MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING
AND BASIC EDUCATION

KENYA GPE PRIMARY EDUCATION DEVELOPMENT (PRIEDE)
PROJECT

EARLY GRADE MATHEMATICS
Teachers’ Training Manual

APRIL 2018
<table>
<thead>
<tr>
<th>TIME</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 – 8:30 am</td>
<td>Registration, Welcome and Announcements</td>
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<tr>
<td>8:30 – 10.15 am</td>
<td>Infusing aspects of CBC in EGM</td>
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<td>10:15 – 10:40 am</td>
<td><strong>TEA BREAK</strong></td>
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<tr>
<td>10.40 – 11.10 am</td>
<td>EGM grade 3 book walk through</td>
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<td>11:10 – 11:30 am</td>
<td>Checklist for a lesson</td>
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<td>11.30 – 12.40 pm</td>
<td>Operations: Number family</td>
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<td>12.40 – 1.00 pm</td>
<td>Multiplication as repeated addition</td>
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<td>(Introduction and trainer Activity)</td>
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<td>1:00 – 2:00 pm</td>
<td><strong>LUNCH BREAK</strong></td>
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<td>2:00 – 2:50 pm</td>
<td>Multiplication Cont’</td>
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<td>2:50 – 4.00 pm</td>
<td>Subtraction by Breaking Apart</td>
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<td>4:00 – 5:10 pm</td>
<td>Fractions: Quarter and Eighth as part of a group</td>
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<td><strong>DAY 2</strong></td>
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<td>8:15 – 8:30 am</td>
<td>Registration, Welcome and Announcements</td>
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<td>Geometry: Patterns using Shapes</td>
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<td>9:40 – 10:50 am</td>
<td>Operations: Addition by regrouping using place value apparatus</td>
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<td>10:50 – 11:20 am</td>
<td><strong>HEALTH BREAK</strong></td>
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<td>11:20 – 12:30 pm</td>
<td>Subtraction by regrouping</td>
</tr>
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<td>12:30 – 1:10 pm</td>
<td>Operations: Division as equal Grouping</td>
</tr>
<tr>
<td>1:10 – 2:10 pm</td>
<td><strong>HEALTH BREAK</strong></td>
</tr>
<tr>
<td>2:10 – 2:40 pm</td>
<td>Operations: Division as equal Grouping Cont’</td>
</tr>
<tr>
<td>2:40 – 3:50 pm</td>
<td>Measurement: Capacity</td>
</tr>
<tr>
<td>3.50 – 4.50 pm</td>
<td>Full lesson</td>
</tr>
</tbody>
</table>
Day 1

Welcome and Announcements - (15 Min; 8.15 am-8:30 am)
Welcome the participants and introduce yourselves. Ask them to introduce themselves. Tell them that this is going to be a 2 days EGM training. Post day one agenda and take the participants through. Inform them that to keep track of their daily attendance, they will be required to fill in an attendance sheet every morning and afternoon.

Infusing Competence Based Curriculum (CBC) Aspects in Early Grade Mathematics (15 Min; 8.30am to 8.45am)

Introduction

Training Outcomes

By the end of the training, the participant should be able to:

1. teach Early Grade Mathematics using various strategies.
2. infuse Competence Based Curriculum Aspects in teaching of Early Grade Mathematics.

Introduction to the preparation documents (30 Min; 8.45 am-9.15 am)

A teacher will be required to prepare adequately before delivering an EGM lesson. The documents required for preparation are:

- EGM books
- Handbooks
- Competence Based Curriculum (CBC) Mathematics activities design

EGM books

The EGM books in use for grade one and two are being reviewed to conform to the competence based curriculum (CBC). Meanwhile teachers are to use the EGM books together with the handbooks and mathematics activities designs. The grade three EGM books in schools have already been aligned to CBC.
**Handbook**

A Handbook is a document that has been developed to guide teachers on how to align the existing grade one and two EGM content in the books to the Competency Based Curriculum. It contains the Strands, Sub strands, Specific learning outcomes, Suggested learning experiences, curriculum Assessment and key inquiry question. The handbooks show what is to be covered in each term. The handbooks describe the CBC aspects in detail. It also describes the professional documents and how a teacher is expected to use them in the lesson delivery. The professional documents include Schemes of work, lesson plans, records of work and assessment records.

The content in a sub-strand is spread throughout the year. The suggested learning experiences and the learning outcomes are also spread out in the terms proportional to the number lessons. It is therefore important that a teacher refers to the information given in the handbook for guidance when teaching concepts in EGM.

**Mathematics Activities curriculum design**

A mathematics activities design has the following components: National Goals of Education, Level learning outcomes, Essence statements, Strands and sub strands, Specific learning outcomes, Suggested learning experiences, Key Inquiry Question(s), Core competences to be developed, Pertinent and Contemporary Areas to be addressed, Link to values, Link to other subjects, Community Service Learning, Non-formal activity to support learning, Suggested learning and teaching resources, Suggested assessment methods and Assessment rubrics.

**Participants Activity (20 Min: 9:15-9:35am)**

Refer the participants to the Sample Mathematics activities design on appendix 1. Ask them to discuss in groups how the Mathematics Activities Design is organized. Let the participants share their feedback in the plenary.
Tell the participants that Mathematics content is organized in terms of strands and sub-strands. In Early Years, mathematics has 3 Strands namely; Numbers, Measurement and Geometry. Sub-strands under each strand are as:- Display on a flip-chart

<table>
<thead>
<tr>
<th>STRAND</th>
<th>SUB-STRANDS GRADE 1</th>
<th>SUB-STRANDS GRADE 2</th>
<th>SUB-STRANDS GRADE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Numbers</td>
<td>• Number Concept</td>
<td>• Number Concept</td>
<td>• Number Concept</td>
</tr>
<tr>
<td></td>
<td>• Whole numbers</td>
<td>• Whole numbers</td>
<td>• Whole numbers</td>
</tr>
<tr>
<td></td>
<td>• Addition</td>
<td>• Fractions</td>
<td>• Fractions</td>
</tr>
<tr>
<td></td>
<td>• Subtraction</td>
<td>• Addition</td>
<td>• Addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Subtraction</td>
<td>• Subtraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multiplication</td>
<td>• Multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Division</td>
<td>• Division</td>
</tr>
<tr>
<td>2. Measurement</td>
<td>• Length</td>
<td>• Length</td>
<td>• Length</td>
</tr>
<tr>
<td></td>
<td>• Mass</td>
<td>• Mass</td>
<td>• Mass</td>
</tr>
<tr>
<td></td>
<td>• Capacity</td>
<td>• Capacity</td>
<td>• Capacity</td>
</tr>
<tr>
<td></td>
<td>• Time</td>
<td>• Time</td>
<td>• Time</td>
</tr>
<tr>
<td></td>
<td>• Money</td>
<td>• Money</td>
<td>• Money</td>
</tr>
<tr>
<td>3. Geometry</td>
<td>• Lines</td>
<td>• Lines</td>
<td>• Lines</td>
</tr>
<tr>
<td></td>
<td>• Shapes</td>
<td>• Shapes</td>
<td>• Shapes</td>
</tr>
</tbody>
</table>

Feedback on infusion of CBC aspects in EGM (40 Min: 9.35-10.15)

The CBC was introduced in the country in 2017. Teachers were trained on the infusion of CBC aspects in EGM. It is therefore important to share on the successes and challenges on the infusion of CBC aspects in EGM and suggest ways of overcoming the challenges.

Participants’ Activity

Ask the participants to discuss in groups on the status of infusion CBC aspects in EGM. Let them share on the successes and the challenges of the implementation and suggest on the mitigation measures. Ask the participants to give feedback and hand in a copy of the same to the trainer.
Health Break (25 Min: 10.15-10.40)

Grade 3 EGM book walk through (30 Min: 10.40-11.10)

Show participants a Teacher’s guide and a Pupil’s book. Allow them 10 minutes to interact with the books. Tell them that each pupil will get a pupil’s book while each teacher teaching grade 3 will get both the Teacher’s Guide and the Pupil’s book.

Ask the participants the following questions:

1. How do you get the total number of lessons in a sub-strand?
2. How many lessons are there in each term?
3. How is content for a given sub-strand organized in the book?
4. How is content for a particular lesson organized?

Allow an interactive session where the participants discuss more on the books.

Pupil’s Book

The pupil’s book is not a work book. Therefore, learners need to have an exercise book for their work.

The illustrations in the frame are for both the learner and teacher’s reference. These can also be used to enhance support from home.

There are 55 lessons for term one, 55 for term two and 40 for term three.

The Teacher’s guide

Preliminary pages in the teacher’s guide have information on the CBC aspects. The lessons in each sub-strand are distributed across the year for the learner to continue interacting with the same concept.
Checklist for a lesson (20 Min: 11.10-11.30)

Ask the following question:
How do you infuse CBC aspects when teaching mathematics lessons?

The teacher’s guide outlines the skill to be developed in each lesson. However, the teacher is required to bring out CBC aspects during the lesson. These aspects are:
Core competencies, Pertinent and contemporary issues, Values, Links to other learning areas, Suggested non-formal activities to support learning, Suggested community service learning and Suggested assessment.

Prepare the following flip charts:

Checklist

- Core competencies
- Pertinent and contemporary issues
- Values
- Links to other learning areas
- Suggested non-formal activities to support learning
- Suggested community service learning
- Suggested assessment

Core competences

- Communication and collaboration
- Critical Thinking and Problem Solving
- Creativity and Imagination
- Citizenship
- Digital Literacy
- Learning to Learn
- Self-efficacy
Values

- Love
- Responsibility
- Respect
- Unity
- Peace
- Patriotism
- Social Justice
- Integrity

Pertinent and contemporary issues (PCI)

- Citizenship
- Health Education
- Life Skills and Values Education
- Education for Sustainable Development (ESD)
- Learner Support programmes
- Community Service learning
- Parental Empowerment and Engagement

Tell the participants that during the modelling of a lesson the CBC aspects should be infused. Ask participants to be giving feedback starting with what went on well and what needs to be improved.
Operations: Number Family (70 Min: 11.30 am-12.40 pm)

Introduction (10 Minutes; 11.30 -11.40am)

Learning Outcomes

By the end of the session the participant should be able to

- Teach the relationship between addition and subtraction through number families
- Infuse CBC aspects

Ask the participants the following questions:

- How do you teach the relationship between addition and subtraction?
- What is a number family?
- What is a number fact family?
- Why is teaching number family important?

A number family is made up of 3 numbers. The 3 numbers can be used to make up a number fact family. Knowing one fact can help learners get other facts. For example, facts that can be made with 3,4,7 are:

<table>
<thead>
<tr>
<th>Addition Facts</th>
<th>Subtraction fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 + 4 = 7</td>
<td>7 – 3 = 4</td>
</tr>
<tr>
<td>4 + 3 = 7</td>
<td>7 – 4 = 3</td>
</tr>
</tbody>
</table>

The addition facts together with the subtraction facts form a fact family.

Subtraction facts are harder for the learners to learn than addition facts. If the learners learn the importance of the relationship between addition and subtraction, subtraction facts become much easier.
### Task 1 Trainers activities: Number family  
*(10 Min: 11.40-11.50am)*

Model the facts of the number family of 2, 3, 5 *(the trainer may use numeral cards)*

During the lesson, infuse CBC aspects. Ask participants to give feedback using the checklist. Ensure that when giving feedback, participants start with what went on well in the presentation before they discuss areas of improvement.

1. Write $2 + 3 = 5$ and $3 + 2 = 5$
   - Discuss with the participants that the two facts have the same 3 numbers.
   - The numbers 2 and 3 are in both facts but the order is different.

2. Write $5 - 2 = 3$ and $5 - 3 = 2$
   - Discuss with the participants that the largest number comes first on both facts. Also numbers 2, 3, 5 are in both facts.
   - Tell the participants that the four facts make a fact family as
   
   $\begin{align*} 
   2 + 3 &= 5 & 3 + 2 &= 5 \\
   5 - 2 &= 3 & 5 - 3 &= 2 
   \end{align*}$

Tell participants that 2, 3, 5 make a Number family

### Task 2 Participants activity: Number Family  
*(20 Min: 11.50-12.10am)*

Ask participants to model the following activity to their partner or groups.

<table>
<thead>
<tr>
<th>Participant’s Activity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Model the facts of the number family of 4, 5, 9</td>
<td></td>
</tr>
<tr>
<td><em>Ask participants to infuse CBC aspects.</em></td>
<td></td>
</tr>
</tbody>
</table>
Task 3 Presentation: Number Family
(30 Min: 12.10-12.40 pm)
Ask two participants to model the facts of the number family of 4, 5, 9 while the rest give feedback referring to the checklist. Ensure that when giving feedback, participants start with what went on well in the presentation before they discuss areas of improvement.

Operations: Multiplication as Repeated Addition
(70 Min: 12.40 pm-2.50 pm)

Introduction (10 Min: 12.40 – 12.50 pm)
Learning outcome
By the end of the session, the participant should be able to:
- Teach multiplication as repeated addition
- Infuse CBC aspects

Ask participants the following questions:
- What is Multiplication?
- What are the strategies that can be used to teach multiplication?
- What is the importance of teaching multiplication as repeated addition?

Multiplication is the process of adding a number to itself a certain number of times. Learners need to understand multiplication as repeated addition. They need to add repeatedly to work out multiplication tasks.
TASK 1 Trainer’s activity: Multiplication as repeated addition
(10 Min: 12.50 - 1.00 pm)

<table>
<thead>
<tr>
<th>Trainer’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work out:</td>
</tr>
<tr>
<td>3x5=__</td>
</tr>
<tr>
<td>Show participants that 3x5 is 3 “fives”</td>
</tr>
<tr>
<td>Model the multiplication as repeated addition: 3 groups with 5 objects each.</td>
</tr>
<tr>
<td>5 + 5 + 5 = 15</td>
</tr>
<tr>
<td>3 x5 which is 3 “fives”, is same as 5+5+5=15</td>
</tr>
<tr>
<td>Therefore, 3 x 5=15</td>
</tr>
</tbody>
</table>

Work with participants to model the multiplication:

5x3=__

5 groups with 3 objects each

During the lesson, infuse CBC aspects.

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Health Break (60 Min: 1.00-2.00pm)
TASK 2 Participant’s activity: Multiplication

(20 Min: 2.00-2.20 pm)

Ask participants to model the following activity to their partner:

<table>
<thead>
<tr>
<th>Participant’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model multiplication as repeated addition:</td>
</tr>
<tr>
<td>1) 2 x 3 as 2 groups with 3 objects each</td>
</tr>
<tr>
<td>2) 5 x 2 as 5 groups with 2 objects each</td>
</tr>
<tr>
<td>Ask participants to infuse CBC aspects.</td>
</tr>
</tbody>
</table>

TASK 3 Presentation: Multiplication as repeated addition

(30 Min: 2.20-2.50pm)

Ask two participants to model the multiplication as repeated addition while the rest give feedback. Ensure that when giving feedback, participants start with what went on well in the presentation before they discuss areas of improvement. When they are presenting it is an opportunity for them to enhance their self-efficacy and communication skills.

Subtraction by breaking apart strategy

(70 Min: 2.50 pm-4.00 pm)

Introduction (10 Min: 2.50-3.00pm)

Learning outcomes

By the end of the session the participant should be able to:

- teach subtraction by breaking apart
- infuse CBC aspects
Ask the following questions to the participants:

1. What are the strategies of teaching subtraction?
2. What is subtraction by breaking apart?
3. How do you break numbers apart?
4. How does this strategy help learners to subtract?

Tell participants that the breaking apart strategy ensures that the second number is broken down to create a ten in the first number. We break the second number to create two numbers. The first number is the same as the number in the ones place value of the first number. The second number is what remains when the ones digit in the first number is taken away from the minuend. The remaining number is subtracted from the tens that has been created. Working with tens is much easier for learners. Breaking apart strategy helps to avoid “borrowing” which confuses learners.

Emphasize that it is always easy to work with a ten when subtracting.

**TASK 1 Trainer’s Activity: Subtraction by breaking apart strategy**

(10 Min: 3.00-3.10pm)

<table>
<thead>
<tr>
<th>Trainer’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work out 12-7=___ by breaking apart.</td>
</tr>
<tr>
<td>12-7= 12-<strong>-</strong></td>
</tr>
<tr>
<td>12 - 2 – 5 = 5</td>
</tr>
</tbody>
</table>

During the lesson, infuse CBC aspects.
TASK 2 Participants activity: Subtraction by breaking apart strategy
(20 Min: 3.10-3.30pm)
Ask participants to practice Subtraction by breaking apart strategy with their partner.

<table>
<thead>
<tr>
<th>Participant’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work out 12-6= __ and 51-7= __ by breaking apart.</td>
</tr>
<tr>
<td>Ask participants to infuse CBC aspects.</td>
</tr>
</tbody>
</table>

TASK 3 Presentation: Subtraction by breaking apart strategy
(30 Min: 3.30-4.00 pm)
Ask two participants to model subtraction using breaking apart strategy in subtraction while the rest give feedback using the checklist. Ensure that when giving feedback, participants start with what went well in the presentation before they discuss areas of improvement.

Fractions: Quarter and Eighth as Part of a group
(70 Min 4.00 pm-5.10 pm)
Introduction (10 min: 4.00-4.10pm)
Learning Outcomes
By the end of the session the participant should be able to
- teach fractions as part of a group
- infuse CBC aspects
Ask the following questions to the participants:

1. What are the strategies of teaching the meaning of a fraction?
2. How can you represent a fraction as part of group?
A fraction is introduced as a part of a whole or part of a group.
TASK 1: Trainer’s activity: Part of a group
(10 Min: 4.10 pm- 4.20 pm)

Trainer’s Activity

Demonstrate to participants a quarter as part of a group of 16 objects

Example

Whole group of 16 objects

We have a group of 16 objects

- Put them into 4 equal groups
- There are 4 groups.
- One group is shaded.
- The shaded group is a quarter; a quarter of 16 objects is 4 objects.
- A quarter of 16 objects is 4 objects

During the lesson, infuse CBC aspects.
**TASK 2 Participants activity: Quarter and Eighth as part of a group**

(20 Min: 4.20- 4.40 m)

Ask participants to model the following activity to their partner.

<table>
<thead>
<tr>
<th>Participants’ Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate eighth of a group of 24 objects</td>
</tr>
<tr>
<td>Example:</td>
</tr>
<tr>
<td>What is an eighth of 24?</td>
</tr>
</tbody>
</table>

Whole group of 24

An eighth of 24 is 3

During the lesson, infuse CBC aspects.

**Task 3 Presentation: Fraction: Quarter and Eighth as part of a group**

(20 Min: 4.40- 5.10 pm)

Ask 2 participants to model the activity on fraction using a group of 20 objects.

Allow feedback from the plenary using the checklist. When giving feedback, ensure that participants start with what went on well in the presentations before they can talk about areas of improvement.

**Homework**

Refer participants to appendix 3.

Ask them to work in groups to model the activity.
Day 2

Welcome and Announcements
(15 Min 8:15 am-8:30 am)

Welcome participants to day 2 of training.
Post and Review the agenda. Make any announcements.
Remind the participants to sign the participants’ attendance list in the morning and afternoon.

Geometry: Patterns using shapes
(70 Min: 8.30 -9.40am)

Introduction (10 Min: 8.30-8.40am)

Learning Outcomes
By the end of the session the participant should be able to
- teach how to make patterns using shapes
- infuse CBC aspects.

Ask participants the following questions:

1. Why is learning patterns important?
2. What strategies can we use to teach patterns?

Tell participants that the next concept they are going to learn is patterns. A pattern is an arrangement of items following a certain rule. Emphasize that patterns help us in developing the ability of sequencing. It helps learners to learn how to predict and solve tasks based on a certain rule.
**TASK 1 Trainer’s activity: Patterns using shapes**

*(10 Min: 8.40-8.50am)*

<table>
<thead>
<tr>
<th>Trainer’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make a pattern using rectangular, triangular and circular shapes,</td>
</tr>
<tr>
<td>Example:</td>
</tr>
<tr>
<td>🟠 □ △ 🟠 □ △ 🟠 □ △</td>
</tr>
<tr>
<td>Explain to the participants the rule of the pattern. (<em>the trainer may colour the pattern to make them more attractive)</em></td>
</tr>
<tr>
<td>During the lesson infuse CBC aspects.</td>
</tr>
</tbody>
</table>

Ask participants to give feedback after the lesson following the checklist.

**TASK 2 Participants activity: Making patterns using shapes**

*(20 Min: 8.50-9.10am)*

Ask participants to practice teaching the following lesson activities to their partner.

<table>
<thead>
<tr>
<th>Participants’ Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make a pattern using rectangular, triangular and circular shapes. Explain to the partner the rule of the pattern</td>
</tr>
<tr>
<td>During the lesson infuse CBC aspects.</td>
</tr>
</tbody>
</table>

Ask the participants to take turns as the teacher and the learner. Correct any error while giving formative feedback.
Task 3: Presentation (30 Min: 9.10- 9.40am)
Ask two Participants to model making patterns using rectangular, triangular and circular cut-outs.

Allow feedback from the plenary using the checklist. When giving feedback, ensure that participants start with what went on well in the presentations before they can talk about areas of improvement.

Operations: Addition by regrouping using place value apparatus (70 Min: 9.40- 10.50am)

Introduction (10 Min: 9.40-9.50am)

Learning outcomes
By the end of the session, participants should be able to:
- teach addition by regrouping.
- infuse CBC aspects

Ask participants the following questions:

1. What strategies are used in teaching addition?
2. Which place value apparatus can we use in addition by regrouping?
3. How do you teach addition by regrouping?

Regrouping is used to describe the process of changing groups of ones into tens, tens into hundreds and vice versa. Regrouping is used in addition and subtraction of numbers.
TASK 1 Trainer’s activity: Operations: Addition by Regrouping
(10 Min: 9.50- 10.00 am)

Trainer’s Activity 1

Addition using Place Value Tins

27 + 35 = ___
- Place 7 sticks in the ones Tin and 2 sticks in the tens tin to represent 27
- Place 5 more sticks in the ones tin and 3 more sticks in the tens tin
- Since there are 12 sticks in the ones tin, remove 10 sticks from the ones tin and place 1 stick in tens tin.
- There are 2 sticks in the ones tin and 6 sticks in the tens tin.
Therefore 27 + 35 = 62

Trainer’s Activity 2

Addition using Place Value Table

38 + 42 = ___
- Write 38 + 42 as ones and tens on a place Value Table

\[
\begin{array}{c|c}
\text{Tens} & \text{Ones} \\
3 & 8 \\
+ 4 & 2 \\
\end{array}
\]
- Add 8 ones to 2 ones to get 10 ones
- Regroup 10 ones as 1 ten and 0 ones, write 0 in the ones place value and carry 1 ten.
- Add the carried 1 ten to 3 tens and to 4 tens to get 8 tens
- Write 8 in the Tens Place Value

\[
\begin{align*}
38 \\
+ 42 \\
\hline
80
\end{align*}
\]

During the lesson, infuse CBC aspects.
TASK 2 Participants activity: Addition by Regrouping  
(20 Min: 10.00-10.20am)  
Ask participants to model the following activity to their partner.

<table>
<thead>
<tr>
<th>Participant’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work out:</td>
</tr>
<tr>
<td>1. 18+24=__ (using place value tins)</td>
</tr>
<tr>
<td>2. 56+37=__ (using place value table)</td>
</tr>
<tr>
<td>Ask participants to infuse CBC aspects</td>
</tr>
</tbody>
</table>

Task 3: Presentation (30 Min: 10.20-10.50am)  
Ask two Participants to model the activity in task two above.  
Allow feedback from the plenary using the checklist. When giving feedback, ensure that participants start with what went on well in the presentations before they can talk about areas of improvement.

Health Break (30 Min: 10.50-11.20am)  

Subtraction by Regrouping  
(70 Min: 11.20-12.30pm)  

Introduction (10 Min: 11.20-11.30am)  

Learning Outcomes  
By the end of the session, participants should be able to:  
- teach Subtraction by regrouping.  
- infuse CBC aspects  
Ask the following questions to the participants:

| 1. What strategy do you use to teach subtraction?  
| 2. How do you teach subtraction by regrouping?  
|
While teaching subtraction by regrouping, a teacher could ask the learners to carry out simple subtractions.

**TASK 1 Trainer’s Activity: Subtraction by regrouping**  
*(10 Min: 11.30-11.40am)*

Model an activity Subtraction by regrouping

<table>
<thead>
<tr>
<th>Trainer’s Activity 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subtraction using abacus</strong></td>
</tr>
<tr>
<td>Work Out 42-18=___</td>
</tr>
</tbody>
</table>

Put 2 bottle tops on the ones spike and put 4 bottle tops ten spike to represent 42.

Remove 8 bottle tops from the two bottle tops the ones spike. It is impossible

Since 1 ten represents 10 ones.

Remove 1 bottle top from the tens spike and put 10 bottle tops on the ones spike

There are 12 bottle tops on the ones spike, remove 8 bottle tops and remove 1 bottle top from the remaining 3 on the tens spike.

There are 4 bottle tops on the ones spike and 2 bottle tops on the tens spike 42 -18 =24

<table>
<thead>
<tr>
<th>Trainer’s Activity 2</th>
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<tbody>
<tr>
<td><strong>Subtraction Using Place Value Table</strong></td>
</tr>
<tr>
<td>82-47=___</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
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</thead>
<tbody>
<tr>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>-4</td>
<td>7</td>
</tr>
</tbody>
</table>

- Subtract 7 ones from 2 ones. Since we cannot subtract 7 from 2, regroup 8 tens as 7 tens and 10 ones
- Add 10 ones to 2 ones to get 12 ones and subtract 7 ones from 12 ones to get 5 ones
- Write 5 in the ones, Place Value
- Subtract 4 tens from the remaining 7 tens to get 3 tens.
- Write 3 in the tens place value

Therefore

<table>
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<tr>
<th>Tens</th>
<th>Ones</th>
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</thead>
<tbody>
<tr>
<td>8</td>
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<tr>
<td>- 4</td>
<td>7</td>
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<tr>
<td>3</td>
<td>5</td>
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</tbody>
</table>

During the lesson, infuse CBC aspects.

**TASK 2 Participants’ activity: Subtraction by regrouping**

*(20 Min: 11.40-12.00noon)*

Ask the participants to practice in pairs to work out Subtraction by regrouping.

<table>
<thead>
<tr>
<th>Participant’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work out:</td>
</tr>
<tr>
<td>1. 80-34=___ (using abacus)</td>
</tr>
<tr>
<td>2. 275-82=___ (using place value table)</td>
</tr>
</tbody>
</table>

Ask participants to infuse CBC aspects.

**Task 3: Presentation (30Min: 12.00-12.30pm)**

Ask two Participants to model the activity in task two above.

Allow feedback from the plenary using the checklist. When giving feedback, ensure that participants start with what went on well in the presentations before they can talk about areas of improvement.

This activity is likely to promote self-efficacy.
Operations: Division as equal sharing (70 Min: 12.30 -2.40pm)

Introduction (10 Min: 12.30-12.40pm)

Learning Outcomes

By the end of the session, participants should be able to:
- teach division as equal sharing.
- infuse CBC aspects

Ask the following questions to the participants:

1. What strategies can you use to teach division?
2. How do you teach division as equal sharing?

Division is one of the basic operations on numbers. Division involves calculating the number of times one number is contained in another number.

Division may be introduced as equal sharing and as repeated subtraction (equal grouping).

**Task 1: Trainers activity: 10 Min (12.40-12.50pm)**

Model a lesson on division as equal grouping

**Division as equal grouping**

<table>
<thead>
<tr>
<th>Trainer’s Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12÷3=___</td>
</tr>
<tr>
<td>• Count 12 bottle tops</td>
</tr>
<tr>
<td>• Put them into equal groups of 3 bottle tops each</td>
</tr>
<tr>
<td>• Count the number of groups</td>
</tr>
</tbody>
</table>
24÷4=____
- Count 24 objects
- Put them into equal groups of 4 objects each
- Count the number of groups

During the lesson infuse CBC aspects.

Task 2: Participants’ Activity: 20 Min :(12.50-1.10pm)

Ask the participants to practice the following activity using equal grouping with their partners:

Participants’ Activity:
Work out:
1. 12÷4=____
2. 24÷6=____

During the lesson infuse CBC aspects

Health Break (60 Min: 1.10-2.10pm)

Task 3 Presentation: (30 Min: 2:10 pm-2:40pm)

Ask two participants to model an activity on division as equal grouping at plenary. Allow feedback from plenary on how well the teachers used to help learners understand how to divide numbers using equal grouping. When giving feedback, ensure that participants start with what went on well in the presentations before they can talk about areas of improvement.
Measurement: Measuring capacity  
(70 Min 2.40 am-3.50 pm)

Introduction (10 Min: 2.40-2.50pm)

Learning outcomes

By the end of the session, participants should be able to:

- teach capacity.
- infuse CBC aspects

Ask participants the following questions:

1. What is capacity?
2. Why do we teach capacity?
3. How do you teach the concept of capacity?

Tell participants that capacity is the amount that a container can hold. Teaching capacity helps learners to develop appropriate language at an early stage. Vocabulary such as full and empty should then be followed by holds more, holds less and holds same as when direct comparison is introduced. Children can develop estimation skills by trying to estimate capacities of several containers.

**TASK 1 Trainer’s Activity:**
(10 Min: 2.50-3.00pm)

**Model**

**Trainer’s Activity 1**

**Measurement: Comparing Capacity**
- Using containers of different capacities, show how to identify which container holds more through emptying and filling activities.
- Work with learners to practice emptying and filling with different containers to identify which container holds more, less or same as.

**Trainer’s Activity 2**

**Measurement: Measuring capacity**
- Show pupils how to measure how much a container can hold by filling and emptying a bigger container using a smaller containers (cups, glasses, bottles, tins/cans)

Show the pupils how to write the capacity of the bigger container by counting
the number of smaller containers (cups, glasses, bottles, tins/cans) that fill the bigger container.

• Work with the pupils to measure the capacity of a bigger container using smaller containers by filling and emptying. Emphasize that the amount the bigger container holds is the number of the smaller containers that fills or completely empties the bigger container. Draw a few illustrations on the board to show how many smaller containers are needed to fill a bigger container. During the lesson infuse CBC aspects

Task 2: Participants’ Activity: 20 Min (3.00-3.20pm)

Ask the participants to practice the following activity on comparing capacity:

Participants’ Activity:
Ask participants to model the activities in task 1 above in groups. During the lesson infuse CBC aspects

Task 3 Presentation: Measurement: Capacity

(30 Min: 3.20-3.50pm)

Ask 2 participants to model an activity on measuring capacity in the plenary. Allow feedback from plenary on how well the teachers helped learners understand how to compare capacity and how to measure capacity using arbitrary units. When giving feedback, ensure that participants start with what went on well in the presentations before they can talk about areas of improvement.

Full Lesson: (60 Min: 3.50pm-4.50pm)

Prepare and present a full CBC lesson on division.
Appendix 1: Sample of Mathematics Activities Curriculum Design

ESSENCE STATEMENT
Numeracy is a foundational skill that prepares the learner for number work, Mathematics in higher levels of schooling and mathematical approaches in all aspects of life. Numeracy activities involve identification and value placement of mathematical numerals, basic mathematical operations as well as measuring and describing shapes.

GENERAL LEARNING OUTCOMES
By the end of Early Years Education, the learner should be able to:

1) demonstrate mastery of number concepts by working out problems in day to day life,
2) apply measurement skills to find solutions to problems in a variety of contexts,
3) describe properties of geometrical shapes and spatial relationships in real life experiences.

GRADE ONE

<table>
<thead>
<tr>
<th>Strand</th>
<th>Sub-Strand</th>
<th>Specific Learning Outcomes</th>
<th>Suggested Learning Experiences</th>
<th>Key Inquiry Question(s)</th>
</tr>
</thead>
</table>
| 1.0 Numbers | 1.1 Number Concept (20 lessons) | By the end of the sub-strand, the learner should be able to:  
a) sort and group objects according to different attributes within the classroom,  
b) pair and match objects in the environment,  
c) order and sequence objects in ascending and descending order,  
d) make patterns using real objects,  
e) recite number names in order up to 50,  
f) represent numbers 1-30 using concrete objects,  
g) demonstrate through counting that a group in all situations has only one count, | • Learners in pairs/groups to collect different types of safe objects.  
• Learners in pairs/groups to sort objects with same attribute and group them together.  
• Learners to play digital games involving sorting and grouping according to different attributes.  
• Learners in pairs/groups to pair and match objects to establish “equal to”, “more than” and “less than.”  
• Learners to order objects according to size from smallest to biggest and vice versa.  
• Learners to make patterns using real objects.  
• Learners to recite number names up to 50.  
• Learners to represent numbers 1-30 using concrete objects as well as their body parts.  
• Learners to demonstrate that any given group has only one count.  
• Learner in pairs/groups to | 1) How can we find out which group has more objects than another?  
2) How can we group items?
h) appreciate the use of sorting and grouping items in day to day activities.

- collect and sort litter in the environment and put it in various groups according to an attribute of their choice and give reasons for the grouping.
  - Learners in pairs/groups could assist in arranging, edible items like fruits, cabbages according to size and colour in the school store.
  - Learners could visit a market for them to observe the sorting and grouping of fruits and vegetables.

**Core Competences to be developed:** learning to learn, communication and collaboration, imagination and creativity, digital literacy, critical thinking and problem solving.

**Link to PCI’s:**
**Life skills:** self-awareness and self-esteem- when using body parts in counting.
**ESD: DRR:** safety- when collecting items and litter in the environment, environmental awareness- don’t litter the environment.

**Link to Values:**
- responsibility
- unity

**Link to other learning areas:**
- Environmental activities
- Religious activities
- Language activities

**Suggested Community Service Learning Activities:** learners to assist in collecting and sorting litter in their locality and observe how it is disposed.

**Suggested non-formal activity to support learning:** learners to count trees in the school compound.

**Suggested assessment:** oral questions, written exercise, observation.

### Assessment Rubrics

<table>
<thead>
<tr>
<th>Exceeds expectations</th>
<th>Meets expectations</th>
<th>Approaches expectations</th>
<th>Below expectations</th>
</tr>
</thead>
</table>
Appendix 2: Sample lesson from Teacher’s Guide

FRACTIONS

Time - 4 lessons

Background Information

In this sub strand learners will be introduced to a fraction as part of a whole and as part of a group. Learners may, however, have experiences from home where they have shared whole items like fruits, sweets or even bread.

It is from this background that the teacher can introduce a half (½), a quarter (¼) and an eighth (⅛) as part of a whole using items like an orange, piece of stick, loaf of bread, circular and rectangular cut-outs. In introducing fractions as part of a group the teacher may use items like pebbles, marbles, sticks, bottle tops or any other safe type of counter. Knowledge of division, sorting and grouping acquired in earlier grades will be useful in this sub strand.

Learners are expected to work in pairs or groups in order to learn from each other which would lead to the development of some of the basic education curriculum core competencies. The teacher should bring out the various components in the curriculum designs. These components include but not limited to discussing issues like safety of materials being used (PCIs), values that can be nurtured for example unity, respect, patriotism and responsibility among others. The teacher should also involve learners in non-formal activities including sharing edible food items in halves and quarters in school. The teacher may also discuss how the concept on fractions is linked to Language and Hygiene and nutrition activities. Learners may assist in sharing items in halves and quarters in community functions as a way of promoting learning outside the school.

Week 3 Lesson 1

FRACTIONS

Eighth as Part of a Whole

Specific Lesson Learning Outcomes

By the end of the lesson the learner should be able to identify an eighth
as part of a whole.

**Learning Resources**
- Manila Cutouts
- pairs of scissors

**Key Inquiry Question**
How do we represent an eighth of a whole?

**Learning Activities**
1. Guide learners in pairs or in groups to cut rectangular cutouts. Discuss the safety measures when handling sharp objects.
2. Learners in pairs or groups to discuss how to get 1/8 of a cutout.
3. Guide learners to fold the rectangular cutouts into 8 equal parts and identify one part as a ⅛ of the whole.
4. Using the example in the learner’s book page 111, guide learners to identify ⅛ as part of a whole.
5. Learners to play digital games involving fractions.

**Work to do**
Learners to work out questions from the Learner’s book page 111.

---

**Week 3 Lesson 2**

**FRACTIONS**

**Comparing a Quarter and an Eighth**

**Specific Lesson Learning Outcome**
By the end of the lesson the learners should be able to compare a quarter and an eighth as part of a whole.

**Learning Resources**
- Manila cutouts,
- Pair of scissors.

**Key Inquiry Question**
How do we compare ¼ and ⅛ of a whole?
Appendix 3:

# DIVISION

## Week 8 Lesson 1

### Dividing numbers

#### Multiplication table

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<td>45</td>
<td>54</td>
<td>63</td>
<td>72</td>
<td>81</td>
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</tbody>
</table>

#### Example 1

18 ÷ 6 = 

From 18 move up to find 6 in the first row.

From 18 move across to find 3 in the first column.

18 ÷ 6 = 3

#### Example 2

15 ÷ 3 = 

From 15 move up to find 3 in the first row.

From 15 move across to find 5 in the first column.

15 ÷ 3 = 5
Work to do
Divide

1. \[ 9 \div 3 = \square \]

2. \[ 10 \div 2 = \square \]

3. \[ 12 \div 6 = \square \]

4. \[ 16 \div 8 = \square \]

5. \[ 18 \div 9 = \square \]

6. \[ 20 \div 4 = \square \]

7. \[ 25 \div 5 = \square \]

8. A mother shared 24 oranges equally among 4 children. How many oranges did each child get?

9. A class teacher shared 18 pencils between 3 groups of learners. How many pencils did each group get?

10. A farmer put 15 water melons into 3 baskets equally. How many water melons were put in each basket?
Appendix 4:

Week 8 Lesson 2

Dividing numbers

**Multiplication table**

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<td>60</td>
<td>70</td>
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</tbody>
</table>

**Example**

72 ÷ 8 = __________ 

From 72 move up to find 8 in the first row.

72 ÷ 8 = __________ 

From 72 move across to find 9 in the first column.
Work to do

Divide

1. \( 72 \div 9 = \)  
2. \( 90 \div 10 = \)  
3. \( 14 \div 7 = \)  
4. \( 15 \div 5 = \)

5. \( 21 \div 7 = \)  
6. \( 27 \div 3 = \)  
7. \( 36 \div 6 = \)

8. Bakari had 36 mathematics books. He shared equally among 9 groups in his grade. How many did each group get?

9. Wavinya had 64 rubbers. She shared equally among 8 of her friends. How many did each friend get?

10. A shopkeeper had 72 bags of rice. He shared them equally among 8 other shopkeepers. How many bags did each shopkeeper get?