication)

32 ÷ ☐ = 8 (division)

Can you try to find the number that the box represents?

Many pupils find algebra difficult to understand because of the way it is being taught in our schools. Some of the materials teachersuse makes it difficult for pupils to understand the concept. It is important that care is taken to teach this concept (*batu*) in a way that our pupils will understand.

Objectives of the module

By the end of this module, teachers will be able to guide pupils to:

- Order numbers from 1 to 20.
- Find the missing number in an open sentence.
- Solve open sentences involving multiplication and division.
- Use more than or less than to compare numbers in problems.

Key words

- variable
- compare
- order
- ascending
- open sentence
- descending
- addition
- subtraction
- multiplication
- division
- number cards
- greater than
- less than
- equal

Section 1:
Ordering

Put the numbers in order from smallest to biggest:

27, 4, 10, 15, 3, 18

Ordering is an important part of pupils' life. Even before schooling, pupils understand the concept of ordering. For example, they can tell who is the first sibling (*dan'uwa*), 2nd sibling, 3rd sibling and so on in the family.

Ordering is putting something in the correct place according to a rule (*Samarwa, yana nufin saka wani abu a wurin da ya dace*). For example, numbers can be put in order of small to big e.g. 1, 2, 3, 4 and 5. This is known as ascending order (*haurawa sama*). The order can also go from big to small e.g. 5, 4, 3, 2, 1, known as descending order (*sauka kasa*). In real life, pupils very often are engaged in ordering. They may need to arrange things based on their size or quantity. The next video clip will introduce how ordering can be taught in primary 1-3 classes.

Think

1. When did you last teach a lesson on ordering?
2. What activities did you do with the pupils in that lesson?

Watch the video clip MM4 V1 and think about the following questions as you watch:

- Write true or false in front of the right statement (*Rubuta eh! Ko a a, a gaban bayanin da ya dace*).

a. _____ The teacher used number cards.

b. _____ The teacher used numbers on the chalk board.

c. _____ The pupils were asked to order numbers 1-10.

d. _____ The pupils were asked to order numbers 1-20.

e. _____ The pupils started with the largest number.

f. _____ The pupils started with the smallest number.

g. _____ The pupils worked in groups.

i. _____ The pupils worked individually.

j. _____ The pupils completed the task.

k. _____ The pupils could not complete the task.

Reflect

1. Apart from number cards, what other materials can you use to teaching ordering?
2. Were the pupils actively involved (*dalibai sun gwada a aji*) in the activity? What would you do to increase pupils' participation more in this lesson?

Work with Your Partner in School

1. How can the lessons in the video clip you watched be improved?
2. Play the following game with your partner:

Directions

- Step 1: Make some numbers 1-10
- Step 2: Put them face down on the table.
- Step 3: Ask your partner to take any three cards and then you take any two cards.
- Step 4: Put the number cards in order by ascending (starting with the smallest number)
- Then repeat above with a new set of cards.
- Step 5: Put the new set of cards in order by descending (starting with the bigger number)

3. Did you enjoy playing the game? Why?
4. Try this game with your class.

Use numeracy lesson plans primary 1 Term 1 Week 1 Day 3 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 1 page 13 or New Method Mathematics book 1 page 22

Section 2:
Addition and Subtraction Using Open Sentences

Look at the sum (*hadawa*) below:

20 - ☐ = 4

In this sentence, the box represents the missing number. A box that stands for a missing number is called a variable (*Wannan gurbi da babu komai shi ake kira variable*). In our sum above, the variable is. Now ask yourself what number you would write in place of to give you the answer 4.

A sentence that has a variable in it, such as 20 - ☐ = 4 is called an open sentence (*Jumla wanda yake da VARIABLE kamar 20 - ☐ = 4, ana kiransa budadden jumla*). To solve an open sentence involving addition or subtraction you replace the with a number that completes the sum. For example, in the above sum, we need to subtract 16 from 20 to make the sentence equal to 4. So, the missing number in the ☐ is16.

The variable can be placed anywhere in an open sentence. It can be placed in the position of numbers or signs. Such as 15 ☐ 5 = 10. In this example, the missing variable is " – ".

Think

1. Have you taught addition and subtraction using open sentences?
2. Can teaching aids be helpful in teaching open sentences?

Watch the video clip MM4 V2 and think about the following questions as you watch:

1. How did the teacher teach the activity in the video? Tick the correct one.
   a) ___ using the pupils and number cards
   b) ___ using the pupils and the chalkboard

c) ___ using only number cards

d) ___ using only pupils

2. In order for the pupils to know the right signs to use, what will they need to have?

   a) Prior knowledge (*ilimin baya*) of _____

   b) Prior knowledge of _____

Reflect

"I can teach open sentences using my pupils only without the number cards" – True or False. Explain why.

Practice 4.2:

1. Fill in the signs that are missing to the following sums (*Cike gurbin abubuwanda babu su anan*):

   a) 23 ☐ 14 = 37

   b) 80 ☐ 25 = 55

   c) 325 ☐ 485 = 810

   d) 536 ☐ 245 = 291

Work with Your Partner in School

- Here is a number 4562 for you. Both you and your partner have to make as many open sentences as possible in the next 3 minutes. You can use both – addition and subtraction for this activity. Whoever can make the maximum number of open sentences is the winner (*mai nasara*).

Use the numeracy lesson plans Primary 3 Term 3 Week 28 Day 2 with this lesson.

Section 3:
Multiplication Using Open Sentences

Look at the sum below:

4 x ☐ = 24

Can you work out what the stands for?

In this open sentence, the stands for a number that is known as a variable. The box in 4 x ☐ = 24 makes it an open sentence (multiplication). In order to solve the sum you need to ask yourself: what will I need to multiply by 4 that will give me 24? In this case it will be 6, because 4 x 6 = 24.

Practice 4.3:

Solve the following:

5 x ☐ = 20

☐ x 6 = 48

7 x ☐ = 56

☐ x 8 = 72

Think

1) Have you taught open sentences involving multiplication before?
2) What methods and instructional materials have you been using to teach open sentences involving multiplication?

Watch the video MM4 V3 about multiplication using open sentences and list at least 2 things that you learnt new from the video.

Reflect

- Why do you think it is important to know the times table before children are taught multiplication using open sentences?

Practice 4.3:

1. What number can replace in each of the following open sentences?

   a) 15 x 5 = ☐

   b) ☐ x 4 = 80

   c) 3 x ☐ = 45

   d) ☐ x 8 = 64

Work with Your Partner in School

1. Discuss some of the challenges you observed in your class when you taught an open sentence lesson?

2. How can you overcome the challenge(s)?

Use the numeracy lesson plans primary 3 Week 28 Day 2 with this lesson.

Section 4:
Division Using Open Sentences

Look at the sums below. Work out what you think each box is.

18 ÷ 3 = ☐

36 ÷ ☐ = 4

☐ ÷ 6 = 6

The sums above are all open sentences with division. The numbers in the sums have been replaced with ☐. How did you work out the value of each? You probably have used the times table to find out the variable. Division is the reverse (*maimaici*) of multiplication and once pupils have a solid foundation in this area, it will be easier for them to solve problems involving division.

Pupils use division every day. They share things equally. When they want to play football they divide themselves into teams. The teaching of division is very important in primary 1-3 classes as the pupils build on that experience in later primary and secondary levels.

Think

1. Have you taught division using the open sentence before?
2. What instructional materials have you been using to teach open sentences in division?

Watch the video MM5 V4 on how to teach open sentences involving division.

1. Mention two rules for open sentences?
2. Where can you place the ☐ in the sum?

Reflect

1. Write down three things that will make you remember how to teach open sentences involving division

2. Why do you think the position of the ☐ in an open sentence using division is so important?

Practice 4.4:

- Change the following sums into open sentences (*Canza wadannan zuwa budaddiyar jumla*):

  a) 18 ÷ 6 = 3
  b) 56 ÷ 8 = 7
  c) 75 ÷ 3 = 15

Work with Your Partner in School

1. Plan a lesson with your partner using number cards to teach open sentences involving division in your class.

2. Write your experience in your Teacher Journal

Use the numeracy lesson plans primary 3 Week 18 Day 1 with this lesson.

Section 5:
Comparison

When we talk about comparison in mathematics we mean comparing numbers (*Kwatanci a lissafi yana nufin kwatanta lambobi*). A number can be greater than, less than or equal to another number. Did you know that greater than, less than and equal to can be represented by symbols (*alamu*)? See below for the symbols:

The symbol > means greater than (*fiye da*) .

The symbol < means less than (*kasa da*).

The symbol = means equal to (*daidai da*).

Most pupils can compare different objects when playing; they compare dresses they wear and how much foodis given. Since pupils already have the knowledge of comparison, it will help them to apply it in mathematics.

Think

1. Do you know what the word comparison means in mathematics?
2. When was the last time you taught comparison in primary 1-3?
3. What instructional materials have you used to teach comparison?

Watch the video clip MM4V5 and think about the following questions as you watch:

1. Put the activities below in order according to the video you watched.

   a) ___ Teacher demonstrates <, > and = on the chalkboard.

   b) ___ Teacher asks pupils to work in groups.

   c) ___ Teacher asks numbers that are less/greater than 20.

2. Teacher asks pupils to do example of work on the chalkboard.

Reflect

- Fill in the table below:

Two things you liked about the video	One thing you would like to improve and why?

Practice 4.5:

1. Put the correct names in front of the symbols
   - _____ <
   - _____ >
2. Write four numbers greater than 1000 and four numbers less than 1000.
3. Write two sums with the less than (<) symbol and two sums with the greater than (>) symbol

Work with Your Partner in School

1. What challenges you might face in your class organisation if you applied the method in the video?
2. How can you overcome the challenge(s)?
3. With your partner in school, plan your next lesson teaching basic operation – addition, subtraction, multiplication or division using open sentences.

Summary of the Module

Algebra is the part of mathematics that uses letters or symbols. Then you might ask yourself why did we do ordering of numbers in this module? This is because much of algebra involves ordering. Situations such as Musa is 4cm taller than Fati might arise. This concept is very well understood if their heights are ordered. This makes the ordering important and is the reason we learntit first in this module.

Next, we looked at open sentences, in a situation where mama Jamila sells banana for N25 and orange N15 and knows her sale for the day is N40, we will be able to write this as an open sentence. N25 ☐ N15 = N40, what goes in the box? This situation offers pupils an opportunity to decide which of the four basic operations goes in the box. Similar situations are posed in other modules that challenge pupils to decide on other operations. As long as pupils have a solid foundation in using all four operations, applying it to open sentences seem to be effortless.

In the area of comparison, the phrases greater than and less than were used to compare numbers. The symbol for “greater than” is represented by “ >” and less than is represented by “<”. The activities offered in the module offers teachers opportunity to find ways to help pupils to differentiate between both symbols..

Ideas to try in the classroom

Below are some activities that you can practice in your classroom with your students. Once you try these activities, we encourage you to write a note about your experiences: what worked well, what were the challenges, what did you do to overcome the challenges and what difference did it make in your classroom/ lesson? Hand over your notes in the next cluster meeting.

Try in the classroom 1

Topic: Open sentences (addition)

Duration: 35 minutes ☐

Learning Outcomes: By the end of the lesson, pupils will be able to:

- find missing numbers in an open sentences.
- solve simple open sentence problems.

Teaching Aids:

- bottle tops
- number cards 1-9
- dot cards

Step 1: (5 mins)

- The teacher guides the class to find missing numbers in the open sentence shown below on the chalkboard.

  a. 1 + ☐ = 5

  b. 2 + ☐ = 7

  c. 4 + ☐ = 9

Step 2: (25 mins)

- Give each group a set of 30 counters and a set of number cards 1-9.
- Ask each group of pupils to group the counters as follows 3, 2, 5, 6, 4, 8, etc. and place number cards against each number of counters.
- Teacher goes around and supports pupils.
- Ask each group to use their number cards to form sentences. Each group can form two different open sentences with an empty box at the beginning, middle and end of the sentence. e.g.

  a. ☐ + 6 = 10 (beginning)

  b. 15 + ☐ = 35 (middle)

  b. 17 + 12 = ☐ (end)

- Teacher will demonstrate above examples on the chalkboard for pupils to see.
- While the activity is going on the teacher should go around and support the groups where necessary.

Step 3: (5 mins)

- The teacher calls pupils one at a time to solveopen sentences seen below on the chalkboard. e.g.

  a. 1+ ☐ = 4

  b. 2 + ☐ = 8

  c. ☐ + 3 = 7

  d. ☐ + 6 = 11

Try in the Classroom 2

Topic: Ordering

Duration: 35 minutes

Learning Outcomes: By the end of the lesson, pupils will be able to:

- Order numbers from 1-20.

Teaching Aids:

- counters
- number cards 1-20
- dotted cards

Step 1: (5 mins)

- Ask 7-13 pupils to come out and stand before the chalkboard and arrange themselves according to height and then age.

Step 2: (25 mins)

- Divide pupils into groups and give each group a set of number cards 1-20.
- Write boxes from 1-20 on the chalkboard and call on pupils to pick cards randomly and place it in the right place on the chalkboard.
- Continue this activity until the pupils have put the numbers 1-20 in the correct order.
- Then ask each person in the group to place the number cards face down on the table and pick up a number card. Ask the pupils to arrange the number cards from lowest to highest.
- Ask the pupils to write the numbers in their exercise books.
- Ask the pupils to repeat this activity a few times.
- Before they start again, the pupils should replace the cards they have taken.
- The teacher should move round the class and see which pupils have understood the task. Make a note of those who cannot do the task, so that they can be given support during the next lessons on ordering.

Step 3: (5 mins)

- Take pupils outside and call out a number randomly between 1 to 20. Ask the pupils to get into groups of that number e.g. 3, 6, 8, 11 etc. Repeat the activity three or four times.

Experiencing Change in Your Classroom

Don't forget to write your expereince in your journal. It is very important that as a teacher you always notice what students liked and if the pupils learned what you wanted them to learn. Questions that might guide your writing about your experiences are:

1. Which activities did you try out in your classroom?
2. Which ones went well? Why?
3. Which ones were less successful? Why?
4. If you tried these activities again, what changes/adaptations would you make?

Suggestions for the Next Cluster Meeting (CM)

Please list below if you have anything to discuss in your next cluster meeting.

Use numeracy lesson plans primary 2 Week 2 Day 2 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 3 page 10 or New Method Mathematics book 3 page 6.

Use numeracy lesson plans primary 1 Week 1 Day 3 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics 1 page 13 or New Method Mathematics 1 page 22.

Module 5: Geometry

Module 5:
Geometry

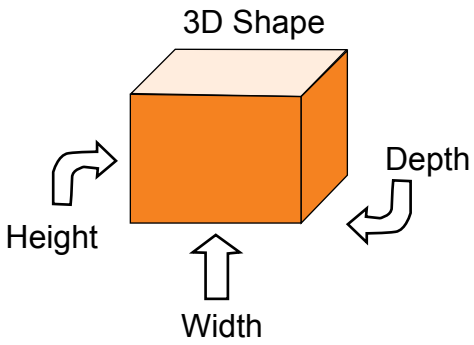
What is geometry? Geometry is the study of 2-dimensional (2D) and 3-dimensional (3D) shapes (*Nazarin alamu masu fuska 2 da 3 shi ake kira Geometric*). We see it every day in many places: in art, architecture (*zane-zane*), sports, machines, cars and much more. Geometry is linked to many other topics in maths, specifically measurement.

First, geometry focuses on identification of shapes; being able to name each shape. Then, geometry looks more at the properties of shapes, which include how many faces, edges and corners a shape has. See below an example of a 2D and 3D shape.

2D Shape

Do you know why this shape is called 2D? It is because it has two dimensions: width and length. Can you label (*goga*) the length and width on the shape above?

A shape is 3D when it has three dimensions such as width, height and depth.



Although shapes may be familiar to our pupils, they still need to learn the names of each shape and what their properties are. This module is designed to guide teachers on how to effectively teach geometry in primary schools.

Objectives of the module

By the end of this module, the teacher will be able to guide pupils to:

- Identify and name plane shapes such as square, rectangle and circle.
- Sort and name cubes, cuboids, cylinders and spheres from a collection of objects.
- Count the faces, edges and corners of cubes and cuboids.
- Identify a line(s) of symmetry in a shape.
- Identify the difference between curved and straight lines.

Key words

- cube
- cuboids
- cylinder
- sphere
- cone
- 3-dimensional
- 3D Shape
- 2-dimensional
- 2D Shape
- curved
- straight Lines
- edge
- corner
- symmetry
- symmetrical
- fold
- tear
- half
- properties
- edges
- curves
- surfaces
- faces
- corners
- rectangle
- square
- circle
- triangle
- cut-out
- straight lines.

Section 1:
Straight and Curved Lines

When pupils are learning to draw, they start off with straight and curved lines that eventually develop into patterns. Getting our pupils to practise straight and curved lines gets our pupils ready to start writing letters or numbers that will become part of their everyday life. The numbers and letters of the alphabet are all made of straight lines, curved lines or both. Learning straight and curved lines will give the pupils a solid foundation in writing, which will help them become good writers.

Fill in the table below:

Numbers that only have straight lines	Numbers that only have curves	Numbers that have both straight lines and curves

Think

1. Have you taught curves and straight lines in mathematics class? How?
2. Did you experience any difficulty?

Watch the video clip MM5V1 and find out if the following statements are true or false:

- Teacher asked students to draw the shapes.
- Teacher asked students to trace the shapes.
- Only two students got the opportunity to practice straight and curve lines on the board.

Reflect

- "Teaching pupils how to draw straight and curve lines in mathematics lesson is not important." Do you think this is true? Why or why not?

Work with Your Partner in School

1. Together with your partner, think of any other way of teaching curved and straight lines other than the one shown in the video clip.
2. Plan a lesson with your partner on straight and curved lines and try it out in class.

Practice 5.1:

- Draw one 3D shape that has:
  a) only straight lines.
  b) lines and curves.
  c) only curves.

Use numeracy lesson plans primary 3 Term 1 Week 5 Days 1-2 with this lesson.

Section 2:
Identification of Rectangles, Squares and Circles

2D shapes include shapes like circles, squares and rectangles. '2D' stands for 2-dimensional. A 2D shape is any shape that has only two dimensions - length and width *(alamar 2D alama ce mai fuska biyu*).

In mathematics, a flat surface is called a plane (*wuri mai sarari shi ake kira plane).*We look at many shapes on a plane because it can lay flat on a piece of paper. A rectangle is an example of a 2D shape. When it lies on a flat surface, you can see its two dimensions: length and width. Pupils tend to learn 2D shapes before 3D shapes because they can be drawn on paper.

Name the following 2D shapes below:

Write the number of corners and edges for each shape.

Think

1. What type of instructional materials have you been using to teach identification of rectangles, squares and circles?
2. What problems did you experience when teaching this topic?

Watch the video clip MM5 V2 and think about the following questions as you watch:

1. How did the teacher introduce the lesson? Tick the right one below:
   a) ___ by drawing the shapes on the chalkboard
   b) ___ by using shapes she had cut out
   c) ___ by asking the pupils to form shapes

2. When the pupils formed a rectangle, how many pupils were on each side?
3. What did the teacher do in the video to assess the pupils?

Reflect

1. Do you think taking the pupils outside encourages learning? Why?
2. Is there anything you would like to do differently from what is in the clip?

Work with Your Partner in School

1. Together with your partner, design a game using flash cards that can be used in the classroom for identification of squares, circles and rectangles.
2. Play the game in the class and write your experiences in your teacher journal.

Use numeracy lesson plans primary 1 Week 2 Days 1-2 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics 2 pages 123 - 124 or New Method Mathematics book 2 pages 71 -72

Section 3:
Sorting of Cubes, Cuboids, Cylinders and Spheres

Cubes, cuboids, cylinders and spheres are all examples of 3D shapes. What makes a shape 3D? They are shapes that can be measured in three dimensions such as width, height and depth (*3D alamu wadanda za a iya auna su ta fuska uku, wato tsawonsu, fadinsu, da zurfinsu*). Most 3D shapes are very familiar and can be seen at home or around the school. For example, the ball pupils play with at school, the cans of drinks and carton of boxes are all example of 3D shapes.

Think

- Fill in the table below using two examples of things you see around you. One has been done for you.

Shapes	Two Examples
Cube	
Cuboid	
Sphere	ball and orange
Cylinder	

Watch the video clip MM5 V3 and think about the following questions as you watch:

1. How did the pupils participate during the lesson?
2. Name 3 teaching aids that the teacher used in the lesson to teach 3D shapes.

Reflect

1. Why is it important to teach 3D shapes using real objects?
2. Write down two things from the video clip that were useful in achieving the lesson's objectives.

Work with Your Partner in School

- Discuss two techniques to assess pupils' understanding about 3D shapes and use it in your class.

Use numeracy lesson plans primary 2 Week 13 Days 1- 2 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 2 pages 120 - 122 or New Method Primary Mathematics book 2 pages 109 -111

Section 4:
Properties of Cubes and Cuboids

Cubes and cuboids are both 3D shapes. Pupils come into contact with these shapes at home and at school. Can you mention some 3D shapes you can see around you? All 3D shapes have properties (*dauke da darusa*) that help us to know the similarities and differences between them. The most common properties are faces, edges (*fuskoki da mahadi*) (sides) and corners (*kwana-kwana*) (also known as vertices). As there are so many shapes, properties can help us learn facts about the shapes. It also helps with easy identification when shapes look alike.

Think

1. What type of instructional materials have you been using in teaching the properties of cubes and cuboids?
2. Are you comfortable teaching this lesson?
3. What did you find most difficult when you taught properties of cubes and cuboids?

Watch the video clip MM5V4. As you watch, identify which of the following statements are true and which are false:

- The teacher used a football to demonstrate cuboid.
- Cuboids sides are also known as edges.
- Cuboids have faces.
- The teacher engaged pupils to participate in the lesson.

Reflect

1. Mention something new you have learnt from the clip.
2. What questions did the teacher use to encourage pupils to think? Why?

Work with Your Partner in School

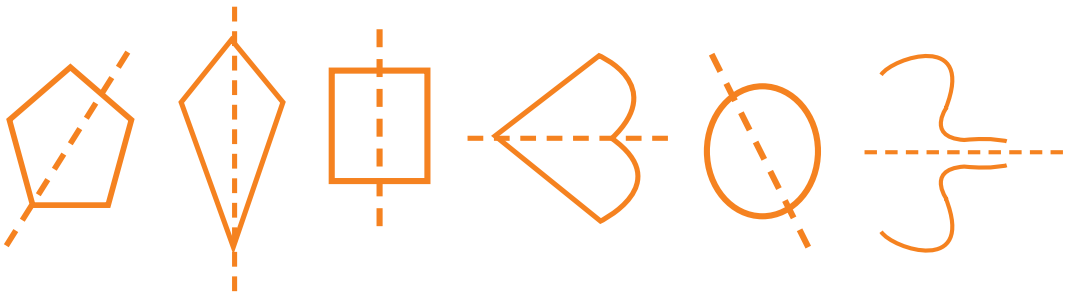
1. Plan a lesson where you will use the method in the video to teach properties of a cube.
2. Discuss with your partner and fill in the table by writing two similarities and one difference about the shapes below:

Shapes	Two Similarities	One Difference
Cube		
Cuboid		

Use numeracy lesson plans primary 2 Week 13 Day 1 with this lesson.
For more practical examples open to: Macmilllan New Primary Mathematics book 2 page 120 or New Method Mathematics book 2 pages 110 -111

Section 5:
Lines of Symmetry

Symmetry is when one side of a shape looks exactly like the other side (*A lokacinda wani gefen alama yayi kama dayan, shi ake kira symmetry*). The line that divides a shape or pattern into two identical parts (fannoni biyu masu kama) is known as the line of symmetry. See some examples below:



Several objects in our environment are symmetrical; leaves, many fruits and a lot of the 2D shapes such as squares, rectangles, and circles.

Think

1. Have you ever taught line(s) of symmetry?
2. What type of teaching aids did you use to teach line(s) of symmetry?

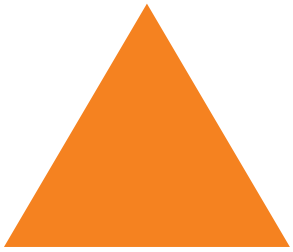
Watch the video clip MM5 V5 and think about the following questions as you watch:

1. Were the teaching aids used in the clip helpful for teaching line(s) of symmetry?
2. How did the teacher involve the pupils in the lesson?

Practice 5.4:

1. How many lines of symmetry does:
   a) a square have?
   b) a rectangle have?

2. Draw the equilateral triangle below and calculate how many lines of symmetry it has.



Reflect

1. Did you think the activity could be done in a group instead of pairs? Why or why not?

2. How will you assess whether the pupils have learnt the objectives of the lesson?

Work with Your Partner in School

1. Write the letters of the alphabet A-Z in capital letters and work with your partner to find the lines of symmetry for each letter.

2. Would this be a good activity to give pupils in class?

3. Plan an activity for your pupils using numbers.

Summary of the Module

Geometrical shapes are everywhere: in our home, school and community. Pupils need to be familiar with the concept of shapes and their properties while in primary school. For the teacher to teach the shapes effectively, the use of physical objects, which are of no or low cost, are encouraged. This allows the pupils to explore the different shapes and learn their different properties. Teachers are encouraged to provide opportunities for pupils to work in groups. This enables the pupils to share their ideas and learn from one another. It also leads to active participation in lessons, which will have a positive impact on their learning.

Identifying rectangles, squares and circles offer pupils a way to describe their environment. That sheet of paper is rectangular or is circular. Most items we use at home are cylindrical, cubical or spherical. The world

we live on is a sphere. The favorite magi cube we all enjoy so much in our food is in the shape of a cube. The carton you find in stores are in the shape of cuboid. Most likely our rooms are shaped as cylinder or a cuboid.

Symmetry is such a powerful concept. The objects we have mentioned here all have lines of symmetry. It is believed that objects that are symmetrical are more pleasing to the eye, they look beautiful. This module provides means to the teacher to effectively help pupils identify lines of symmetry in all sorts of objects.

Ideas to try in the classroom

Below are some activities that you can practice in your classroom with your students. Once you try these activities, we encourage you to write a note about your experiences: what worked well, what were the challenges, what did you do to overcome the challenges and what difference did it make in your classroom/lesson? Hand over your notes in the next cluster meeting.

Try in the Classroom 1

Topic: Geometry: Properties of Cuboids

Duration: 35 Minutes

Learning Outcomes: By the end of the lesson, pupils will be able to:

- Identify and count the faces, corners and edges of a cuboids.
- Mention objects in their homes that are cuboids.

Teaching Aids:

- concrete or real objects such as empty boxes of matches, empty carton of milk, empty box of sugar,
- pictures and charts showing different sizes of cuboids.

Step 1: (5 min)

- The teacher asks the pupils to name some 3D objects they can see in the classroom/home.
- The teacher takes verbal feedback.

Step 2: (25mins)

- The teacher puts different types of cuboids on a table in front of the class.
- The teacher picks up an object from the table and asks the pupils to identify it.
- The pupils identify the names of the different objects (cuboids) on the table.
- The teacher reminds pupils that “cuboid” is an example of a 3-dimensional shape.
- The teacher continues to ask the pupils to identify the other objects on the table such as the match box, sugar box, and milk cartons.
- The teacher picks up a cuboid (milk carton) and shows the pupils the edges, corners and faces on a cuboid.
- The teacher hands out a cuboid to a pair of pupils to touch and talk about.
- The teacher instructs the pupils to count the number of faces, corners and edges of their cuboids as shown by the teacher previously.
- The pupils carry out the activity in pairs by participating actively in the discussion and observing that cuboids have

  a) 6 faces

  b) 8 corners

  c) 12 edges
- After the activity the teacher asks two pairs to tell the class about their observations.
- The teacher asks pupils to draw the picture of a cuboid in their notebook and colour or shade the faces.

Step 3: (5mins)

- Ask pupils to answer the following questions. Responses must be entered in pupils' exercise books.

    a) Name three objects in the school that are cuboids.

    b) Name four objects in the home that are cuboids.

    c) How many faces does a cuboid have?

    d) A cuboids has ____ edges.

    e) How many corners does a cuboid have?

Try in the Classroom 2

Topic: Line(s) of symmetry

Duration: 35 minutes

Learning Outcomes: By the end of the lesson, pupils will be able to:

- work as a group to solve a 'Tangram' puzzle
- identify shapes with lines of symmetry.

Teaching Aids:

Before the lesson:

- Prepare a 'Tangram' for each group
- Cut out a selection of squares, rectangles and triangles from newspaper
    - Get some old newspaper or plain paper and use a ruler to make the shape exactly as it is pictured below.
    - Cut along the thick black lines so that you have seven shapes. Keep each set together with a clip or in separate envelops or containers
    - Make as many copies as you need for each group or pair to have one

Step 1: (5 mins)

- Divide the pupils into four groups and give each group a set of 'Tangram' pieces (not the animal shapes).

- Ask the pupils to do the ‘Tangram’ puzzle.
- Ask each group to use all the shapes to make a rectangle, a triangle or a square.

Step 2: (25 mins)

- The teacher gives the pupils a selection of shapes (squares, rectangles and circles) cut out of newspaper.
- The teacher asks the pupils to pick up the square and fold it so that the edges match together exactly.This may be done across the middle or diagonally.
- The teacher tells the pupils that if the edges do not match, the shape is not symmetrical. If the edges match exactly, the shape is symmetrical.
- The teacher explains that the place where paper is folded in half is called a line of symmetry and that a square has four lines of symmetry.
- Ask each pair to fold their shapes in matching halves in as many different ways as possible.
- Ask each pair to record on the table below how many lines of symmetry they have found on each shape.
- Shape table:

Step 3: (5 mins)

- Ask each pair to share their table of shapes with the rest of the class.

Experiencing Change in Your Classroom

Don’t forget to write your expereince in your journal. It is very important that as a teacher you always notice what students liked and if the pupils learned what you wanted them to learn. Questions that might guide your writing about your experiences are:

1. Which activities did you try out in your classroom?

2. Which ones went well? Why?
3. Which ones were less successful? Why?
4. If you tried these activities again, what changes/adaptations would you make?

Suggestions for theNext Cluster Meeting (CM)

Any topic you wish to discuss in your next cluster meeting?

Shapes	Number of Lines of Symmetry (folds)
Square	
Rectangle	
Circle	

Use numeracy lesson plans primary 3 Term 1 Weeks 4 Days 1-2 with this lesson.

Module 6: Measurement

Module 6:
Measurement

Measurement is a number that shows the size or amount of something (*Ma'auni lamb ace wadda ta ke nuna fadi ko yawan abu*). Measurement takes place all the time: when we walk to school, fetch (*diba*) water with our buckets or buy things and get change. All these activities involve one form of measurement or the other. In the past measurement happened using hand span, feet and strides (*gwajin ma'auni da takun kafa*). They were known as non-standard units of measurement because the unit used to measure was different. A person with long feet will get a different measurement from a person with short feet. This made the units of measurement inaccurate and unfair (*rashin daidaito*).

Now there are standard units of measurement like rulers, scales, and tape measures that give us more accurate measurements. Your height in Katsina will be the same in Zamfara, thus making measurement fair. We can measure many things but mostly we measure length, weight, time, capacity and area.

Objectives of the Module

By the end of this module, teachers will be able to guide pupils to:

- Identify different units of measuring length, weight, area, capacity, time and money.
- Compare objects by their length, weight, area and capacity.
- Tell time of the day using long and short hands of the clock.
- Carry out simple transactions with money up to fifty naira.

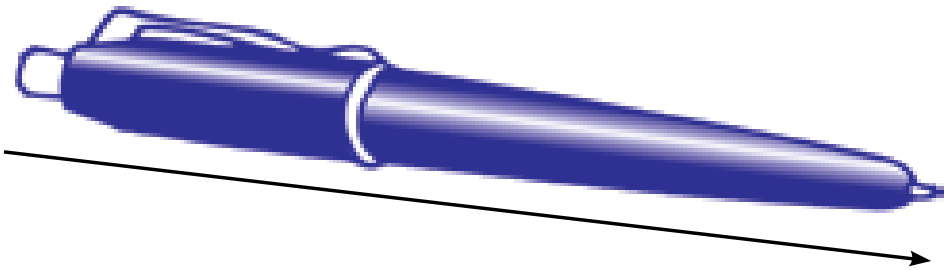
Key words

- heavy
- light
- heavier
- lighter
- weight
- weighing
- long
- short
- tall
- longer
- shorter
- taller
- longest
- shortest
- length
- height
- coins
- money
- naira
- kobo
- buying
- selling
- area
- surface
- larger
- metre
- centimetres
- grams
- kilograms

Section 1:
Length

Length describes how far an object is from one point to another (*Length yana nufin tsawon abu ne*).Take a look at your pen. From the tip of your pen that you use to write to the end of it is known as length. Lengths in the classroom can be measured using non-standard units like feet and hand span. We can also use standard units like rulers and scales.

Length of a pen is shown below:



Fill in the table below:

Items to be measured	What standard unit will you use to measure it?
length of your pen	
length of your bedroom	
length of your dress/trousers	
length of your finger	

Short lengths are measured in inches, centimetres or metres. These units of measurements can be used to measure the length of an exercise book or of your finger. Long distances are measured in kilometres. The distance between Abuja and Katsina is measured in kilometres.

Think

1. What type of instructional materials have you used in the classroom to teach length?
2. Have you used hand span or feet in the teaching of length?

Watch the video clip MM6 V1 and think about the following questions as you watch:

1. Give two examples of how teacher engaged pupils in teaching length.

2. Write down two non-standard units used in the video.

Reflect

- Why do you think the teacher demonstrated the differences between the guessed and actual measurement (*hasashe da tabbacin ma'auni*) of the objects? Was it necessary? Why or why not?

Work with Your Partner in School

- Find some time with your partner in school and discuss objects you can use in the classroom to teach length.

Use numeracy lesson plans primary 2 Term 2 Week 16 Days 2-5 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 2 pages 87- 89 or New Method Mathematics book2 pages 97 - 100

Section 2: Weight

If you were given a coconut and an apple, how could you tell which one was heavier? You will have to hold both of them in your hands to know. This type of measurement is known as weight. It allows you to know how heavy or light an object or person is. Finding the weight of objects can be done using scales. Scales are standard units of measurement that allow us to know how light or heavy an object is (*Sikeli ma'auni ne mai auna nauyin abu*).

There are different scales for different things. Scales to measure things in the kitchen are different from scales we use in the hospital to measure our weight. Grams are the unit of measurement used in weighing light things such as a cup of rice, garri or beans. A kilogram measures the weight of

heavier things like bags of potatoes, rice and garri. We can also measure our own weight in kilograms. This section will help teachers to teach weight in the classroom in a fun and interesting way.

Think

1. What type of objects have you used to teach weight?
2. How did you engage your pupils in the lesson?

Watch the video clip MM6 V2 and think about the following questions as you watch:

1. List four materials the teacher used in teaching weight in the video.
2. Fill in the gaps in the sentence below (Cike wadannan gurabai):

   Light objects are measured in _____ while heavier objects are measured in_____.

Reflect

1. In the total lesson, how much time was spent on teacher talking about weight and how much time was spent for pupils doing practical activities? Which one is more effective – teacher explaining more or students learning through practical experience? Why?
2. What do you think about girls' participation in the activity?

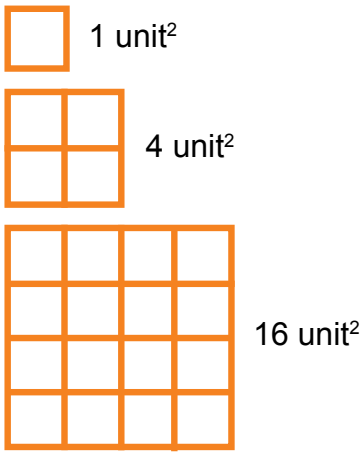
Work with Your Partner in School

1. Discuss objects you can use to teach weight that are not shown in the video.
2. Discuss challenges you still have after viewing the video clip on teaching weight.

Use numeracy lesson plans primary 2 Term2 Week 19 Days 1-2 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 2 pages 103 - 107 or New Method Mathematics book 2 pages 79 - 81

Section 3:
Area

Area is a part of measurement that measures space (*Area fannin ma'auni ne wanda yak e auna fadin-wuri*). Look at the three shapes below. What do you see inside the shapes? Each shape is made of small squares inside. These small squares inside the shape help us calculate the area.



Which shape has the larger area? It is the 16 unit² shape because it has more squares inside. Which shape has the smallest area? The shape with 1 unit² is the smallest because it has the least number of squares inside.

Understanding area is important to our pupils. It helps them understand how space around them can be managed well.

Think

1. Have you taught area in your class before?
2. What activities did you use to teach area?

Watch the video clip MM6 V3 and think about the following questions as you watch:

1. What did the teacher use to teach area in the video?
2. How did the teacher organise the class while teaching the topic?

Reflect

1. How would you use the strategies used in the clip to teach area for objects outside the classroom?

2. How would you improve the strategies in the clip to increase pupils' participation in the lesson?

Work with Your Partner in School

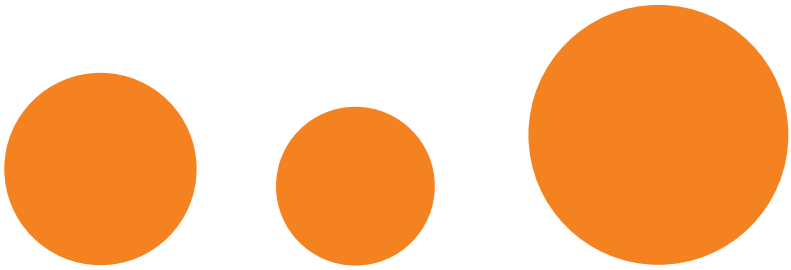
1. Can you find examples of controlled speaking practise activities in your textbooks or lesson plans?

2. Watch the video clip together with your partner again and discuss at least one activity that you will add or improve in your own lesson.

Practice 6.3:

1. Tick the shape with the largest area:

2. Tick the shape with the smallest area:



3. Circle the objects that will have the largest area:

    a) football or lemon

    b) Maggi or sugar cubes

    c) A4 paper or a sheet of paper from an exercise book

    d) can of Coke or a tin of Milo

Work with Your Partner in School

1. Play the following game with your partner:

   Directions

   - **Step 1:** Cut squares, circles, rectangles and triangles of different sizes. Make sure you have different sizes of each shape.
   - **Step 2:** Pick up shapes that are the same and ask your partner to point to the shape that has the larger or smaller area.
   - **Step 3:** You can pick up shapes that are the same size and see whether your partner can tell they have the same area.

2. Do you think this is a good game to play with your pupils? Discuss why.

Use numeracy lesson plans primary 3 Term 3 Week 23 Day 2 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 3 pages 117 - 119 or New Method Mathematics book 3 pages 97 - 98

Section 4:
Money

We see and use money in many places such as the bank, market, home, and school. Money is all around us. Without money we will not be able to buy food, go to school or have a house to live in. We need money in order to survive. When we talk about money it can either be in note or coin form. In Nigeria, a lot of the money spent is in note form, but pupils still need to know that coins exist.

Draw below a Nigerian note:

Have you seen a coin before? Draw what you think it would look like.

Pupils come into contact with money on a daily basis. It is important that they have a solid foundation in money as is it something they will continue to use later on in life.

Think

- Have you used actual coins and naira notes to teach money?

Watch the video clip MM6 V4 and think about the following questions as you watch:

1. List all the coins mentioned in the video.
2. Are the pupils able to mention uses of money?
3. Are they able to identify pictures on different denominations of Nigerian coins?
4. How did the pupils respond to teacher's demonstration in the video clip?

Reflect

- Look at the two lessons below. Which one do you think will be more enjoyable (*alfanu da marmari*) for pupils and also more effective for learning? Why?

***Teacher A** is teaching money and decides to use a poster to show the pupils the different types of coins. The teacher stands in front of the class and points to each picture in turn. The pupils chant the different types of coins after the teacher.*	***Teacher B** is teaching money and brings in real coins for the pupils to look at. The teacher allows the pupils to discuss and differentiate between the different coins. The pupils give feedback after discussion.*

Work with Your Partner in School

- Discuss with your partner the challenges you might face when you teach 'Money'. How can you solve those challenges?

Use numeracy lesson plans primary 3 term 1 Week 10 Day 1 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 3 pages 91 - 106 or New Method Mathematics book 3 pages 79 - 87 or Macmillan New primary Mathematics book 2 pages 67-81 or New Method Mathematics book 2 pages 91 - 94

Section 5:
Time

Everybody knows what time is. We know what time we want to eat or what time we want to go to the market. By looking outside we can tell whether its morning, afternoon, evening or night but this will not give us an exact measurement of time.

The clock helps us do this. It tells us the time in seconds, hours and minutes. Using the clock gives us an accurate measurement of time, for example 7am in Zamfara will be 7am in Kaduna. Time has different units of measurement - seconds, hours, days, weeks, months and years.

- Fill in the table below:

Time	What can you do within this time?
60 seconds	
1 hour	
1 day	
1 month	

As you can see from the table above, we can do various things depending on how much time we have. Time is an important part of our lives and needs to be taught so that pupils understand the concept from an early age. Once pupils have a solid foundation, they can use it to solve more difficult problems when they get to secondary school.

Think

1. Which areas of time have you taught?
2. Have you used a clock to teach time?

Watch the video MM6 V5 and answer the following questions.

1. How does the teacher introduce the lesson?
2. What activity were the pupils doing in pairs?
3. How does she check that they understand the activity?

Reflect

1. Why was it important for the pupils to act out what they did at each particular time?
2. What will you do next to make sure your pupils can tell the time?

Work with Your Partner in School

1. Look at the activity below:
   - Write numbers 1-12 separately on a flash card.
   - Go outside and arrange the number cards 1 - 12 in a circle like a clock on the ground.
   - Tell the pupils they are going to be the long and short hands of the clock.
   - Practice 6 o'clock with the class.
   - Tell 5 pupils to stand in a straight line (one behind each other) in front of the 12 on the floor representing the long hand.
   - Then put a big stone at the end of that line to represent where the two hands meet.
   - Ask another 3 pupils to stand in front of the 6 on the floor (one behind each other) representing the short hand.
   - Make sure the line starts just immediately after the stone.
   - Tell the pupils they have now formed 6 o'clock, using the pupils as the hands of the clock
   - Call out times randomly and get the pupils to form that time. For example 2 o'clock you will have 5 pupils standing near the 12 to show the long hand and 3 pupils standing next to the 2 to show the short hand.
2. Discuss with your partner
   a) Is this a good way of teaching time?
   b) Is this something you can do with your class?

Use numeracy lesson plans primary 2 Term 2 week 18 Days 1-5 and Weeks 19 Days 1 - 3 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 2 pages 111 - 115 or New Method Mathematics book 2 pages 84 - 87

Section 6:
Capacity

Have you ever heard of the word capacity? You have a cup in your hand and you fill it up with water. The amount of water that cup can hold is its capacity. It is the maximum amount a container, such as a cup, can hold. Capacity is the measurement of liquids such as water, petrol, oil, kerosene etc (*Capacity, ma'aunin ruwa, ko mai ne*).

When small amounts of liquids are measured such as bottles of coke and cups of tea we use milliliters (ml). Large amounts of liquids are measured in litres, so the petrol we put in our car and the big bottles of water we buy are measured in litres. These are the more accurate forms of measurement.

Think

- What materials have you used to teach capacity?

Watch the video clip MM6 V5and think about the following questions as you watch:

1. What did the teacher use to teach capacity in the video?
2. How did the teacher arrange the class for the main activity?

Reflect

- Look at these stages from the lesson. What was the reason for each stage? Write your ideas in the spaces on the right.

Stage of the lesson	Reason
1) The teacher told the pupils what capacity was	
2) Pupils worked in groups	
3) The teacher asks the pupils to fill up their bottles?	
4) The teacher asks pupils to say how many containers will fill the bottle	

Practice 6.6:

1. Circle the container with the largest capacity.

2. In the diagram above, how many bottles of water will you need to fill the jug up to 1.5 litres?

3. How many tea cups of water can you fit into the bottle?

Work with Your Partner in School

1. Discuss two successes and one improvement of the lesson.

2. Together with your partner, plan a lesson to teach capacity in your class including possible challenges and the solutions.

Summary of the Module

We measure every day by going to the market to use money to buy things, knowing the time our parents leave for work in the morning, and filling up our cups with water. All these activities involve using one form of measurement or the other.

Measurement tools and skills help us live in everyday life. The ability to use measuring tools like rulers, measuring tapes, clock and scales to estimate are skills we use in the world around us. They can tell us how tall we are, how hot we are, how much we drink, how heavy we are and how far it is from here to Abuja.

When pupils are first introduced to measurement, they compare objects by using the language longer and shorter. As pupils grow older, they begin to understand that different units are needed to measure different things. For example, the length of a field and the length of an exercise book cannot be measured with the same tools. Pupils should be able to make choices depending on the different measurement problems given to them. It is important to know that length can be measured using certain tools and time is measured with a different tool.

Ideas to Try in the Classroom

Below are some activities that you can practice in your classroom with your students. Once you try these activities, we encourage you to write a note about your experiences: what worked well, what were the challenges, what did you do to overcome the challenges and what difference did it make in your classroom/lesson? Hand over your notes in the next cluster meeting.

Try in the Classroom 1

Topic: Time

Duration: 35 minutes

Learning Outcomes: By the end of this lesson, pupils will be able to:

- tell and read the time hourly.

Teaching Aids:

- dummy clock
- card board drawing of clock faces
- **Note:** if you do not have a dummy clock, draw a clock with numbers on the board. Use two different sized sticks to show the long and short hands.

Step 1: (5 mins)

- Teacher asks the pupils the following questions:

  a) What do you do in the evening?

  b) When do you come to school?

  c) When do you eat your lunch?

Step 2: (25 mins)

- Teacher explains in addition to morning, afternoon and evening. we can also tell time using a clock.
- Teacher shows a dummy clock and the pupils read the numbers on the face of the clock (1, 2, 3 …….12).
- Get the pupils to look at the hands of the clock and describe the short and long hands.
- Teacher puts the long hand of the dummy clock on 12, while the short hand changes position to various numbers. The class reads the position of short hand and the pupils are guided to read the position of the short hand as 3 o'clock, 7 o'clock, 9 o'clock, 4 o'clock.
- The pupils will be grouped into six groups (if the class is large, the number of group can be increased). Each group would be given a dummy clock (or draw one in their exercise book).
- They will be asked to adjust the hands of the clock to read 1 o'clock, 4 o'clock, 7 o'clock.

- The teacher tells the pupils to draw faces of clock showing 3 o'clock, 10 o'clock, and 12 o'clock in their exercise books. The teacher goes round to support where necessary.

Step 3: (5 mins)

- The teacher draws faces of clocks on the chalkboard. Then randomly says different times and asks a few pupils to draw in the correct hands.

Try in the Classroom 2

Topic: Length

Duration: 35 minutes

Learning Outcomes: By the end of this lesson, pupils will be able to:

- estimate and make actual measurements.

Teaching Aids:

- Metre rule (for each pair)
- Draw the following table on the chalk board

Step 1: (5 mins)

- Write the word 'length' on the chalkboard.
- Ask the pupils to look at the bench and show him/her which part is the length.
- Tell the students that the length is how long an object is.

Step 2: (25 mins)

- Show the pupils a metre ruler and ask if they know what it is used for.
- Show the pupils a metre stick and explain that the measurement is a metre and they are going to use it to estimate/guess the length of chalkboard in metres.

- Read through the table with the pupils and ask how many metres long do they think the length of the chalkboard is.
- Write their estimate in the first column.
- Demonstrate to the pupils how to measure accurately with the metre ruler.

Estimate of the Length	Actual Measurement of the Length
Length of the chalkboard	
Length of the classroom	

- Put the end of the measure stick at the end of the chalkboard they want to measure.
- Move the metre stick to zero ‘0’ and measures the length of the chalkboard.
- Use the metre ruler to measure the length of the chalkboard and ask pupils to record in the second column.
- Pupils are asked to use the same process to measure the length of their classroom. Split the pupils up into pairs.
- Remind pupils to estimate/guess before doing the actual measurement.
- Each pair will take turns with the metre ruler.

Step 3: (5mins)

- Ask two pairs to demonstrate how they measured the length of their classroom. Ask for their answers and fill in your table on the chalkboard.

Experiencing Change in Your Classroom

Don’t forget to write your expereince in your journal. It is very important that as a teacher you always notice what students liked and if the pupils learned what you wanted them to learn. Questions that might guide your writing about your experiences are:

1. Which activities did you try out in your classroom?
2. Which ones went well? Why?
3. Which ones were less successful? Why?
4. If you tried these activities again, what changes/adaptations would you make?

Suggestions for the Next Cluster Meeting (CM)

Please write below any topic you wish to discuss in your next cluster meeting. The topic can include a comment, a challenge or an experience that you want to share with your fellow teachers.

Use numeracy lesson plans primary 3 Term 2 Week 20 Days 1- 5 with this lesson.
For more practical example open to: Macmillan New Primary Mathematics book 3 page 121 or New Method Primary Mathematics book 3 pages 99- 101

Use numeracy lesson plans primary 3 Term 2 Week 20 Day 2 with this lesson.
For more practical examples open to: Macmillan New Primary Mathematics book 3 pages 121 - 125 or New Method Mathematics book 3 ppages 99 - 101

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