

Math Intervention

TRAINER'S MANUAL

FOR MANAGERS TO TRAIN SHLS
LEADERS AND FACILITATORS

SAFE HEALING AND
LEARNING SPACES TOOLKIT



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For more information about the Safe Healing and Learning Spaces Toolkit, please contact the IRC at children@rescue.org. To download the resources in the SHLS Toolkit, please go to SHLS.rescue.org.

DISCLAIMER

The content and conclusions in the Safe Healing and Learning Spaces Toolkit are those of the authors and do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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Introduction

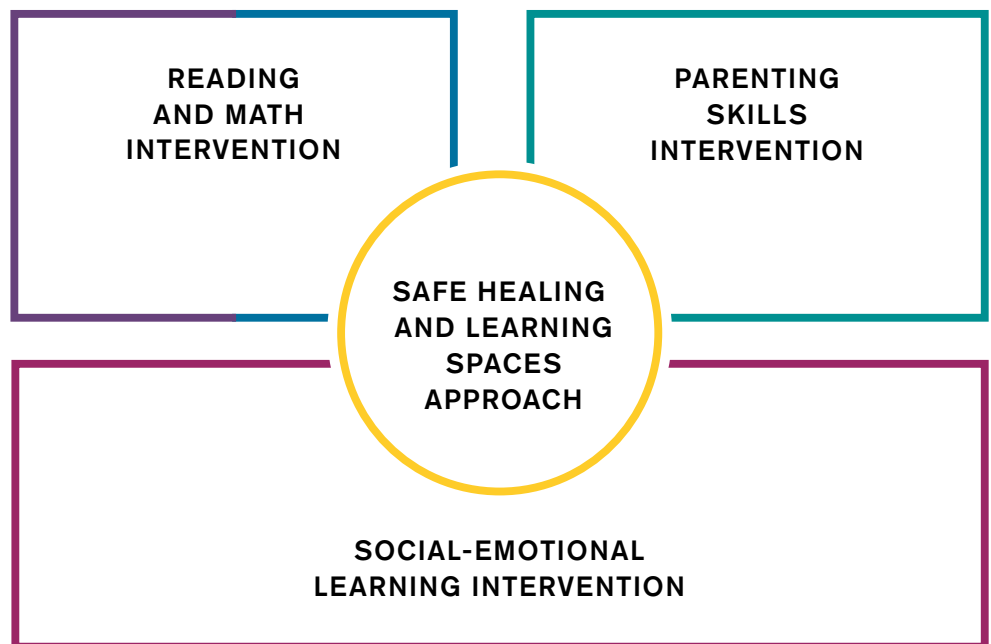
Welcome to the *Safe Healing and Learning Spaces* Math Trainer's Manual!

This resource is to be used by a trainer to train Facilitators to deliver the Math Intervention in a Safe Healing and Learning Space (SHLS). It is designed to be used with the SHLS Math Trainee's Handbook.

This manual contains 3 parts:

- Part 1: Information for the trainer to understand the content and prepare for the training
- Part 2: Scripted Math Training sessions
- Part 3: Math Training resources

The Reading and Math Intervention is one of the 4 components of the SHLS Toolkit. As illustrated in the diagram below, the SHLS Approach, the Social-Emotional Learning Intervention, the Parenting Skills Intervention, and the Reading and Math Intervention are complementary and contribute to the overarching goal, that **children are safe, well and learning in emergencies**.



PART 1

Information for the Trainer

The first part of the Math Trainer's Manual provides you, the trainer, with information needed to understand the math content and to train Math Facilitators on how to deliver it. It is divided into 3 sections:

- 1 Background Information** – This section provides information about the concept and competencies of math.
- 2 Understanding the Tools** – This section provides information about the structure of the SHLS Math tools – the Math Trainer's Manual and the Math Lesson Plan Bank.
- 3 Delivering the Math Training** – This section provides guidance on how to prepare for and deliver the training with fidelity.



1

Background Information

What are the Competencies of Math?

Math develops students' ability to master numbers and the application of numbers using operations, understand measurement, develop spatial sense and explore basic geometric figures. The primary goal of the math component is for students to develop problem-solving skills through analysis and reasoning. Learning math is important for several reasons – it predicts students' academic success,¹ increases intelligence,² develops mathematical thinking and problem solving skills,³ and builds students' self-confidence.⁴ Math skills are divided into 4 'Math Competencies' that form the foundation of early math learning.⁵ Below is a brief definition of each competency. Math Facilitators in your training will also learn about these competencies and see how they relate to the teaching of math in the SHLS.

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2. Dweck, C. 2012. Mindset: How you can fulfil your potential. Constable & Robinson Ltd.
3. Clements, D.H. and Sarama, J. 2009. Learning and teaching early math: The learning trajectories approach. New York, NY: Routledge; Clements D.H. and Sarama J. 2009. Early childhood mathematics education research: Learning trajectories for young children. New York, NY: Routledge; Carpenter, T.P., Fennema, E. and Franke, M.L. 1996. Cognitively guided instruction: A knowledge base for reform in primary mathematics instruction. *The Elementary School Journal*. 97:1, 3–20; Carpenter, T.P., Fennema, E., Peterson, P.L., Chiang, C.P., and Loef, M. 1989. Using knowledge of children's mathematics thinking in classroom teaching: An experimental study. *American Educational Research Journal*. 26(4), 499–531
4. Dweck, C. 2012. Mindset: How you can fulfil your potential. Constable & Robinson Ltd.; Dickerson, A.P., McIntosh, S. and Valente, C. 2013. Do the maths: An analysis of the gender gap in mathematics in Africa. Discussion paper series, Forschungsinstitut zur Zukunft der Arbeit. No. 7174.
5. UNESCO and Center for Universal Education at Brookings Institute. 2013. Toward universal learning: What every child should learn. Retrieved from: www.brookings.edu/~media/Research/Files/Reports/2013/02/learning-metrics/LMTFRpt1TowardUnivrsLearng.pdf?la=en; Common Core State Standards Initiative. 2012. Common Core State Standards for Mathematics. Retrieved from www.corestandards.org/wp-content/uploads/Math_Standards.pdf.



- 1. Number Sense** – This competency develops the verbal counting sequence. Number words are tied to objects as students mentally connect each number word in one-to-one correspondence with an object. Other important aspects of counting include knowing the next number in a sequence and comparing quantities.
- 2. Operations** – This competency involves the manipulation of objects to join them together (addition) or take them apart (subtraction). For example, “We have 3 girls and 4 boys in our group. How many students do we have altogether?” Subtraction for young students is a separation activity. For example: “If you have 5 blocks and you give me 2, how many will you have left?” It also includes multiplication and division.
- 3. Measurement and Data** – This competency introduces students to the use of non-standard measurement tools to understand length, height, weight and volume. Later, they can use standard tools such as rulers and scales to measure precisely. They also learn to collect, sort and represent data and make decisions.
- 4. Geometry** – This competency includes shape recognition and naming. For example, “That’s a triangle.” Spatial sense involves knowing location, distance and direction using terms such as ‘over’, ‘under’, ‘above’, ‘below’, and so on.



Math Competencies

NUMBER SENSE

To recognize numbers, identify their relative values, count, order, measure and estimate

Emerging

- Count up to 100
- Recognize numbers up to 100
- Read and write numerals up to 100 with corresponding words
- Count forward and backward within 100, starting at any number less than 100
- Understand the hundreds, tens and ones place values
- Use concrete objects and pictorial representation to compare, order and estimate
- Predict what comes next in a number pattern
- Skip count by 10s to 100

Developing

- Count up to 1,000
- Recognize numbers up to 1,000
- Read and write numerals up to 1,000 with corresponding words
- Understand the thousands, hundreds, tens and ones place values
- Use concrete objects and pictorial representation to compare, order and estimate
- Compare 3-digit numbers using the symbols $<$, $>$ and $=$
- Predict what comes next in a number pattern
- Skip count by 2s, 5s, 10s and 100s

OPERATIONS

To manipulate numbers using mathematical processes such as addition, subtraction, multiplication and division

Emerging

- Add and subtract within 100 using concrete objects or images with band of 10 or number bonds
- Solve 1-step word problems using addition or subtraction
- Recognize and use plus (+), minus (−) and equals (=) symbols appropriately
- Add and subtract within 100 using standard way in vertical columns
- Understand and apply properties of operations and the relationship between addition and subtraction
- Work with equal groups of objects (foundations for multiplication)
- Recognize concepts of multiplication
- Recognize and use multiply ($\times$) symbol appropriately
- Multiply up to 10
- Multiplication table and mental calculation of multiplying by 2, 3, 5 and 10
- Solve 1-step word problems with multiply using picture representation

Money

- Recognize coins or bills/notes within 100
- Count an amount of money within 100
- Compare amounts of money
- Solve 1-step addition or subtraction word problems involving money set in real life



OPERATIONS

To manipulate numbers using mathematical processes such as addition, subtraction, multiplication and division

Developing

- Add and subtract within 1,000, without regrouping, using number bonds or place value chart
- Add and subtract within 1,000, with regrouping, using number bonds or place value chart
- Solve 1-step and 2-step word problems using addition or subtraction
- Solve word problems that call for adding 3 whole numbers whose sum is less than or equal to 20
- Add and subtract within 1,000 using standard way in vertical columns
- Use mental calculation to find 10 more or 10 less than a 2-digit number, one more or one less than a 2-digit number
- Develop fluency with addition facts
- Introduce concepts of multiply and divide
- Multiply up to 10 and beyond
- Multiplication table and mental calculation of multiplying and dividing by 2, 3, 5 and 10
- Recognize and use multiply ($\times$) and divide ($\div$) symbols appropriately
- Introduce relationship between multiply and divide
- Solve 1-step word problems with multiply and divide using picture representation

Money

- Recognize coins or bills/notes within 1,000
- Count amount of money within 1,000
- Compare amounts of money
- Solve 1-step addition or subtraction word problems involving money set in real life

MEASUREMENT AND DATA

To explore concepts of measurement such as length, distance, mass and capacity and to collect, sort and represent data and make decisions

Emerging

Measurement

- Measure lengths of different objects or images of objects using non-standard measures
- Compare lengths using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than'
- Measure and compare mass using language such as 'heavy as', 'heavier than', 'as light as', 'lighter than'
- Measure and compare capacity using language such as 'weighs as much as', 'more than', 'less than'

Time

- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, week, year)
 - Identify tools that measure time (analog clock, digital clock, calendar)
 - Name the days of the week
 - Identify the time (to the nearest hour) of everyday events (lunchtime, bedtime etc.)
-



MEASUREMENT AND DATA

To explore concepts of measurement such as length, distance, mass and capacity and to collect, sort and represent data and make decisions

Emerging

Data

- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as'
- Classify objects into given categories, count the number of objects in each category and order categories based on count
- Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another

Developing

Measurement

- Measure lengths of 3 to 5 different objects or images of objects using standardized measures
- Measure, order, estimate and compare lengths using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than'
- Measure, order, estimate and compare mass using language such as 'heavy as', 'heavier than', 'as light as', 'lighter than'
- Measure, order, estimate and compare capacity using language such as 'weighs as much as', 'more than', 'less than'

Time

- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, week, year)
- Identify tools that measure time (analog clock, digital clock, calendar)
- Name the days of the week
- Identify the time (to the nearest hour and half hour)

Data

- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as'
- Classify objects into given categories, count the number of objects in each category and order categories based on count
- Organize, represent and interpret data with up to three categories
- Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another
- Represent collected data in simple picture graphs
- Read and interpret data from picture graphs



GEOMETRY

To identify characteristics, measurement, orientation, size and relationships of objects and shapes in space

Emerging

- Describe objects in the environment using names of shapes
- Describe the relative position or orientation of objects, using language such as 'on', 'under', 'over', 'in front', 'behind', 'between', 'next to', 'inside', 'outside', 'far', 'near', 'to the right of', 'to the left of'
- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color
- Build and draw shapes (circle, rectangle, square, triangle) with defining attributes
- Combine shapes to form larger shapes

Developing

- Describe objects in the environment using names of shapes
- Describe the relative position or orientation of objects, using language such as 'on', 'under', 'over', 'in front', 'behind', 'between', 'next to', 'inside', 'outside', 'far', 'near', 'to the right of', 'to the left of'
- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color
- Build and draw shapes (circle, rectangle, square, triangle) with defining attributes
- Identify, name, describe and classify: cube, cuboid, cone, cylinder and sphere



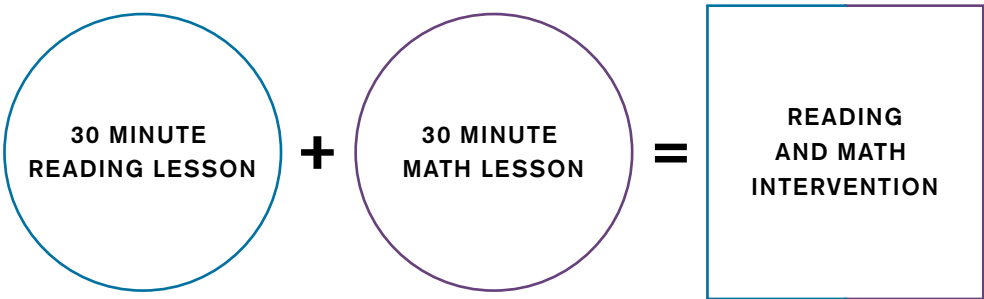
2

Understanding the Tools

The Math Intervention

Math in an SHLS is designed to develop and strengthen foundational math skills and a love for problem-solving in students and adolescents in a safe, predictable and nurturing environment. The Toolkit provides content for a **9-month intervention cycle**. It is recommended that students attend **30 minutes of Math and 30 minutes of Reading lessons, 5 times a week**.⁶

There are 2 math ability levels based on students' prior knowledge – 'emerging' and 'developing' – for which the Scope and Sequence and Math Competencies are defined. The levels are loosely based on international standards for primary level grades 1 and 2 but do not correspond exactly. The 'emerging' level includes students with little to no Number Sense, knowledge of Operations, and understanding of Measurement and Data, and spatial reasoning. The 'developing' level includes students with some Number Sense, knowledge of Operations, and understanding of Measurement and Data, and spatial reasoning. **Training and instructional resources are only provided for the 'emerging' level.**



⁶ The Math Trainer's Manual and the Math Lesson Plan Bank are designed for 30-minute lessons, 5 times a week. This delivery schedule should be contextualized as required.



Math Trainer's Manual

The Math Trainer's Manual provides scripted guidance to deliver the **2-phase** Math Training to Math Facilitators. The **first phase is 2 days** long, and must be delivered before Facilitators start Math lessons in the SHLS. The **second phase is a 1-day training** designed to provide Facilitators with the specific skills and knowledge they need after the initial 3 months of the intervention. It is essential for you to **study the training sessions and resources in advance** and **follow the script** in the Math Trainer's Manual to ensure that the content is delivered accurately and in the allocated time.

Resources and handouts are provided at the end of the Trainer's Manual. Trainees will receive the **Math Trainee's Handbook**, which is a compilation of key information and handouts to be used by trainees during the training, and as a reference tool for when they start delivering the content.

All sessions in the Math Training are important for preparing Facilitators to teach math in the SHLS program. All sessions are interactive and informative, focusing on the key math teaching strategies, reviewing the math daily lesson plan, and include allocated time to practice delivering the lessons.

Each training session is divided into 2 parts:

- 1. Training session summary** – The 'Training session summary' at the beginning of each training session provides a quick reference for key information about the training session, including training session objectives, key messages, sensitivity notes, duration, resources required, preparation required and training session overview.
- 2. Steps to follow** – The 'Steps to follow' section under the Training session summary provides the script you must follow to deliver the training session. All the training sessions except the first and last session follow a 4-part structure – Warm-up, Present, Practice and Apply.



Math Lesson Plan Bank

The Math Lesson Plan Bank contains all the instructional content for Math Facilitators to deliver 30-minute math lessons to students in the SHLS. It has three sections:

1. Core resources – Scope and Sequence and Math Competencies

The **Scope and Sequence** is a detailed plan of what to teach, how to teach it and in what order, during the 9-month Math Intervention. It is important to teach math in the explicit and sequenced manner outlined here.

The **Math Competencies** contain level-specific skills that develop each competency. The Math Competencies are used to guide and measure teaching because they include the essential skills students need to become strong mathematical thinkers and problem-solvers.

For reference, the Scope and Sequence for the Emerging and Developing levels is provided in [“Resource 4a: Math Scope and Sequence – Emerging Level”](#) and [Resource 4b: Math Scope and Sequence – Developing Level \(page 135\)](#) of this Math Trainer’s Manual. The Math Competencies listed above can also be found in [Resource 5: Math Competencies – Emerging, Developing on page 145](#).

2. Daily lesson plans – The daily lesson plans in the Math Lesson Plan Bank provide prescriptive guidance for the 30-minute lesson. They are highly structured 30-minute plans that target the skills early learners need to become successful in math. **Daily lesson plans are provided for the first 12 weeks.**

Each math daily lesson plan is divided into two parts:

- i. **Lesson summary** – The ‘Lesson summary’ provides a quick reference for key information about the lesson, including – competency being taught, level of students, topic, week number, lesson number, duration, learning objectives, resources required, preparation required, sensitivity notes and the lesson overview.
- ii. **Steps to follow** – The ‘Steps to follow’ section under the Lesson summary provides the guidance that the Math Facilitator must follow to deliver the daily lesson plan. Please note that the daily lesson plans follow the same structure as the training sessions in the Math Trainer’s



Manual. They are divided into four sections – Warm-up, Present, Practice, Apply – and each section contains the same activities.

Warm-up – In this section, students participate in an activity that prepares them to learn the objective of the day. This activity can be a review of a previously learned skill or one that is fun and enjoyable to set the tone of the lesson, such as a song or a story.

Present – In this section, the Facilitator introduces the learning objective of the lesson.

Practice – In this section, students practice the skill either individually, in pairs, or in small groups.

Apply – In this section, students present their work, individually answer a question, or solve a problem to show what they have learned during the lesson.

- 3. Weekly lesson plans** – Weekly lesson plans in the Math Lesson Plan Bank outline the lesson objectives and activities for each day of the week. They identify the competency, topic, level and week at the top of each page. **Weekly lesson plans are provided for weeks 13–36.** The Math Facilitator must use them to deliver daily lessons in the same format as the daily lesson plans delivered in the first 12 weeks.



3

Delivering the Training

Training Techniques

The Math Training employs the following techniques to deliver the training, using the active, participatory approach.

Assessment (during group/pair work) – Walk around the room and listen to what the groups are discussing and/or writing to check that groups are focused and have a clear understanding of the task. If a group is having difficulties, clarify the directions and purpose of the task or ask additional questions to the group to help start meaningful conversation. When giving feedback on something the trainees should change, give clear, concise and constructive feedback.

Using a flipchart/blackboard – Use the flipchart as needed to highlight key points during the training.

Brainstorming – In a brainstorming session, trainees must produce as many answers to a question as they can. This can take place during whole group discussions, group work or pair work. Pose a clear question or issue and trainees should share ideas out loud without interruption or criticism. All ideas should be accepted. Summarize all responses at the end.

Notice Board – It is likely that trainees will ask important questions or bring up new topics that need time for discussion. If the particular exercise does not pertain to the topic raised or if there is not enough time to discuss at that moment, write the question/topic on a flipchart called the 'Notice Board' to save for later.

Group work – Group work offers an opportunity for all people to participate in an activity, which may not always be the case in large whole group activities and discussions. Give clear instructions, involve all group members in the activity, assign role in the group and promote collaboration, not competition.

Pair work/turn and talk – In a turn and talk, 2 trainees turn to the person sitting nearest to them and talk about something, fill out a handout or discuss a question. One strategy to further promote active listening is to have each pair member report back in plenary on what their partner said during their discussion or activity.



Role-play – Use role-plays to identify best practices, harmful actions, to prompt recollection of past experiences and empathize with students currently in a similar situation. In this manual, most role-plays take place in small groups so that everyone has the chance to participate as an actor.

Energizers – Energizers should encourage physical movement, interactions, laughter and fun, as well as learning. You can also ask for a volunteer to prepare and lead an energizer for the following day. See [Resource 3: Energizers for Math Training](#) (page 124) for some examples of math energizers you can use in this training.

Preparation for the Math Training

- 1. Get to know the trainees** – Prior the SHLS Math Training, gather relevant information to understand the trainees. The SHLS Manager or the person who designed the SHLS program should be able to provide you with background information about the trainees to ensure that the content is aligned with their context and culture, and sensitive to their identities, abilities and experiences.
- 2. Study and contextualize the SHLS Math Trainer's Manual** – In order to deliver high quality training, study the Math Trainer's Manual thoroughly and familiarise yourself with the content of the sessions. While studying the resource, use what you have learned about the trainees to contextualise the content and delivery to the profile of the trainees and the local context. Look out for specific guidance for adaptation in the training sessions.
- 3. Select an appropriate venue** – Select a venue where the training can take place undisturbed. It should have space for all the trainees to sit and perform the whole group and small group activities comfortably.
- 4. Gather materials required** – Gather all necessary materials for the training in advance. Use [Resource 2: Math Training Resource List](#) on page 123 for this purpose. You may need to adapt some of the materials to the context or substitute them with local alternatives that are more readily available or more appropriate for the activity.
- 5. Study and adapt the proposed Math Training Agenda** – Study the proposed agenda before each of the 2 phases of the training. Each session is labeled 'Required' or 'Recommended'. The 'Required' sessions must be covered in their entirety. The "Recommended" sessions can be omitted entirely or revised for time and content in order to align with the overall training plan.



PART 2

Math Training Sessions – Phase 1

Training Objectives

Upon completing the 2-day Phase 1 Math Training, Facilitators of the Math Intervention in the SHLS will be able to:

- 1** Understand the importance of introducing young students to math.
- 2** Use the math resources effectively.
- 3** Design active and fun learning activities to teach math.
- 4** Use teaching aids in daily lessons.
- 5** Develop problem-solving skills in students.



Proposed Math Training Agenda

This training is planned for **2 days** with **11 hours, 30 minutes of required training**. Adapt the training agenda below. The sessions marked as 'Required' must be delivered in their entirety, and the 'Recommended' sessions can be omitted entirely or revised for time and content.

Priority	Session	Duration	Session objectives <i>By the end of this session, trainees will be able to</i>
Recommended	MATH TRAINING SESSION 1: OPENING THE TRAINING	50 minutes	Define a safe learning environment suitable for an open exchange of ideas.
Required	MATH TRAINING SESSION 2: WHAT IS MATH?	1 hour	- Identify 5 key reasons for introducing young students to math. - Name the 4 competencies of math.
Required	MATH TRAINING SESSION 3: EXAMINE THE MATH RESOURCES	1 hour	Use the Math Trainee's Handbook and Math Lesson Plan Bank to conduct daily lessons.
<i>Recommended</i>	<i>Break</i>	<i>15 minutes</i>	
<i>Recommended</i>	<i>Energizer</i>	<i>15 minutes</i>	<i>Trainees warm-up using an energizer activity.</i>
Required	MATH TRAINING SESSION 4: MAKE TEACHING AIDS FOR NUMBER SENSE	2 hours	- Incorporate teaching aids to teach students Number Sense and Operations. - Collect counters and make number cards and the band of 10 using locally available materials.
<i>Recommended</i>	<i>Break</i>	<i>1 hour</i>	
Required	MATH TRAINING SESSION 4 (continued)		
Required	MATH TRAINING SESSION 5: ADD AND SUBTRACT WITHIN 20	1 hour 45 minutes	Use band of 10 and number bonds in daily lessons to teach addition and subtraction within 20.



Priority	Session	Duration	Session objectives
<i>By the end of this session, trainees will be able to</i>			
Required	MATH TRAINING SESSION 6: ADD AND SUBTRACT BEYOND 20	1 hour 45 minutes	Use number bonds in daily lessons to teach addition and subtraction beyond 20.
<i>Recommended</i>	<i>Break</i>	<i>15 minutes</i>	
Required	MATH TRAINING SESSION 7: MAKE MATH FUN	1 hour 30 minutes	Use games and songs to build fluency in Number Sense and Operations.
<i>Recommended</i>	<i>Break</i>	<i>1 hour</i>	
<i>Recommended</i>	<i>Energizer</i>	<i>15 minutes</i>	<i>Trainees warm-up using an energizer activity.</i>
Required	MATH TRAINING SESSION 8: SOLVE WORD PROBLEMS	2 hours	Use real-life or imaginary scenarios and storytelling to present counting, addition and subtraction problems.
Recommended	MATH TRAINING SESSION 9: SOLVE MONEY PROBLEMS	1 hour	- Design activities to teach students about money. - Compose 1-step, real-life addition or subtraction problems involving money.
Required	MATH TRAINING SESSION 10: REFLECTION AND CONCLUSION	30 minutes	Reflect on the training experience and complete the Math Training Post-test.



Math Training Session 1:

Opening the Training

Training session summary | Duration: 50 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Define a safe learning environment suitable for an open exchange of ideas.

KEY MESSAGES

A learning environment should be respectful, friendly and permit an open exchange of ideas.

RESOURCES REQUIRED

List of questions for the game 'Mingle mingle'

PREPARATION REQUIRED

Prepare a list of questions to pose during the 'Mingle mingle' game.

TRAINING SESSION OVERVIEW

In this session, the trainer welcomes trainees and leads them through a warm-up game called 'Mingle mingle' to get to know each other. Then trainees co-create rules of the training to ensure a safe environment for open learning and exchange.



Steps to follow

Welcome

Activity: Welcome to the training | **Time:** 5 minutes | **Arrangement:** Whole group

1. Introduce yourself and invite trainees to introduce themselves.
2. Welcome everyone to the training.



3. **SAY >** *We will begin the training with a warm-up game in order to get to know each other and co-create the rules for the training days. After that, I will present the training objectives and share with you the agenda for the next 2 days.*

'Mingle mingle' rules

Activity: Present the rules of 'Mingle mingle' | **Time:** 5 minutes | **Arrangement:** Whole group

1. Present the rules of the game 'Mingle mingle'.



2. **SAY >** *We are going to play a game called 'Mingle mingle'. For this game, we all have to stand up and walk around the room. I will call out an instruction preceded by the words "Mingle mingle!" When I give the instruction, you need to act it out. Shall we begin?*

Play 'Mingle mingle'

Activity: Play 'Mingle mingle' | **Time:** 20 minutes | **Arrangement:** Whole group

TIP > Give enough time for trainees to complete each instruction.



1. Ask trainees to go over to an open space in the room or outdoors where there is space to move around.
2. Play the game, 'Mingle mingle'.
3. **SAY >** *Mingle mingle with 5 people and exchange your name and favorite sport.*



TIP > You can modify these instructions to make the game more fun or to suit your context.

- *Mingle mingle with 3 different people. Shake hands with each person, then tell each other about your favorite teacher from the time you were in school and why you liked him or her.*
- *Mingle mingle with 4 different people and tell each other about the teacher you never liked from the time you were in school and why you didn't like him or her.*
- *Mingle mingle with 6 people and do 6 squats in a group while holding hands.*
- *Mingle mingle with 2 people and share your reason for joining this training.*

Co-creating rules

Activity: Co-create rules | **Time:** 20 minutes | **Arrangement:** Whole group

1. Regroup the trainees.
2. Lead a brainstorming session to define the rules we will all follow during the training days to ensure that the learning environment is friendly, open and supportive.
3. Write the rules shared by trainees on a flipchart and mount it on the wall.



4. SAY >

- *In addition to these rules that you have defined, I would like to add the following – during the course of the training, we will be doing group discussions, role-playing, small group work and other games or activities.*
 - *During this training, you will be exchanging ideas with each other and talking actively. When I want to get your attention and regroup all of you, I will say “Clap once if you can hear me!” and clap my hands. When you hear me, clap your hands and bring your attention to me.*
 - *If you do not, I will repeat myself by saying “Clap twice if you can hear me!” and I will clap twice. I will keep doing this until all trainees are paying attention. This is a technique that you can also use in your classrooms. Shall we practice it?*
5. Practice this technique by clapping once and saying “Clap once if you can hear me!”, clapping twice and saying “Clap twice if you can hear me!”, and so on.
 6. Thank trainees for their active participation.



Math Training Session 2:

What is Math?

Training session summary | Duration: 1 hour

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Identify 5 key reasons for introducing young students to math.
- Name the 4 competencies of math.

KEY MESSAGES

- It is important for students to learn math for the following 5 reasons: 1) It predicts students' later success in school; 2) It makes students more intelligent; 3) It builds students' self-confidence; 4) It develops mathematical thinking and problem-solving skills; and 5) It is useful for everyday living.
- There are 4 Math Competencies in this: 1) Number Sense; 2) Operations; 3) Measurement and Data; and 4) Geometry.

SENSITIVITY NOTE

When discussing the importance of learning math, emphasize that research shows that mathematical ability is not determined by gender, but by the social expectations and gender roles that students grow up with. Therefore, it is important for Facilitators to develop a mind-set that all students can learn and grow their math capacity through perseverance and practice.

Facilitators must especially believe and convey this growth mind-set about girls.

RESOURCES REQUIRED

- Board and chalk/flipcharts and markers
- Tape
- Notebook and pen
- Math Trainee's Handbook for all trainees

PREPARATION REQUIRED

- Print copies of the Math Trainee's Handbook for all trainees.
- Write the training agenda for the 2 days on a flipchart paper and mount on the wall.
- Make copies of the 2-day agenda for each trainee, if possible.
- Write the objectives of the 2-day training on a flipchart paper and mount on the wall.
- Write the objectives of the session on a flipchart paper and mount on the wall.
- Write 'Notice Board' on a blank flipchart paper and mount on the wall.
- Write the name of each competency on 4 separate pieces of flipchart paper and mount on the wall.



- Write the definition of each competency on 4 separate pieces of flipchart paper and keep it available to use during the 'Practice' part of the session.

TRAINING SESSION OVERVIEW

In this session, the trainer guides a discussion on the importance of teaching math at an early age. Then trainees examine each of the 4 Math Competencies and summarize their importance using their own words.

Steps to follow

Warm-up

Activity: Reflection on use of math skills in everyday life | **Time:** 15 minutes |

Arrangement: Whole group; Pairs

TIP > Ensure that the flipchart with the objectives written clearly is mounted on the wall of the training room so that all trainees can easily read it.

1. Welcome trainees to the Math Facilitator Training.
2. Give each trainee a copy of the Math Trainee's Handbook.
3. Present the training agenda for the 2 days (point to the flipchart with the agenda and/or hand out a copy to each trainee).
4. Present the objectives of the training to the trainees. Trainees can follow along by reading page 6 of the Math Trainee's Handbook.

Objectives of Math Training

By the end of this training trainees will be able to:

1. Understand the importance of introducing young students to math.
2. Use the math resources effectively.
3. Design active and fun learning activities to teach math.
4. Use teaching aids in daily lessons.
5. Develop problem-solving skills in students.



6. Present the objectives of Training Session 1 to the trainees.

By the end of the session, trainees will be able to:

1. Identify 5 key reasons for introducing young students to math.
2. Name the 4 competencies of math.



6. **SAY >** *You have 10 minutes to think about and discuss the following 2 questions in pairs. There are no right or wrong answers to these 2 questions. The activity is meant to start a discussion. You are not required to take notes for this activity.*

- *Think about the things you do in the course of the week and tell each other about all the times that you may have done something that needed math.*
- *Why do you think it is important to teach students math early?*

7. Allow trainees to discuss in pairs for 10 minutes.

8. Bring back everyone's attention to the whole group.

9. Select 2 or 3 trainees to provide some responses to the questions.

Example answers to the first question:

- *Using the clock to wake up.*
- *Counting money.*
- *Buying an item at a store.*
- *Giving someone directions (using distance).*
- *Helping a student with school work.*
- *Filling a car or motorbike tank with gas/petrol.*
- *Making an organized list of things to do for the day.*
- *Constructing a hut or a table.*
- *Estimating the amount of change at the shop.*

10. Point to the Notice Board flipchart paper posted on the wall.

TIP > If required, you can use the 'clap once if you hear me' strategy to bring everyone to focus.





11. SAY >

- *When we are learning together, questions or concerns may come up that we don't have time to discuss immediately. That's why we have a 'Notice Board'. The Notice Board is the paper posted on the wall there.*
- *At any point during our training, you can ask a question or state a concern that I might put on the Notice Board. That way, we can stay on task during our session and will be sure to review what you have written at the end of the day or later in the training.*

Present

Activity: Key reasons for students to learn math in early life | **Time:** 15 minutes

Arrangement: Whole group

1. Thank trainees for their thoughtful discussion.
2. Have trainees turn to page 8 of the Math Trainee's Handbook and follow along.



3. READ ALOUD > *Let us talk about 5 key reasons why it is important for students to learn math in early years:*

- ***It predicts students' later success in school*** – *Students' early knowledge of math strongly predicts their later success in math and science subjects, in high school and beyond. More surprising is that it predicts later success in reading. That is because doing more math increases oral language skills such as vocabulary and grammar.*
- ***It develops mathematical thinking and problem-solving skills*** – *Students who develop mathematical thinking can communicate, reason, organize, classify, sort, and prioritize to solve a problem. Mathematical thinking is a form of critical thinking – the student finds a problem, plans the steps to solve the problem, solves the problem and then checks if the answer is correct. This process is used in many other areas of life as well. Also remember that mathematical ability is not determined by gender. Both girls and boys can do math equally well. **All** students can learn and grow their math ability by working hard and practicing.*
- ***It builds students' self-confidence*** – *Students who can accurately calculate and find answers feel capable and smart. They feel proud of themselves. Students must feel good about learning and the future.*



Students who have confidence in themselves are then able to apply abstract mathematical concepts in everyday life. Students who have confidence in themselves are then able to apply abstract mathematical concepts in everyday life.

- **It makes students more intelligent** – The brain is like a muscle. The more it is used and does the work, the more it grows. Intelligence can grow. All students, girls included, are able to increase their intelligence when they work the muscles of their brain.
- **It is useful for everyday living** – Students who can calculate quickly and accurately do better in their daily life tasks, such as going to buy goods at the market. They are also able to solve problems in everyday life by using their mathematical knowledge. And, as they become adults, they have more opportunities for employment.

Practice

Activity: Examining the competencies | **Time:** 20 minutes | **Arrangement:** Small groups

1. Introduce the competencies for math.



2. SAY >

- The goal of the Safe Healing and Learning Spaces Math program is to give students learning opportunities even when they are not able to attend formal schooling. Therefore, the program does not align exactly with the official national curriculum.
- Instead, it is designed to provide the foundational skills so that when students are reintegrated into formal schooling, they will be able to follow along.
- Math has 4 competencies. The competencies are: 1) Number Sense; 2) Operations; 3) Measurement and Data; and 4) Geometry.
- Now we are going to do an activity to discover the meaning of each of these 4 competencies.

3. Have trainees get into 4 groups.



4. Distribute the 4 pieces of flipchart paper with the definitions of each competency written on them, to the groups.



5. **SAY >** *The piece of paper you have before you contains the definition of 1 of the 4 competencies you see mounted on the wall. Read the definition out loud amongst your group members and take 5 minutes to decide which competency name is matched to the definition.*
6. Call on each group to read aloud their definition and explain which competency they matched it with.

Apply

Activity: Presentation and summary of relevance of each competency | **Time:** 10 minutes

Arrangement: Whole group

1. Have each group select a representative to present to the whole group.



2. Pose the following questions to each group and give them 5 minutes to discuss. **ASK >**
 - *How would you summarize, in your own words, the goal of your competency?*
 - *What is the importance of your competency for students' growth and development?*

3. Have the representative from each group present the group's answers to everyone else.

4. Have trainees turn to page 10 of the Math Trainee's Handbook and follow along as you present a summary of the competencies.



5. **READ ALOUD >** *The Math Intervention covers 4 competencies: Number Sense, Operations, Measurement and Data, and Geometry.*
 - *Number Sense – This competency develops the verbal counting sequence. Number words are tied to objects as students mentally connect each number word in one-to-one correspondence with an object. Other important aspects of counting include knowing the next number in a sequence and comparing quantities.*
 - *Operations – This competency involves the manipulation of objects to join them together (addition) or to take them apart (subtraction). For*



example: “We have 3 girls and 4 boys in our group. How many students do we have altogether?” Subtraction for young students is a separation activity. For example: “If you have 5 blocks and you give me 2, how many will you have left?” It also includes multiplication and division.

- Measurement and Data – This competency introduces students to using non-standard measurement tools to understand length, height, weight and volume. Later, they can use standard tools such as rulers and scales to measure precisely.
- Geometry – This competency includes shape recognition and naming. For example: “That’s a triangle.” Spatial sense involves knowing location, distance and direction using terms such as ‘over’, ‘under’, ‘above’, ‘below’ and so on.

During this training, we will concentrate on how to teach Number Sense and Operations. Another training will focus on the rest of the content.

6. Thank trainees for their active participation.



Math Training Session 3:

Examine the Math Resources

Training session summary | Duration: 1 hour

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Use the Math Trainee's Handbook and Math Lesson Plan Bank to conduct daily lessons.

KEY MESSAGES

- The Math Trainee's Handbook contains key messages, best practices in teaching math, examples of teaching aids and general recommendations on how to facilitate daily lessons.
- The Math Lesson Plan Bank contains Math Competencies, Scope and Sequence, daily lesson plans, and weekly lesson plans.
- These resources can be adapted and contextualized to your needs.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

Write the objectives of the session on flipchart paper and mount on the wall.

TRAINING SESSION OVERVIEW

In this session, trainees receive copies of the Math Lesson Plan Bank and learn how to use it with the Math Trainee's Handbook to conduct daily lessons.



Steps to follow

Warm-up

Activity: Presentation of Math Lesson Plan Bank | **Time:** 5 minutes | **Arrangement:** Whole group

TIP > Trainees can follow along by reading page 11 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Use the Math Trainee's Handbook and Math Lesson Plan Bank to conduct daily lessons.

2. Distribute copies of the Math Lesson Plan Bank to each trainee.
3. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

Present

Activity: Parts of the Math Lesson Plan Bank | **Time:** 15 minutes | **Arrangement:** Whole group

- “ — 1. **SAY >** *The Math Lesson Plan Bank contains the Math Competencies, Scope and Sequence, math daily lesson plans and math weekly lesson plans*

- “ — 2. Ask trainees to turn to page 12 of the Math Trainee's Handbook and invite them to take turns to **READ ALOUD >**

The Math Competencies are broken down into level-specific skills that students should learn for each competency. In the SHLS Reading and Math Intervention, there are 2 learning levels based on students' prior knowledge – 'emerging' and 'developing'. The levels are loosely based on international standards for primary level grades 1 and 2 but do not correspond exactly. Math Competencies can be assessed at the end of a lesson or at the end of the week or end of the 36 weeks.

3. Ask trainees to turn to page 10 of the Math Lesson Plan Bank and read 1 or 2 examples of skills under the Math Competencies.





4. Invite another trainee to turn to page 12 in the Math Trainee's Handbook and **READ ALOUD >**

- *The Scope and Sequence determines the Math Competencies for each lesson and the order in which they can be covered over the period of 36 weeks with 5 lessons per week. It outlines what to teach, how to teach it and when to teach it.*
- *The SHLS program provides a Scope and Sequence for both the emerging and developing levels of math.*

5. Ask trainees to turn to page 34 and 146 of the Math Lesson Plan Bank and read the contents of weeks 1 and 7 for the example.



6. Invite another trainee to continue on page 13 of the Math Trainee's Handbook, and **READ ALOUD >**

The daily lesson plans provide guidance on activities to be completed during a 30-minute lesson. Learning objectives for each lesson come from the Scope and Sequence. The SHLS Toolkit provides a Scope and Sequence for both the emerging and developing levels, but lesson plans for only the emerging level. Daily lesson plans have been provided for the first 12 weeks. For the remainder of the weeks, use the weekly plans as a guide to deliver the daily lessons. Daily lessons use games, songs, art activities, role-playing, working in small groups or in pairs, and teaching aids to create an inclusive, safe, predictable and enjoyable learning experience.

7. Ask trainees to turn to page 35 of the Math Lesson Plan Bank and read 1 or 2 examples of daily lesson plans.



8. Invite another trainee to **READ ALOUD >**

The weekly lesson plans for weeks 13 to 36 outline the lesson objectives and classroom activities for each week. They identify the competency, topic, level and week at the top of each page, and use the Scope and Sequence as a guide to determine the topics to cover each day. The weekly plans follow the same 4-part structure – Warm-up, Present, Practice, Apply. Use this as a guide to write daily lessons for weeks 13 to 36.

9. Ask trainees to turn to page 255 of the Math Lesson Plan Bank and read 1 or 2 examples of weekly plans.



Practice

Activity: Understanding the tools | **Time:** 30 minutes | **Arrangement:** Pairs

1. Have trainees form pairs with their neighbor.



2. **SAY >** *You will now work in pairs with the person next to you to complete the assignment on page 17 of the Math Trainee's Handbook, Activity 2.1 'Understand my resources'. Use the Math Lesson Plan Bank to complete your assignment. You have 20 minutes to work on this. This activity is like a treasure hunt. You will search through the Math Lesson Plan Bank to find the answers to each question. Write your answers on the Activity 2.1 sheet.*
3. Walk around and observe the trainees working and help them identify the various resources and how to read the tables in each document.

Apply

Activity: Impressions of the tools | **Time:** 10 minutes | **Arrangement:** Whole group

1. Inform trainees that they can check their answers using the answer key on page 18 of the Math Trainee's Handbook.
2. Take turns going over the answer to each question.
3. Clarify how to read the tables and find information in the tools.
4. Ask trainees about their impressions of the Scope and Sequence, such as its usefulness and clarity.
5. Ask trainees about their impressions of the daily lesson plans, such as their usefulness and clarity.
6. Ask trainees about their impressions of the weekly lesson plans, such as their usefulness and clarity.
7. Thank trainees for their active participation.

15 MINUTE BREAK (OPTIONAL)

15 MINUTE ENERGIZER (OPTIONAL)



Math Training Session 4:

Teaching Aids for Number Sense

Training session summary | Duration: 2 hours

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Incorporate teaching aids to teach students Number Sense and Operations.
- Collect counters and make number cards and the band of 10 using locally available materials.

KEY MESSAGES

- Teaching aids are any objects or tools that allow students to explore a concept and learn math in an active, hands-on way.
- Lessons that use different teaching methods and aids create a stimulating environment, help build relationships between students, and give students a sense of control over their own math understanding.
- A good lesson has activities that combine student's listening, seeing and manipulating skills.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language, and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these

tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Paper or cardboard found in local environment such as discarded boxes
- Ruler
- Glue
- Scissors
- At least 200 counters, 1 set of number cards, at least 4 pieces of notebook size paper or 4 slates with a band of 10 drawn on each
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

- Write the objectives of the session on flipchart paper and mount on the wall.
- Collect the counters and place in a container such as a bag; counters can be made of stones, seeds, bottle caps or any locally available material for counting.



- Draw a band of 10 using a ruler and marker, on at least 4 pieces of notebook sized paper or slates.
- Review the daily lesson plan for Week 4, Lesson 3.

TRAINING SESSION OVERVIEW

In this session, the trainer presents the importance of using teaching aids when teaching Number Sense and Operations. Trainees role-play to deliver a lesson plan on Number Sense. They then make teaching aids to use in in their classrooms.

Steps to follow

Warm-up

Activity: Familiarize with daily lesson plans | **Time:** 10 minutes | **Arrangement:** Individual

TIP > Trainees can follow along by reading page 19 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Incorporate teaching aids to teach students Number Sense and Operations.
2. Collect counters and make number cards and the band of 10 using locally available materials.

3. Ask trainees to silently read the daily lesson plan for Week 4, Lesson 3 found on page 99 of the Math Lesson Plan Bank. As this lesson is from week 4, it assumes that students have covered the content taught in the previous weeks.



4. **ASK >**

- *What competency does this lesson focus on?*
Answer: Number Sense.
- *What is the topic and learning objective of the lesson?*
Answer: Topic is 'Develop Number Sense within 10'; Lesson objective is to use concrete objects and pictorial representation to compare, order and estimate.
- *What are the resources required to do this lesson with students?*
Answer: Counters, number cards and band of 10.



5. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

Present

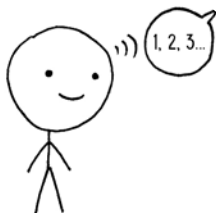
Activity: Presentation of key messages | **Time:** 30 minutes | **Arrangement:** Whole group



1. Instruct trainees to turn to page 20 of the Math Trainee's Handbook and follow along as you **READ ALOUD** >

The daily lesson plans use different teaching aids to help students learn. Learning occurs when students actively develop their own understanding. Different teaching methods help with this. Some students learn by listening, others like to see things written down, and some students learn by working with their hands, using objects to manipulate, organize, or play. A good lesson has activities that combine a student's listening, seeing and manipulating skills. Some examples of teaching methods for each type of learning style are provided below. We will explore some of these examples in-depth during the training.

Examples of teaching methods/aids



- Number rhymes
- Songs
- Demonstration
- Presentation
- True/false
- Who am I?
- Simon says



- Number cards
- Number charts
- Fill in the blank
- Associate
- Categorize



- Manipulatives or counters (e.g. rocks, sticks, beans, seeds)
- Cut-outs of shapes (square, rectangle, triangle, circle)
- Measuring tools
- Band of 10
- Show me



Different teaching methods and aids create a learning environment that:

- Draws students' attention.
- Makes learning interesting and fun.
- Builds friendships between students.
- Improves students' self-confidence and sense of control over their own learning.
- Increases student participation.
- Makes the lessons more concrete.
- Helps to assess learning.



2. **SAY >** *In this training, we will focus on 3 teaching aids:*

- *Counters*
- *Number cards*
- *Band of 10*

3. Instruct trainees to turn to page 21 of the Math Trainee's Handbook and follow along.
4. Select a trainee to read the section on 'Counters'.
5. Show trainees the counters you have already collected as an example.
6. Instruct trainees to turn to page 23 of the Math Trainee's Handbook and follow along.
7. Select a trainee to read the section on 'Number Cards'.
8. Show trainees the number cards you have already made.
9. Instruct trainees to turn to page 29 of the Math Trainee's Handbook and follow along.
10. Select a trainee to read the section on the 'Band of 10'.
11. Demonstrate how the band of 10 is used – draw a band of 10 on the board.



12. **SAY >** *This is how you can represent the number 8.*

13. Fill in the cells starting from the top row, from left to right, followed by the second row while counting "1, 2, 3, 4, 5, 6, 7, 8".
14. Now draw a band of 10 on a piece of paper and place it in front of you.



15. Using counters, fill in the cells again from the top row, from left to right, followed by the second row while counting “1, 2, 3, 4, 5, 6, 7, 8”.



16. **SAY >** *The order of placing the counters or filling in the cells with a circle from left to right starting from the top row is very important because it shows the ‘adding on principle’, develops pattern recognition and improves estimation skills in students. Remove counters or erase the circles in reverse order, from the bottom right to left and then the top row.*

Activity: Role-play on Number Sense lesson | **Time:** 40 minutes | **Arrangement:** Small groups



1. **SAY >** *Now we will take 30 minutes to teach ‘Emerging Level Week 4, Lesson 3’ in your groups. One person will play the role of the Facilitator and the rest of you will act like students.*
2. Form 2 groups of trainees – ask trainees to count “1, 2, 1, 2, 1, 2” and so on. Those who called out “1” form the first group and those who called out “2” form the second group.
3. Ask trainees in each group to select their ‘Facilitator’.
4. Give each group a set of 100 counters, a set of number cards and 2 bands of 10.
5. Explain that these are the resources needed in order to teach this lesson.
6. In order to create a classroom environment for role-playing the lesson, give each group a flipchart paper, marker and tape. Give each group a part of the training room or a different room, to use as their classroom. They can mount the flipchart paper and use it as a board. The other group members should rearrange themselves to simulate a classroom.
7. Walk around and assist each group with the activity.
8. Give the trainees 30 minutes to role-play the lesson.
9. After the role-play, take 10 minutes to discuss the following questions:
- What worked in the lesson?
 - What was challenging in the lesson?
 - How did the teaching aids support the lesson?
10. Clarify any questions about how to use a daily lesson plan effectively. 

15 MINUTE BREAK (OPTIONAL)



Apply

Activity: Making teaching aids | **Time:** 40 minutes | **Arrangement:** Whole group

1. Inform trainees that they can use the information on pages 21–29 in the Math Trainee's Handbook as a guide to collect counters (page 21), make number cards (page 23) and draw bands of 10 (page 29).

Counters

2. Show trainees the counters you have collected from the local environment.
3. Ask them to follow the instructions on page 22 of the Math Trainee's Handbook.
4. Give trainees 15 minutes to go outdoors with a bag to collect counters.

TIP > If materials are not available in the immediate environment or it is unsafe, give this activity as a homework assignment, and have trainees bring the counters to the training the following day.

Number cards

5. Show them your sample set of number cards and inform them that they will be making the same for their own use.
6. Give groups of trainees a pair of scissors, markers, glue and cardboard in the same size as the paper.
7. Ask trainees to cut out the number card sheet.
8. Ask trainees to follow the instructions on page 24 of the Math Trainee's Handbook.
9. Give trainees 15 minutes to complete cutting out the number cards or to use the given materials to make their own number cards.

Band of 10

10. Give trainees pieces of paper, markers and rulers.
11. Have them draw a band of 10 on each piece of paper and use counters to practice placing counters in the cell of the band of 10 from top to bottom, left to right.
12. Share the key messages of the session.





13. SAY >

- *We will practice how to use these teaching aids during lessons throughout the course of this training. Always store your teaching aids carefully so that you can easily access them when you need to.*
- *Remember that the most valuable learning occurs when students actively construct their own math understanding. This can be accomplished by using a variety of teaching methods and teaching aids, that address students' different learning styles.*
- *Some students learn by listening, others like to see things written down, and still others enjoy working with their hands. Always remember to involve your students through listening, writing and hands-on activities. Using teaching aids can support these various types of learning styles.*

14. Invite trainees to add their own reflections or comments before closing the session.

15. Instruct trainees to gather their teaching aids and store them carefully to be used during the remainder of the training and later on in their classrooms.

16. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

17. Thank trainees for their active participation.



Math Training Session 5:

Add and Subtract within 20

Training session summary | Duration: 1 hour 45 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Use band of 10 and number bonds in daily lessons to teach addition and subtraction within 20.

KEY MESSAGES

- It is important for students to develop basic mental skills **before** learning the standard way of adding or subtracting (using vertical columns).
- Addition and subtraction is taught first with numbers within 10, then by increasing to numbers within 20 and eventually onto larger numbers.
- Band of 10 and number bonds are teaching methods for addition and subtraction.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language, and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- At least 200 counters and paper with band of ten drawn on it
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

- Write the objectives of the session on flipchart paper and mount on the wall.
- Collect counters from previous session and draw band of 10 on paper.
- Review daily lesson plan for Week 5, Lesson 3.

TRAINING SESSION OVERVIEW

In this session, the trainer presents the 'band of 10' and 'number bonds' teaching strategies. Trainees then practice using the band of 10 and number bonds in pairs. This is followed by a role-playing to practice teaching using these techniques.



Steps to follow

Warm-up

Activity: Trainees get familiar with a daily lesson plan | **Time:** 10 minutes

Arrangement: Individual

TIP > Trainees can follow along by reading page 31 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Use band of 10 and number bonds in daily lessons to teach addition and subtraction within 20.

2. Instruct trainees to turn to page 119 of the Math Lesson Plan Bank and silently read the daily lesson plan for 'Emerging level Week 5, Lesson 3'. As this lesson is from week 5, it assumes that students have covered the content taught in the previous weeks.

3. Give trainees at least 5 minutes to read in silence.



4. **ASK >**

- *What competency does this lesson focus on?*
Answer: Number operation.
- *What is the topic and learning objective of the lesson?*
Answer: Topic is 'Add and Subtract within 10'. Objective is to add and subtract using concrete objects and to solve problems.
- *What are the resources required to do this lesson with students?*
Answer: Number bonds and counters.

5. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.



Present

Activity: Key messages of session | **Time:** 20 minutes | **Arrangement:** Whole group



TIP > You can also have a trainee read this aloud.

1. Instruct trainees to turn to page 31 of the Math Trainee's Handbook and follow along as you **READ ALOUD >**
 - *Of the 4 operations on numbers – addition, subtraction, multiplication and division, addition is the most natural. Subtraction and addition are opposite operations.*
 - *For example, $6 = 4 + 2$ is the same as $6 - 4 = 2$ and also $6 - 2 = 4$.*
 - *Students can add numbers mentally when they play, while watching sports like football and while buying items at the shops. The standard way of adding or subtracting vertically is taught for larger numbers when mental calculation is difficult.*
 - *There are many ways to add and subtract. **But, it is important for students to develop some basic mental strategies before they are taught the standard way of adding or subtracting vertically.***
 - *First, we teach adding up to 10. Then, numbers within 20 can be introduced. Then, we teach to add 2-digit numbers that does not require regrouping. Then, we teach adding 2-digit numbers that requires regrouping.*
 - *We teach subtraction using the same approach. First, we teach how to subtract 2-digit numbers without regrouping, and then how to subtract 2-digit numbers that require regrouping.*
 - *Adding and subtracting should be presented in this order. The Scope and Sequence reflects this learning progression.*

TIP > Have one trainee respond to the question.



2. Ask trainees if there are any questions regarding this concept. Clarify any questions before continuing.
3. **ASK >** *In the previous session, we introduced the band of 10. Who can explain the band of 10?*





4. Add to the explanation by presenting from page 32 of the Math Trainee's Handbook ('How to use the band of 10'). **READ ALOUD >**

The band of 10 visually shows the properties of ten. It is most suitable for learning Number Sense, at least up to 50 and for adding and subtracting within 50. It can still be used for calculations and counting beyond 50 but there are other teaching methods that can also be used for larger numbers.

5. Inform trainees that there are many detailed examples in the handbook for them to reference during the practice activity. Review examples 1 and 2 with everyone.

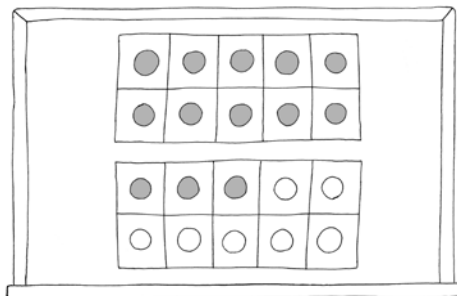


6. **SAY >** *Let us review examples 1 and 2 together and you can review the other examples when you work on your group activity:*

Example 1: Identify numbers of objects

Show different amounts on the bands of 10 and ask the following questions:

- *How many stones do you see?*
- *How do you know?*
- *Is there another way to count and get to 13?*
- *What are the ways to make 13?*

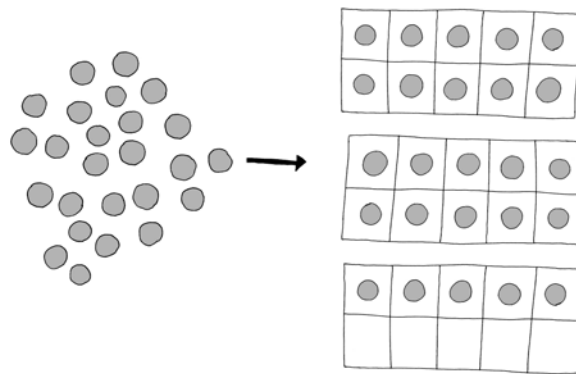


7. Demonstrate using the band of 10 as described in this first example.
8. Continue with an explanation of the second example.



Example 2: Recognize overall amounts

- After exploring the bands of 10 with students, show them a collection of objects.
- Count the objects with the students (for example, 25 objects).
- Then, ask them to predict how many bands 25 objects would fill.
- Ask them to discuss with a partner.
- Ask them to share their predictions and justifications.
- Check by filling the bands' 10 cells and compare student predictions with the results: 2 full bands, plus one with 5 cells filled



9. Inform trainees that they will review the remaining examples in pairs during the practice activity. There are six examples in total.
10. Ask trainees if there are any questions regarding this concept. Clarify any questions before continuing. If the discussion is about exactly how to use the band of 10, inform trainees that they will have an opportunity to practice it shortly.



11. Have trainees turn to page 36 of the Math Trainee's Handbook ('How to use number bonds'). Have a trainee volunteer **READ ALOUD** >

*Another visual approach to teaching Number Sense is called the **number bond**. A number bond is a picture using circles and lines to show the link between a number and the parts that combine to make it. A whole thing is made up of parts. If you know the parts, you can put them together (add) to find the whole. If you know the whole and one of the parts, you take away the part you know (subtract) to find the other part.*

Number bonds let students see the link between addition and subtraction. Students should be able to quickly recall addition facts at least up to 20 for the emerging level, and number bonds help teach this skill. Knowing

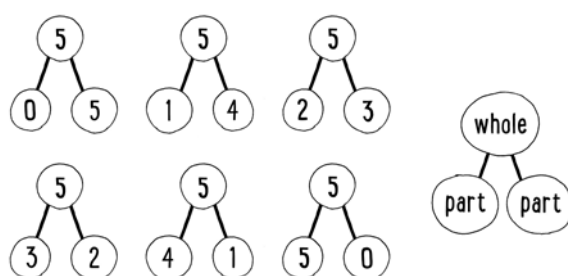


these number facts will help improve students' speed and accuracy when adding and subtracting. You can draw number bonds on paper, using circles. This visual is important to understand before introducing the math symbols '+' '-' and '='.

- 12.** Review each example from pages 36 to 38 of the **Math Trainee's Handbook** one-by-one with the trainees.

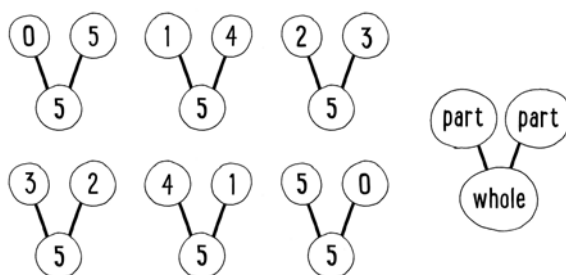
Example 1: Represent a whole as a sum of 2 parts

This is an example of all the number bonds for 5. Here the number bonds are written in a way that represents 'decomposition'.



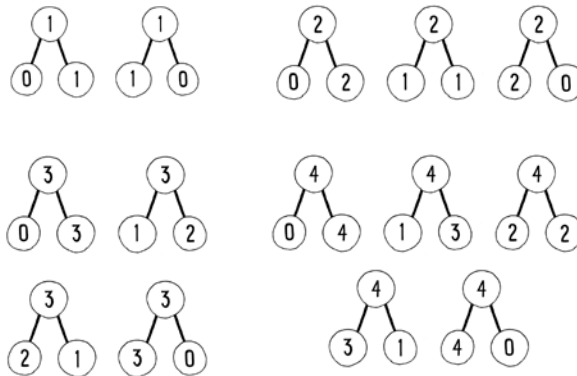
Example 2: Represent the sum of 2 parts is a whole

Here the number bonds are written in a way that represents 'association'.



Example 3: Number bonds for 1 to 10

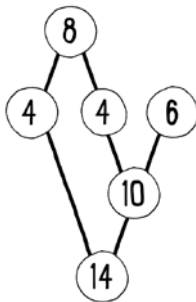
Students should master all the number bonds from 1 to 10.



Example 4: Use number bonds for addition

When using number bonds for addition, there may be more than one way to decompose and associate numbers using basic addition facts.

In this example, the numbers are decomposed in a way that uses addition facts for 10.



$$6 + 4 = 10$$

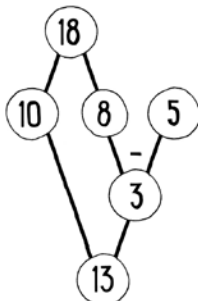
Students should master the number bonds for 10. Then the most efficient way to add $8 + 6$ is to decompose 8 as $4 + 4$ in order to add 4 to 6.

$$8 + 6 = (4 + 4) + 6 = 4 + (4 + 6) = 4 + 10 = 14$$

Example 5: Use number bonds for subtraction

When using number bonds for subtraction, there may be more than one way to decompose and associate numbers. Always remember to write the subtraction sign in the bond. When there is no sign, we can assume that it is an addition.

In this example, the numbers are decomposed in a way that uses place value.



$$18 = 10 + 8$$

Then the most efficient way to subtract.

$$18 - 5 = (10 + 8) - 5 = 10 + (8 - 5) = 10 + 3 = 13$$



- 13.** Ask trainees if there are any questions regarding this concept. Clarify any questions before continuing. If the discussion is about exactly how to use the number bonds, inform trainees that they will have an opportunity to practice it shortly.

Practice

Activity: Practicing band of 10 and number bonds | **Time:** 30 minutes | **Arrangement:** Pairs



14. SAY >

- *Now that we have read about using the band of 10 and number bonds, let us take some time to practice each approach. You will work in pairs with the person next to you.*
- *You have 15 minutes to complete Activity 4.1 on page 39 of the Math Trainee's Handbook. Then we will regroup to share the answers.*

- 15.** Have trainees form pairs to complete the activity.

- 16.** Walk around the room and provide guidance.

- 17.** Regroup the trainees after 15 minutes and call on several trainees to present their responses.

- 18.** Inform trainees that the complete answer key is on page 41 of the Math Trainee's Handbook.

Apply

Activity: Role-play using number bonds | **Time:** 45 minutes | **Arrangement:** Small groups



1. SAY >

- *Now we will take 30 minutes to role-play teaching 'Emerging level Week 5, Lesson 3' in small groups. One person will play the role of the Facilitator and the rest of you will play the role of the students in each group.*
- *Facilitators should remember to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.*



2. Form groups of 5 to 8 trainees.
3. Ask trainees in each group to select their Facilitator.
4. Give each group a set of 20 counters.
5. Explain that these are the resources needed in order to teach this lesson.
6. In order to create a classroom environment for role-playing the lesson, give each group a flipchart paper, marker and tape. Give each group a part of the training room or a different room to use as their classroom. They can mount the flipchart paper and use it as a board. The other group members should rearrange themselves to simulate a classroom.
7. Walk around and assist each group with the activity.
8. Give the trainees 45 minutes to role-play the lesson.
9. After the lesson is acted out, regroup the trainees to discuss the following questions:
 - What worked in the lesson?
 - What was challenging in the lesson?
 - How did the teaching strategies support the lesson?
10. Clarify any questions about how to use a daily lesson plan effectively.
11. Share the key messages of the session.



12. SAY >

- *Remember that addition and subtraction is taught starting with numbers within 10, then by increasing difficulty to numbers within 20 and eventually onto larger numbers.*
 - *It is important for students to develop basic mental strategies before learning the standard way of adding or subtracting vertically. The band of 10 and number bonds support this. In the next session we will go more in depth with number bonds.*
13. Invite trainees to add their own reflections or comments before closing the session.
 14. Instruct trainees to gather their teaching aids and store them carefully to be used during the remainder of the training and later on in their classroom.
 15. Thank trainees for their active participation.



Math Training Session 6:

Add and Subtract beyond 20

Training session summary | 1 hour 45 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Use number bonds in daily lessons to teach addition and subtraction beyond 20.

KEY MESSAGE

- Place value is the value of a digit which depends on its place or position in the number.
- Number bonds can be used in different ways to add or subtract – by decomposing or breaking down numbers according to place value or by using the ‘make 10’ strategy.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

- Write the objectives of the session on a flipchart paper and mount on the wall.

TRAINING SESSION OVERVIEW

In this session, the trainer presents the use of number bonds to teach addition and subtraction beyond 20. Then trainees practice using number bonds and role-play delivering a lesson plan that uses number bonds.



Steps to follow

Warm-up

Activity: Present session objectives | **Time:** 5 minutes | **Arrangement:** Individual

TIP > Trainees can follow along by reading page 44 of the **Math Trainee's Handbook**

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Use number bonds in daily lessons to teach addition and subtraction beyond 20.

Present

Activity: Presentation of key messages | **Time:** 40 minutes | **Arrangement:** Whole group



1. Instruct trainees to turn to page 44 of the Math Trainee's Handbook and follow along as you **READ ALOUD >**

*In our number system, the value of a digit depends on its place or position in the number. Each place has a value of 10 times the place to its right. A numeral or digit is one of the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8 or 9. All numbers are made up of one or more digits. For example, the number 2 has one digit; the number 89 has two digits and the number 450 has three digits. The position of each digit in a number tells its value, or **place value**. For example, the number 'five million, two hundred ten thousand, nine hundred sixty three' is made up of 7 digits and is written as and shown by the place value table below.*

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
5	2	1	0	9	6	3

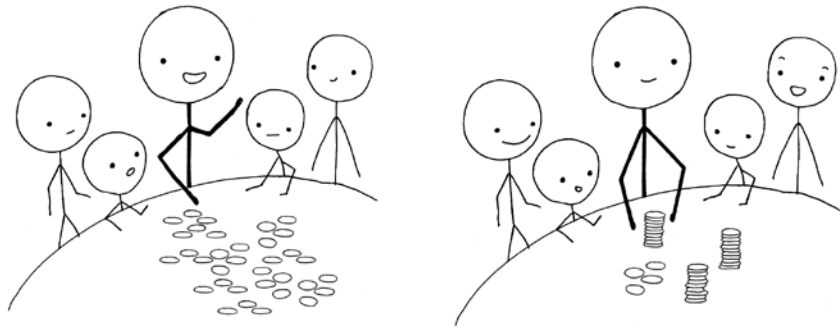
2. Pause reading here and clarify any questions about place value.





3. Invite a trainee to continue to **READ ALOUD** >

- *The emerging level students should learn the place value for ones, tens and hundreds. The developing level students should learn up to thousands.*
- *Understanding the importance of ten is very important so activities should focus on that. Using the band of 10 teaching properties of 10. Skip counting by 10 by counting 10, 20, 30, 40, 50 etc. also does that. By the time they come to school they may know 5, 20 and 50 and 100 from using money at home. Students should be able to think of numbers as 10 and 1, 10 and 2, 10 and 3 and so on.*
- *It is important to teach students to organize items into '10s' as a fast way of counting. For example, a collection of 34 counters can be organized for easy counting in 10s where the 10s are counted first followed by the 1s: "10, 20, 30, 31, 32, 33, 34." There are 34 counters.*



4. Pause reading here and answer any questions.



5. Invite a trainee to continue to **READ ALOUD** >

- *We use number bonds to teach addition and subtraction before teaching how to add or subtract vertically in columns. This is because when adding and subtracting vertically in columns, the concept of regrouping is difficult for students. Therefore, we use the number bonds approach first to build students' ability to do quick mental arithmetic. After they master that, you can teach them to add or subtract vertically in columns.*
- *When using number bonds to add or subtract, there are many ways of breaking down the first number. Here we look at 2 ways:*
 - *By their place value.*
 - *By 'making 10' or a multiple of 10 when adding to the second number.*
- *Students can break down numbers in other ways as well, depending on how they see and understand them. This should be encouraged and you*

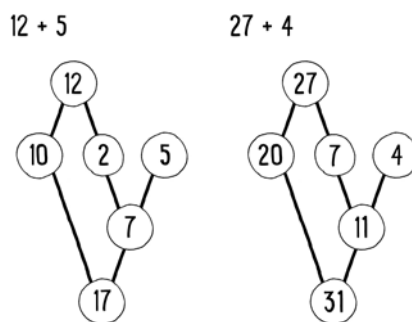


should support it to build their self-confidence and knowledge of number bonds. Working with number bonds should be a fun activity. Make sure that you create an environment where students feel free to try different combinations to form their number bonds.

6. Now let us review some examples together. Review each example from pages 46 to 48 of the Math Trainee's Handbook one-by-one with the trainees by explaining it on the board.

Example 1: Add using number bonds

In these examples, the numbers are broken down according to their place value.



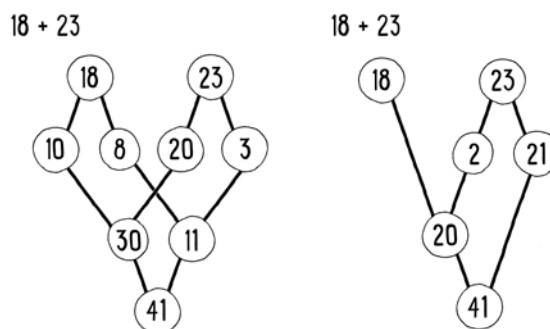
Example 2: Add using number bonds

In this example, numbers are decomposed according to their place value.

$$18 + 23 = (10 + 8) + (20 + 3) = (10 + 20) + (8 + 3) = 30 + 11 = 41$$

Alternatively, numbers can be decomposed in order to make a multiple of 10

$$18 + 23 = 18 + 2 + 21 = (18 + 2) + 21 = 20 + 21 = 41$$



Example 3: Add using number bonds

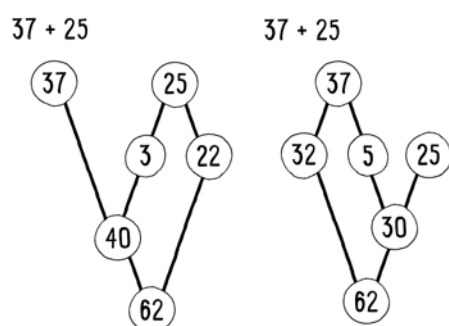
In this example, numbers can be decomposed in order to make a multiple of 10.

$$37 + 25 = 37 + (3 + 22) = (37 + 3) + 22 = 40 + 22 = 62$$

Here we use the addition fact that $37 + 3 = 40$, which should be a quick recall extended from understanding that $7 + 3 = 10$.

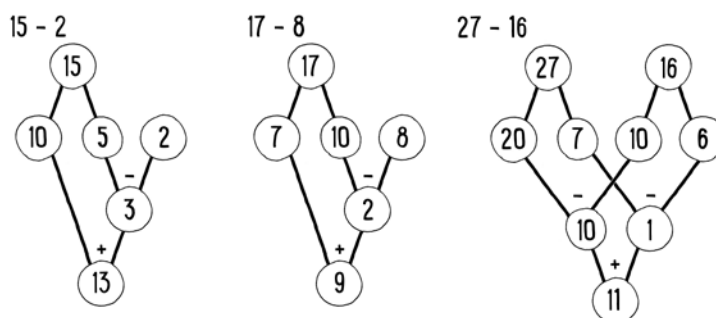
Alternatively, we can make a multiple of 10 using the addition fact that $25 + 5 = 30$ and decompose 37 into 32 and 5.

$$37 + 25 = (32 + 5) + 25 = 32 + (5 + 25) = 32 + 30 = 62$$



Example 4: Use number bonds for subtraction

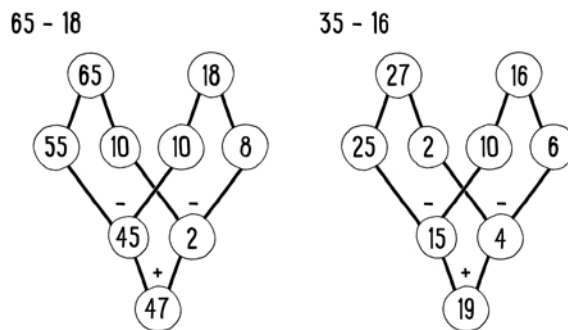
In the following 3 examples, the first number is decomposed by place value.



Example 5: Use number bonds for subtraction

In these 2 examples, because the subtraction requires regrouping, the first number is decomposed using the addition facts for 10. In other words, 65 is 55 and 10, or 35 is 25 and 10. For examples with regrouping, this is the best approach. Then there will be 2 subtractions – one for the 10s place and another for the 1s place.

Always remember to write the subtraction sign in the number bond.



7. Clarify any questions before continuing. If the discussion is about exactly how to use the number bonds, inform trainees that they will have an opportunity to practice it shortly.

Practice

Activity: Practice using number bonds | **Time:** 30 minutes | **Arrangement:** Pairs



1. **SAY >** Now that we have learnt more about number bonds, let us take some time to practice using them. You will work in pairs with the person next to you to complete Activity 5.1 on page 49 of the Math Trainee's Handbook. You have 25 minutes. Then we will regroup to share the answers.
2. Have trainees work in pairs to complete Activity 5.1.
3. Give each pair flipchart paper and markers to present their solutions.
4. Walk around the room and provide guidance.



Apply

Activity: Presentation of number bonds | **Time:** 30 minutes | **Arrangement:** Whole group

1. Bring trainees back to the whole group and call on each pair to present their number bond for each exercise in Activity 5.1.
2. Clarify any questions on how to use number bonds.



3. ASK >

- *What do you think are the advantages of using number bonds?*
- *What do you think will be challenging using number bonds?*

4. Share the key messages of the session.



5. SAY >

- *Recall that place value is the value of a digit which depends on its place or position in the number. Number bonds can be used in different ways to add or subtract – by decomposing or breaking down numbers according to place value or by using the 'make 10' strategy.*
- *We emphasize using this method first before teaching adding and subtracting vertically because we can avoid talking about the regrouping concepts, which are difficult. Also, this method allows for students to break down numbers in different ways, giving them freedom to be creative.*
- *Also, always remember that students need to feel safe in their learning environment, protected against all forms of abuse and sexual exploitation. Remember to use positive discipline in the classroom, maintain a positive code of conduct with students and do not criticize or interact negatively with a student. Always, ensure that the physical space is free from risks.*

6. Invite trainees to add their own reflections or comments.

15 MINUTE BREAK (OPTIONAL)

15 MINUTE ENERGIZER (OPTIONAL)



Math Training Session 7:

Make Math Fun

Training session summary | Duration: 1 hour 30 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Use games and songs to build fluency in Number Sense and Operations.

KEY MESSAGE

- Games and songs create an atmosphere where students enjoy learning math. It creates a sense of belonging, develops confidence and helps the brain to store knowledge.
- Fluency refers to an automatic recall of basic number facts such as number bonds, adding and subtracting within 10, adding and subtracting within 100 and doubling numbers. Being fluent frees up the short-term memory, which we need for everyday tasks, to learn new things. Building fluency is not the same as memorizing. You can memorize and not understand, but when you develop fluency you recall facts quickly and also understand them.
- When counting forward and backward students know the forward number sequence up to 100, using words and symbols for 0, 1, 2, 3, 4 and so on; and the backward sequence from 100 to 0. It helps their ability to name the number before and after a given number thereby introducing the concept of addition and subtraction.

- Skip counting is counting by a number that is greater than 1, such as by 2s, 5s or 10s. It is an introduction to the concept of multiplication.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- 100 number chart
- Math Trainee's Handbook
- Math Lesson Plan Bank



PREPARATION REQUIRED

- Review daily lesson plan for Week 8, Lesson 3, and make your own tune for the song in the lesson.
- Write the objectives of the session on flipchart paper and mount on the wall.

- Make a 100 number chart and mount on the wall.
A 100 number chart is a 10 x 10 table of numbers from 1 to 100 written clearly on a large piece of paper, which can be used to point and guide during counting exercises. It is a visual teaching aid.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

TRAINING SESSION OVERVIEW

In this session, the trainer presents the importance of making math fun, while building fluency through games and songs used for skip counting and counting forward and backward. Then trainees practice games such as 'Simon says' and 'Who am I?' and learn songs for counting.



Steps to follow

Warm-up

Activity: Familiarization with weekly lesson plan using a song | **Time:** 5 minutes

Arrangement: Individual

TIP > Trainees can follow along by reading page 54 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Use games and songs to build fluency in Number Sense and Operations.

2. Instruct trainees to turn to page 174 of the Math Lesson Plan Bank and silently read the daily lesson plan for the 'Emerging level Week 8, Lesson 3'. This lesson is from week 8, which means it assumes that students have covered content taught in the previous weeks.



3. **ASK >** *What teaching strategies are being used in this session?*

Answer: Counting forward and backward using song and band of 10.



4. **ASK >**

- *Why do you think counting forward and backward with ease is important?*
- *Why should we incorporate singing into math lessons?*

5. Have trainees share their answers with the rest of the group. It is their viewpoint so there is no right or wrong answer.
6. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.



Present

Activity: Presentation of key messages | **Time:** 15 minutes | **Arrangement:** Whole group



1. Instruct trainees to turn to page 55 of the Math Trainee's Handbook and follow along as you **READ ALOUD** >
 - **Fluency** refers to the automatic recall of basic number facts such as number bonds, adding and subtracting within 10, adding and subtracting within 100 and doubling numbers. Being fluent frees up the short-term memory when tackling a more interesting and engaging piece of math. Counting forward and backward, and skip counting are examples of strategies that build fluency.
 - **What is counting forward and backward?**

Counting forward and backward helps to develop an understanding of the number sequence to 100 (or 1,000) using words and symbols for 0, 1, 2, 3, and 4 onwards. Counting forward also introduces the idea of addition or 'one more.' Counting backward from 100, 99, 98, and 97 down to 1 is a more challenging skill to develop but important as it introduces the concept of subtraction or 'one less.' Developing mastery of counting forward and backward sets the foundation for developing number Operations and other mathematical concepts.
 - **What is skip counting?**

Skip counting is counting by a number that is not 1. In other words, it is counting by skipping numbers by a number greater than 1, such as by 2s or 5s or 10s. For example, to skip count by 2s is to count as follows: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 and so on. To skip count by 5s is to count as follows: 5, 10, 15, 20, 25, 30, 35, 40 and so on. To skip count by 10s is to count as follows: 10, 20, 30, 40, 50, 60 and so on. Building fluency in skip counting lays the foundation for success with multiplication. It emphasizes pattern recognition in counting for students. For example, when skip counting by 2, we begin at 0 and skip every other number. When skip counting by fives the numbers always end in either 5 or 0. When skip counting by tens, the number always ends only in 0.
 - Counting forward and backward, and skipping can be practiced using a variety of counting experiences such as counting songs or rhymes,



finger play, games and working with counters. The number chart can be used to point at as students sing a song or play other games, such as asking them to count while skipping with a skipping rope, or forming a circle and throwing a ball around the circle while skipping the number of pupils you are skip counting by. These strategies develop the students' comprehension of Number Sense, ability to see patterns, build fluency and improve memory capacity.

2. Pause reading here and clarify any questions.



3. Continue from page 56 of the Math Trainee's Handbook.

READ ALOUD >

Why use games and songs to build fluency?

Games and song create an atmosphere where students enjoy learning math. It creates a sense of belonging, develops confidence and stimulates the brain to retain knowledge. Games and song can be used to build fluency in Number Sense and Operations. Some games used in the math lessons are 'Simon says' and 'Who am I?' Today we will practice singing and play 'Simon says'.

Practice

Activity: Practice 'Simon says', 'Who am I?' and singing a song | **Time:** 40 minutes

Arrangement: Whole group

1. Practice the game 'Simon says'



2. **SAY >**

- *Now we will practice a game called 'Simon says'. Simon says is a fun game that allows students to practice new skills and shows what they understand. Here are the steps to the game.*
- *Tell students that you will be calling out instructions for them to act out. Sometimes, you will simply call out the instructions and at other times you will first say 'Simon says' before stating the instruction. Students are supposed to follow the instruction only when you say 'Simon says' first. Otherwise, they should not do anything.*
- *For example, if I say "Simon says jump up and down," everyone should jump up and down. But if I say "Jump up and down," no one should do anything. If anyone does the action, they are out of the game.*
- *This is a fun way to make sure students learn how to follow instructions and also to test if they understand math concepts. Let*



us try it together. I will call out instructions and you should follow or not follow depending on what I say. Some math concepts to test here are counting skills.

3. Form a circle with all the trainees.



4. **SAY >**

- Simon says count backward from 10 to 1
- Skip count by 2 until 10
- Simon says skip count by 2 until 10"
- Simon says jump up and down 5 times
- Go around in circles 3 times

5. Clarify any questions on how to play this game.

6. Now practice the game 'Who am I?'



7. **SAY >** Let us try another game. This one is called 'Who am I?' In this game, you will give a clue and ask students "Who am I?" Students raise their hands and when you call on a student she or he should say "I am a _____."



8. **ASK >** I have 3 sides and 3 angles. Who am I?

Answer: I am a triangle.



9. **ASK >** I am a number that is 2 more than 13. Who am I?

Answer: I am the number 15.



10. **SAY >**

- Singing songs is a fun way of capturing students' attention. In math you can sing counting songs or make up songs about shapes and their properties. You can write your own songs about any concept, to help students learn.
- In Week 8, Lesson 3 there is a song. Many of the lessons begin with a song. Let us, as a group, come up with a tune for the song or we can revise the song to make it easy for us to sing.
- Take a few minutes to read the lyrics of the song and come up with a tune for it.

11. Ask for a volunteer to sing the song according to his or her own tune.

12. Practice the song together as a group.



Apply

Activity: Make a song about zero | **Time:** 30 minutes | **Arrangement:** Small groups

1. Form groups of 3 to 4 trainees.
2. Ask each group to come up with a tune for this song used to introduce the concept of zero. The words to the song can be found on in the daily lesson plan for Week 4, Lesson 1 on page 92 of the Math Lesson Plan Bank.

10 green bottles hanging on a wall,
10 green bottles hanging on a wall,
If 1 green bottle should accidentally fall,
There'll be 9 green bottles hanging on the wall.

9 green bottles hanging on a wall,
9 green bottles hanging on a wall,
If 1 green bottle should accidentally fall,
There'll be 8 green bottles hanging on the wall.

[fill in the remaining lyrics counting down 8, 7, 6, 5, 4, 3, 2...]

1 green bottle hanging on a wall,
1 green bottle hanging on a wall,
If 1 green bottle should accidentally fall,
There'll be no green bottles hanging on the wall.

3. Give trainees 20 minutes to practice.
4. Call on each group to present their tune.
5. Note down any questions or concerns or clarifications to address.
6. Share the key messages of the session.





7. SAY >

- *Let us close this session by reviewing the key messages. Fluid automatic recall of basic number facts such as number bonds to 10, adding and subtracting within 10, adding and subtracting within 100 and doubling numbers frees up short-term memory for students so that they can focus on other new concepts.*
- *In this session we practiced counting forward and backward. This helps students know the forward number sequence using words and symbols for 0, 1, 2, 3, 4... and the backward sequence from 100, 99, 98, 97... It also helps students' ability to name the number before and after a given number, thereby introducing the concepts of addition and subtraction.*
- *Songs are a great way to do this kind of activity, as it is fun for students and creates an enjoyable learning environment. Games are also very important in math classes to help students feel relaxed and enjoy their learning experience.*
- *We did not practice skip counting today. You will see this technique in some of the other lessons after week 15. Skip counting is a more advanced technique and is introduced after students have learned to count beyond 20.*
- *Skip counting is counting by a number that is not 1 but by skipping numbers by a number greater than 1 such as by 2s or 5s or 10s. Skip counting is the first step toward understanding multiplication. This can be practiced through songs as well.*

8. Thank trainees for their active participation.

15 MINUTE BREAK (OPTIONAL)

15 MINUTE ENERGIZER (OPTIONAL)



Math Training Session 8:

Solve Word Problems

Training session summary | Duration: 2 hours

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Use real-life or imaginary scenarios and storytelling to present counting, addition and subtraction problems.

KEY MESSAGES

- Problem-solving is one of the most important teaching strategies in math.
- Problem-solving provides a context in which learning math becomes meaningful and enjoyable to students.
- Problem-solving builds students' ability to reason logically, and to persevere and manage their emotions.
- The primary goal of problem-solving is the thinking process that leads to the solution.
- Understanding how students think about a problem will give us insight into how they understand or misunderstand math concepts.
- Problem-solving is best taught by allowing students to work in small groups or pairs.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the

session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

- Write the objectives of the session on flipchart paper and mount on the wall.
- Write the key messages on flipchart paper to use during the 'Present' section.
- Write each of the following problems on a separate flipchart paper and mount on the wall to use during the 'Practice' section:
 - Mohammed read 22 pages of his book yesterday. Today, he read another 5 pages. How many pages did he read in total?



- The chalk box had 28 pieces of chalk in it. Mr Katabalo had a few more in his pocket. When he pulled them out to check, there were 5 more pieces. How many pieces of chalk were there altogether?

ADAPTATION > Adapt the names and currency to your context.

TRAINING SESSION OVERVIEW

In this session, the trainer explains the importance of teaching problem-solving skills to students at a young age. Then trainees role-play solving problems in small groups or in pairs and compose 1-step real-life problems to use in lessons.

Steps to follow

Warm-up

Activity: Familiarization with daily lesson plans using real-life problems

Time: 10 minutes | **Arrangement:** Individual

TIP > Trainees can follow along by reading page 60 of the **Math Trainee's Handbook**.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Use real-life or imaginary scenarios and storytelling to present counting, addition and subtraction problems.

2. Instruct trainees to turn to page 202 of the Math Lesson Plan Bank and silently read 2 daily lesson plans – Week 9, Lesson 5 and Week 10, Lesson 5 (page 219). As these lessons are from weeks 9 and 10, they assume that students have covered the content taught in the previous weeks.



3. **ASK** > *How is the lesson objective introduced in each of these lessons?*

Answer: Through a story and a scene drawn on the board.



4. **ASK** > *Why do you think this teaching strategy is useful?*

Example answer: Storytelling activates students' imagination and keeps them interested. Also, if the story is relevant to their daily life, it is meaningful and they are able to understand the problem more easily.

5. Have trainees share their responses with the group. There are no right or wrong answers because they are sharing their own viewpoints.



6. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

Present

Activity: Presentation of key messages | **Time:** 40 minutes | **Arrangement:** Whole group



1. Invite trainees to turn to page 61 in the Math Trainee's Handbook. Have them take turns to **READ ALOUD** >
 - *In the previous sessions, we practiced 3 different teaching strategies useful for teaching addition and subtraction, before teaching the standard way of adding vertically using place value:*
 - Band of 10
 - Number bonds
 - Using games and songs
 - *Visual images of addition or subtraction such as band of 10 and number bonds rely on students' ability to decompose and associate numbers. Remember that it is important to use these different methods **before** introducing students to the standard way of adding vertically in columns.*
 - *In the 2 sample lessons we just reviewed, the lesson objective is being introduced to the students in the context of a story or a problem. **Problem-solving is one of the most important teaching strategies in learning math. It is important to introduce problem-solving at an early age because it provides a context in which learning math becomes meaningful and enjoyable to students.** A math problem presented in the form of a story captures the students' imagination because it relates to real life or is humorous.*
 - ***Problem-solving also builds students' ability to reason logically, persevere and manage their emotions.** When students struggle to solve a problem by themselves, we should not show them how to solve it right away. Instead, try the following techniques:*
 - Slowly and clearly read aloud the word problem.
 - Repeat it in local language to ensure that the problem is understood.
 - Invite students who speak other languages to help translate the problem into the different languages spoken in class.
 - Allow students sufficient time to think about the problem.
 - Draw a picture to represent the story.



- Ask students open questions.
- Instruct students to work in small groups or in pairs.
- Ask students to explain how they are thinking about the problem.
- Encourage each group of students to use a technique they understand such as band of 10 or number bonds or using the standard method to find the solution.

2. Pause reading here and invite trainees to comment on what they have read so far.



3. Invite another trainee to **READ ALOUD** >

- *Although finding the right answer to a problem is important, it is not the primary goal of using problem-solving as a teaching strategy. **The primary goal of problem-solving is the thinking process that leads to the solution.***
- *Therefore, when a student provides the incorrect answer, it is important **not** to point out that it is incorrect. It is also important **not** to say that the answer was good or correct. Instead, ask a question such as “Can you explain how you got this answer?” Ask other questions that help the student explain their reasoning such as “Why do you think the problem is done that way?”*
- ***Understanding how students think about a problem will give us insight into how they understand or misunderstand math concepts.** When a student provides an incorrect answer to a math problem, it is not because they are not intelligent or cannot do math.*
- *Mathematical ability is not an in born trait. It is not determined by gender. It is developed through dedication and hard work. Mathematical ability is affected by social expectations and gender roles that students grow up with. All students can learn and grow their math capacity through perseverance and practice.*

4. Pause reading the text and discuss its content for 10 minutes. You can ask some reflection questions to help the discussion. For example, you can ask trainees to summarize the key messages of the training so far, which concepts they understand very clearly, which concepts are not clear to them and so on.

5. Clarify any questions trainees may have about the concepts covered.





6. Invite another trainee to **READ ALOUD** >

▪ **Why should students work in small groups or in pairs?**

Problem-solving is best taught by allowing students to work in small groups or in pairs. Small group work or working in pairs is important because it helps students to:

- *Create important relationships with their classmates.*
- *Learn to work together.*
- *Learn from each other.*
- *Learn to be empathetic.*
- *Develop leadership skills.*
- *Help each other in their own language away from the pressure of the whole class.*

7. Clarify any questions trainees may have about the concepts covered. Remind Facilitators that they learned about group and pair work in the Foundational Training, and they will now revise some of that information.



8. Invite another trainee to **READ ALOUD** >

Some important strategies for small group work or pair work are listed below:

▪ **How many students should be in a small group?**

The ideal size for small group work is 3–5 students. If class sizes are larger, forming larger groups of 6–10 students is acceptable but not ideal. Also, classroom activities can be done in pairs.

▪ **How do we form small groups in class?**

Groups can be formed using the rows of desks students are already seated in. Groups can also be formed by asking students to pick one object out of a container of mixed objects such as leaves, flowers and sticks, then grouping them by matching objects – students who picked a leaf form one group, students who picked a flower form another group, and so on.

▪ **How do I make sure that small group work is a success?**

- *It is important to prepare the activity in advance. Know how many groups you intend to form and what the goal of the activity is going to be. Provide clear and simple instructions to the class.*
- *Create roles and responsibilities for each group member (recorder, reporter, supplies manager, and so on). Have a final product that each*



group presents. Ensure students are always ready to explain what they are doing and what they have learned.

- **How should students behave when working in small groups?**
 - Ensure groups do not talk too loudly to disturb other groups or classes. Inform other Facilitators that you will be doing small group work activities in your class.
 - Inform students that you expect them to interact and express their agreement or disagreement with courtesy. For example, it is not acceptable to tell another student that he or she is stupid or remove materials from the hand of another student.
 - **How should I behave as the facilitator of small group work?**
 - It is important not to criticize or negatively interact with students. Show respect and empathy for each student and encourage all students to show the same attitude.
 - Provide students with exercises they are able to solve. Students must practice and repeat exercises to master and automate mathematical concepts. Activities should be at the students' level so they are able to find solutions, but not so easy that they do not progress.
 - For the emerging level, problems should be about adding and subtracting within 100, with only one step to find the answer. For the developing level, use problems with multiple steps to solve.
 - Provide positive feedback and support so that students enjoy learning and have confidence in the future. Always encourage students using language such as "Good work!", "I like how you explained that problem!", "You are on the right path!", or "Let us all clap for her!".
9. Have trainees turn and talk with the person next to them for 10 minutes on the following reflection questions:
- Summarize in your own words any new concepts we have read about.
 - Which concepts make sense to you?
 - What concepts are not clear to you?
10. Clarify any questions trainees may have about the concepts covered.



11. Point to the flipchart mounted on the wall and read the key messages.

Key Messages

1. Problem-solving is one of the most important teaching strategies in learning math.
2. Problem-solving provides a context in which learning math becomes meaningful and enjoyable to students.
3. Problem-solving builds students' ability to reason logically, persevere and manage their emotions.
4. The primary goal of problem-solving is the thinking process that leads to the solution.
5. Understanding how students think about a problem will give us insight into how they understand or misunderstand math concepts.
6. Problem solving is best taught by allowing students to work in small groups or pairs.

Practice

ADAPTATION > Adapt the names in the problem to your context.

Activity: Role-play on solving problems | **Time:** 40 minutes | **Arrangement:** Whole group

1. Point to the flipchart with the first problem on it.



2. **SAY** >

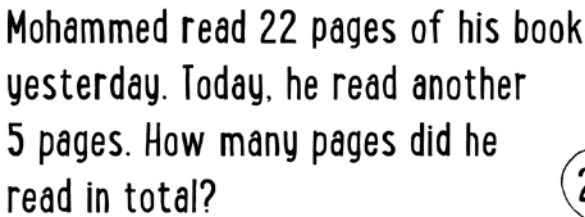
- *Now we are going to look at a **1-step problem** and practice solving it. You will solve the problem by working in pairs with the person next to you. Turn to the person next to you and greet them.*
- *Listen carefully to the following problem – Mohammed read 22 pages of his book yesterday. Today, he read another 5 pages. How many pages did he read in total?*
- *Solve this problem by using the band of 10. You have 5 minutes to work with your partner.*

3. If English is not the first language of the trainees, repeat all the instructions in the local language to demonstrate how the facilitator can incorporate different languages to help students understand the problem.

4. After 5 minutes, invite 1 trainee to play a student who is trying to solve the problem using the band of 10 on the board. You will role-play the Facilitator who observes the student and provides guidance if needed.



- “



- “



ADAPTATION > Adapt the names in the problem to your context.



11. SAY >

- *Now that you are in your group of 4, listen carefully to the problem you are going to solve – The chalk box had 28 pieces of chalk in it. Mr Katabalo had a few more in his pocket. When he pulled them out to check, there were 5 more pieces. How many pieces of chalk were there altogether?*
- *Work with your group to solve this problem using number bonds. You have 10 minutes to solve the problem. Remember to help each other and work together.*

12. Invite 1 or 2 trainees to present their number bonds on the board. You will role-play the Facilitator who observes the student and provides guidance if needed.

Apply

Activity: Compose 1-step problems to use in lessons | **Time:** 30 minutes

Arrangement: Pairs



1. SAY >

- *Thank you for role-playing how to solve the problems using the different methods. We are now going to practice creating your own 1-step problems. Remember that the story of the problem should be one that students will understand because they experience it in their own lives, something imaginative or funny.*
- *You will write these problems while working in pairs. Work with the person next to you. You have 20 minutes to compose as many 1-step problems as you can. I will assign each pair a learning objective to address. Some example problems can be found on page 64 of the Math Trainee's Handbook.*

2. Have trainees get into pairs.

3. Assign each pair 1 or more learning objectives such as:

- Add within 50 without regrouping.
- Add within 50 with regrouping.
- Subtract within 50 without regrouping.
- Subtract within 50 with regrouping.



- Add within 100 without regrouping.
 - Add within 100 with regrouping.
 - Subtract within 100 without regrouping.
 - Subtract within 100 with regrouping.
4. Have each pair compose at least 2 or 3 problems that are suitable for the emerging level.
 5. Walk around and provide guidance to trainees.
 6. Note down any questions, concerns or clarifications to address.
 7. Have each pair present some of their examples to the group.
 8. Repeat the key messages of the session.

Key Messages

1. Problem-solving is one of the most important teaching strategies in learning math.
2. Problem-solving provides a context in which learning math becomes meaningful and enjoyable to students.
3. Problem-solving builds students' ability to reason logically, persevere and manage their emotions.
4. The primary goal of problem-solving is the thinking process that leads to the solution.
5. Understanding how students think about a problem will give us insight into how they understand or misunderstand math concepts.
6. Problem solving is best taught by allowing students to work in small groups or pairs.

9. Thank trainees for their active participation.



Math Training Session 9:

Solve Money Problems

Training session summary | Duration: 1 hour

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Design activities to teach students about money.
- Compose 1-step, real-life addition or subtraction problems involving money.

KEY MESSAGES

- Learning how to count, use and identify coins and bills is an important basic money skill to learn at an early age.
- Play or real money is a useful teaching aid to incorporate into lessons on money.
- Real-life word problems and role-playing activates students' imagination on how to use money.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Math Trainee's Handbook
- Math Lesson Plan Bank
- Paper or cardboard found in local environment such as discarded boxes
- Ruler
- Scissors
- 100 discarded soda bottle tops (if cardboard, ruler and scissors are not available)

PREPARATION REQUIRED

- Review 'Emerging level Weekly Plan 25' (page 305) in the Math Lesson Plans Bank.
- Make sample coins and bills using paper or cardboard, markers, ruler and scissors.
- Write the objectives of the session on flipchart paper and mount on the wall.
- Write the following money problems, to be used during the 'Practice' section, on flipchart paper and mount on the wall:
 - How much would it cost to buy 2 bunches of bananas that cost 50 cents each?
 - You bought an orange for 5 cents and paid for it with a 10 cents coin. How much change did you get back?



- Jonathan bought 5 cakes for 10 cents each, 3 soda cans for 50 cents each and 12 eggs for 5 cents each. How much did he pay in total?

ADAPTATION > Adapt the name and currency to your context.

TRAINING SESSION OVERVIEW

In this session, trainees review examples of money-related problems. They then practice writing their own 1-step money-related problems. Finally, they make paper bills and coins using materials found in the local environment to use as teaching aids in class.

Steps to follow

Warm-up

Activity: Familiarization with a sample weekly plan on money

Time: 10 minutes | **Arrangement:** Individual

TIP > Trainees can follow along by reading page 65 of the **Math Trainee's Handbook**.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Design activities to teach students about money.
2. Compose 1-step, real-life addition or subtraction problems involving money.

2. Instruct trainees to turn to page 313 of the Math Lesson Plan Bank and silently read the weekly lesson plan for week 27. This lesson is from week 27, which means it assumes that students have covered content taught in the previous weeks.

3. Give trainees at least 5 minutes to read in silence.



4. **ASK** > *What is the progression of how the objectives are introduced?*

Answer: Recognizing coins, counting and working with coins and comparing them (before moving on to bills/notes).



5. **ASK** > *What teaching strategies or aids are being used in these lessons?*

Answer: Play money, role-playing, working in groups, problems solving.





6. **ASK >** *Why do you think these teaching strategies and aids are useful?*
7. Have trainees share their responses with the group. There are no right or wrong answers to the last question, because they are personal viewpoints.
8. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

Present

Activity: Presentation of key messages | **Time:** 5 minutes | **Arrangement:** Whole group



1. Have trainees turn to page 63 in the Handbook and follow along as you **READ ALOUD >**
 - *Learning how to count, use and identify coins and bills is an important basic money skill to learn at an early age. One of the more difficult but basic money skills is understanding how to make change and knowing how much change you will receive when spending money and purchasing items. This means developing the subtraction skill is critical.*
 - *Topics related to money are covered during weeks 27 and 28 of the emerging level lessons. Setting up role-playing scenes and giving students real-life problems or stories makes teaching money skills easier by activating their imagination and making learning fun.*
 - *It is important for students to see, touch and feel the coins and bills in order to differentiate between them. If there is not sufficient real money available to do these exercises, you can make play money in order to teach how to buy things, sell things and make change. During this session, we will make some play money for that purpose and compose some real-life word problems to support these activities in your lessons.*



Practice

Activity: Examples of money problems | **Time:** 15 minutes | **Arrangement:** Small groups

1. Point to the flipchart paper with money problems written on them.

1. How much would it cost to buy 2 bunches of bananas that cost 50 cents each?
2. You bought an orange for 5 cents and paid for it with a 10 cents coin. How much change did you get back?
3. Jonathan bought 5 cakes for 10 cents each, 3 soda cans for 50 cents each and 12 eggs for 5 cents each. How much did he pay in total?

2. Invite a trainee to read the first one aloud.



3. **ASK >** *How many steps would it take to find the solution?*

Answer: It takes 1 step to solve. 50 cents plus 50 cents equals 100 cents for the 2 bunches of bananas.

4. Invite another trainee to read aloud the second example.



5. **ASK >** *How many steps would it take to find the solution?*

Answer: It takes 1 step to solve. 10 cents minus 5 cents equals 5 cents.

6. Invite another trainee to read aloud the third example.



7. **ASK >** *How many steps would it take to find the solution?*

Answer: It would take many steps to solve.



8. **SAY >**

- *We learnt in the previous session that it is important to introduce problem-solving at an early age because it provides a context in which learning math becomes meaningful to students. However, it is important that problems are age appropriate.*
- *For the emerging level, problems should be about adding and subtracting within 100 with only 1 step to find the answer. The first 2 examples are appropriate for this level. The third example is too complex.*
- *Also, it is important to create daily lessons where students pretend to engage in money activities such as going to the market to buy*



something. Role-playing with real or play money to solve these problems will make the class active and interesting. The weekly plan for week 27 has examples of such activities for you to use in your class.

Apply

Activity: Make paper bills/notes and coins and create 1-step money problems | **Time:** 30 minutes

Arrangement: Pairs

1. Inform trainees that they will spend the next 20 minutes doing activities which will help them prepare for the lesson on money.
2. Inform trainees that instructions on how to make bills and coins can be found on page 66 of the Math Trainee's Handbook.
3. Have trainees form 2 groups.
4. Assign the first group the task of cutting up cardboard to make paper bills and coins. Instruct them to make at least 10 of each denomination using paper or cardboard, markers, a ruler and scissors. They can also use the bottle caps to make coins.
5. Provide the sample play money already made before the start of the session as an example. Provide them with all the necessary materials to make the teaching aids.
6. Assign the second group the task of composing 1-step money problems that are suitable for the emerging level. Have them compose as many as they can in the time allotted.
7. Remind them that 1-step problems involve only 1 step to find the solution. Also, all the addition and subtraction exercises must be within 100 to be suitable for the emerging level. The numbers chosen must make sense in the context of money.
8. Walk around and support each group with their task.
9. Bring everyone back to the whole group after 20 minutes and have each group present their work to the other group.
10. Allow trainees to pose questions to each other about their activity.
11. Recap the key messages of the session.





12. SAY >

- *Note that for the emerging level, money topics are covered during weeks 27 and 28 of the program. You can use the weekly plan as a guide to prepare the lessons for those weeks.*
- *Learning how to count, use and identify coins and bills is an important basic money skill to learn at an early age. Remember that play or real money is a useful teaching aid to incorporate into lessons on money. Also, real-life word problems and role-playing activates students' imagination on how to use money. It should be a part of your daily lessons during those weeks.*
- *These type of problems create a link between students' lives and what they learn in school, so the use of local language is also encouraged as understanding a problem develops self-confidence in solving it. Then students will understand and make efforts to progressively learn English. Finally, remember to always encourage group activities, paired with precise instructions in which each student has a task to complete or a role to play.*

13. Thank trainees for their active participation.



Math Training Session 10: Reflection and Conclusion

Training session summary | Duration: 30 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Reflect on the training experience and complete the Math Training Post-test.

RESOURCES REQUIRED

- Math Trainee's Handbook
- A football or object to throw around easily.

PREPARATION REQUIRED

- None
-

TRAINING SESSION OVERVIEW

In this session, trainees reflect on the training experience and complete the Math Training Post-test.



Steps to follow

Reflection

Activity: Reflection on training experience | **Time:** 15 minutes | **Arrangement:** Whole group

1. Have trainees stand in a circle.



2. **SAY >**

- *We have come to the end of our training. A lot of key concepts have been covered. Everyone participated actively and energetically. Let us close by sharing 1 key learning or take away from the training and 1 positive quality of each of the trainees in our group.*
- *I will throw the ball randomly to one of you. Share your thoughts and then throw the ball to another trainee. Let me begin by sharing my own reflections.*

3. Share your own key learning and a positive quality of a trainee, and then throw the ball to that trainee.

4. Repeat until everyone has contributed, including all the trainers.

Post-test

Activity: Math Training Post-test | **Time:** 15 minutes | **Arrangement:** Individual

1. Have trainees turn to page 68 of the Math Trainee's Handbook and complete the Math Training Post-test.

2. Instruct trainees to complete it without using their math resources.

3. Collect the tests to review with the training team later.

4. Ask trainees if they have any remaining questions before the close of the Math Training.

5. Address any remaining questions on the Notice Board. If you do not have time to address them with the whole group, try to talk to the trainee who raised the question and address it before he or she leaves.

6. Thank trainees for their hard work, thoughts and dedication to their students!



PART 2

Math Training Sessions – Phase 2

Training Objectives

Upon completing the 1-day Phase 2 of the Math Training, Facilitators of the Math Intervention in the SHLS will be able to:

- 1** Design active and fun learning activities to teach measurement, and explore data and geometry.
- 2** Use teaching aids and active student-centered techniques in daily lessons.
- 3** Develop problem-solving skills in students.



Proposed Math Training Agenda

This training is planned for **1 day** with **5 hours, 30 minutes of required training**. Adapt the training agenda below. The sessions marked as 'Required' must be delivered in their entirety and the 'Recommended' sessions can be omitted entirely or revised for time and content.

Type	Session	Duration	Training session objectives <i>By the end of this session, trainees will be able to</i>
Recommended	MATH TRAINING SESSION 11: WELCOME AND REFLECTION	1 hour, 50 minutes	- Define a learning environment suitable for an open exchange of ideas. - Reflect and share experiences delivering the math content and brainstorm possible solutions to challenges faced.
Required	MATH TRAINING SESSION 12: MEASUREMENT	2 hours	Incorporate teaching aids and games to teach measurement – comparison of length, mass and capacity using non-standard measures.
<i>Recommended</i>	<i>Break</i>	<i>15 minutes</i>	
Required	MATH TRAINING SESSION 13: DATA	1 hour	Design a data exploration activity to develop students' ability to collect, sort and classify objects into given categories and to ask questions.
<i>Recommended</i>	<i>Break</i>	<i>1 hour</i>	
<i>Recommended</i>	<i>Energizer</i>	<i>15 minutes</i>	<i>Trainees warm-up using an energizer activity.</i>
Required	MATH TRAINING SESSION 14: GEOMETRY	2 hours	Incorporate teaching aids and games to develop students' spatial sense and their ability to identify the characteristics of 2-dimensional shapes (rectangle, square, circle and triangle).
Required	MATH TRAINING SESSION 15: REFLECTION AND CONCLUSION	30 minutes	Reflect on the training experience and complete the Math Training Post-test.



Math Training Session 11:

Welcome and Reflection

Training session summary | Duration: 1 hour, 50 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Define a learning environment suitable for an open exchange of ideas.
- Reflect and share experiences delivering the math content and brainstorm possible solutions to challenges faced.
- Print copies of the agenda for each trainee if possible.
- Write the objectives of the training on flipchart paper large enough for all trainees to read, and mount on the wall.
- Write 'Notice Board' on a blank flipchart paper and mount on the wall to use when needed.
- Write the following titles on 3 different flipchart papers and mount on the wall:

KEY MESSAGES

A learning environment should be respectful, congenial and suitable for an open exchange of ideas.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- List of questions for the game 'Mingle mingle'
- Small pieces of paper or sticky notes (e.g. Post-it notes; at least 5 per trainee)
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

- Prepare a list of questions to pose during the 'Mingle mingle' game.
- Write the training agenda on a flipchart paper large enough for all trainees to read and mount on the wall.

TRAINING SESSION OVERVIEW

In this session, the trainer welcomes trainees, Then trainees co-create rules of the training to ensure a safe environment for open learning and exchange. The trainer leads a warm-up game called 'Mingle mingle', followed by a silent reflection and open dialogue on their experience delivering the math content in the SHLS.



Steps to follow

Welcome

Activity: Welcome to the training | **Time:** 20 minutes | **Arrangement:** Whole group

1. Introduce yourself and invite trainees to introduce themselves.
2. Welcome everyone to the training.



3. **SAY >** *We will begin the training by co-creating rules for the training day followed by a warm-up game. After that, I will present the training objectives and share with you the agenda for the day. Finally, you will spend some time sharing your experiences of delivering the math content in the SHLS.*

Co-creating rules

Activity: Co-create rules | **Time:** 20 minutes | **Arrangement:** Whole group

1. Lead a brainstorming session to define the rules we will all follow during the training day to ensure that the learning environment is friendly, open and supportive.
2. Write the rules shared by trainees on a flipchart and mount it on the wall.



3. **SAY >**
 - *In addition to these rules that you have defined, I would like to remind you of a strategy which we used in the first phase of the training.*
 - *When I want to get your attention and regroup all of you during the training day, I will say “Clap once if you can hear me!” and clap my hands. When you hear me, clap your hands and bring your attention to me.*
 - *If you do not, I will repeat myself by saying “Clap twice if you can hear me!” and I will clap twice. I will keep doing this until all trainees are paying attention. Do you remember this technique? Have you used it in your lessons?*



TIP > You can also have a trainee demonstrate this technique.

4. Practice this technique by clapping once and saying “Clap once if you can hear me!”, clapping twice and saying “Clap twice if you can hear me!”, and so on.
5. Thank trainees for their active participation.

‘Mingle mingle’ rules

Activity: Present the rules of ‘Mingle mingle’ | **Time:** 5 minutes | **Arrangement:** Whole group

1. Present the rules of the game ‘Mingle mingle.’
2. **SAY >** *We are going to play a game called ‘Mingle mingle’, which you also played on the first day of the first phase of this training. For this game, we all have to stand up and walk around the room. I will call out an instruction preceded by the words “Mingle mingle!” When I give the instruction, you need to act it out. Shall we begin?*

Play ‘Mingle mingle’

Activity: Play ‘Mingle mingle’ | **Time:** 20 minutes | **Arrangement:** Whole group

1. Ask trainees to go over to an open space in the room or a safe area outdoors where there is place to move around.
2. Play the game, ‘Mingle mingle.’
3. **SAY >**
 - *Mingle mingle with 5 people and exchange your name and a nice moment from your experience in the SHLS.*
 - *Mingle mingle with 3 different people. Shake hands with each person, then tell each other about one thing you learned while facilitating the math lessons in the SHLS.*
 - *Mingle mingle with 4 different people and tell each other about one thing you learned about how students learn math.*
 - *Mingle mingle with 2 people and share one thing you would like to learn during this training.*

TIP > Give enough time for trainees to complete each instruction.

TIP > You can modify these instructions to make the game more fun, or to suit your context.



Training objectives

Activity: Present the objectives of the training | **Time:** 5 minutes | **Arrangement:** Whole group

1. Have trainees pull out their copies of the Math Trainee's Handbook.
2. Present the training agenda for the day (point to the flipchart with the agenda and/or hand out a copy to each trainee).
3. Present the objectives of the training to the trainees.

TIP > Trainees can follow along on page 70 of the Math Trainee's Handbook.

Objectives of Math Training

By the end of this training trainees will be able to:

1. Design active and fun learning activities to teach measurement, and explore data and geometry.
2. Use teaching aids and active student-centered techniques in daily lessons.
3. Develop problem-solving skills in students.

4. Point to the Notice Board flipchart paper posted on the wall.



5. SAY >

- *Do you remember the Notice Board from the first phase of the training? When we are learning together, questions or concerns may come up that we don't have time to discuss immediately. That's why we have a Notice Board. The Notice Board is the paper posted on the wall there.*
- *At any point during our training, you can ask a question or state a concern that I might put in the Notice Board. That way, we can stay on task during our session and will be sure to review what you have written at the end of the day or later in the training.*



Silent reflection

Activity: Silent reflection on personal experiences | **Time:** 20 minutes

Arrangement: Individual



1. **SAY >** *You have spent a few weeks facilitating math lessons in the SHLS. Before we begin the training on new topics, I would like us to take some time to openly and frankly share your experiences so far. You will do this first individually. Silently think about these questions and write down a response to each question on a separate piece of paper. When you finish, stick each piece of paper in its appropriate category on the flipchart paper on the wall. The questions are:*

- *Positive experience: What is working well with your math classes?*
- *Negative experience: What is not working? What do you think will make it better?*

2. It is possible that many trainees will have similar responses to each question. As trainees stick their responses to the questions on the flipchart paper, sort through the responses, grouping all the similar flipchart responses together.

TIP > This is an individual silent reflection activity. This allows for trainees to share their thoughts freely and anonymously.

Sharing experiences

Activity: Share personal experiences | **Time:** 20 minutes | **Arrangement:** Whole group



1. **SAY >** *Thank you for sharing your experiences. As expected, many of you have similar or the same responses to each of the questions. I have grouped similar responses together so that we can maximize our time. I will read one response and we can discuss it in more detail as a group.*

2. Read each positive experience and discuss as a whole group.
3. Read each challenge and discuss as a whole group.
4. Read a possible solution for each challenge.
5. Brainstorm any other possible solutions to the challenges faced.



6. Manage expectations of trainees in terms of possible solutions to any challenges that have been raised based on the resources and time available in your context.
7. Inform trainees of any other possible solutions to the challenges faced by the them.
8. Ask trainees if they have any questions. Address them or note them on the Notice Board to be addressed later.



Math Training Session 12:

Measurement

Training session summary | Duration: 2 hours

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Incorporate teaching aids and games to teach measurement – comparison of length, mass and capacity using non-standard measures.

KEY MESSAGES

- The big ideas in measurement are: attributes (length, mass, capacity, time), units (meter, grams, liters, hours, minutes), measurement sense and measurement relationships.
- In order for students to understand measurement concepts they should be talking to each other, manipulating objects, doing investigative activities, solving problems, and learning using correct math vocabulary.
- Teaching aids like sticks cut in equal lengths, toothpicks, straws, paper clips, pieces of chalk, paper strips of equal lengths, beads, marbles, stones, handmade balance, cups, plastic containers, buckets, bottles, cans, stop-watches, analog clocks, digital clocks, calendars and other everyday objects should be integrated into classroom activities.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Teaching aids for measurement
- **Math Trainee's Handbook**
- **Math Lesson Plan Bank**

PREPARATION REQUIRED

- Write the objectives of the session on flipchart paper large enough for all trainees to read and mount on the wall.
- Collect teaching aids for measurement such as sticks cut in equal lengths, toothpicks, straws,



paper clips, pieces of chalk, paper strips of equal lengths, beads, marbles, stones, empty containers, buckets, bottles, cans, water, sand or other everyday objects found in your local environment.

- Make a handmade balance (see page 76 of the Math Trainee's Handbook for instructions).

TRAINING SESSION OVERVIEW

In this session, trainees silently read and reflect on weekly lesson plans on measurement. The trainer presents the key messages of the session, and models teaching strategies and use of teaching aids. Then trainees practice role-playing a measurement lesson.

Steps to follow

Warm-up

Activity: Familiarization with weekly lesson plans | **Time:** 20 minutes

Arrangement: Individual

TIP > Trainees can follow along on page 71 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Incorporate teaching aids and games to teach measurement – comparison of length, mass and capacity using non-standard measures.

2. Instruct trainees to turn to page 329 of the Math Lesson Plan Bank and silently read the weekly lesson plan for week 31. As this lesson is from week 31, it assumes that students have covered all content taught in the previous weeks.

3. Give trainees at least 5 minutes to read in silence.



4. **ASK >** *What competency does this lesson focus on?*

Answer: Measurement.



5. **ASK >** *What are the learning objectives for the week?*

Answer: Measure lengths of different objects or images of objects using non-standard measures and compare lengths using language such as 'as long as', 'as short as', 'longer than' and 'shorter than'.





6. **ASK >** *What teaching strategies are being used to explore length?*

Answer: Measure using chalk, pencil, stick, hand span, straws or rope

7. Instruct trainees to turn to page 333 of the Math Lesson Plan Bank and silently read the weekly lesson plan for week 32. This lesson is from week 32, which means it assumes that students have covered content taught in the previous weeks.

8. Give trainees at least 5 minutes to read in silence.



9. **ASK >** *What are the learning objectives for the week?*

Answer: Measure and compare mass using language such as 'heavy as', 'heavier than', 'as light as' and 'lighter than'.



10. **ASK >** *What teaching strategies are being used to explore mass?*

Answer: Home-made balance, made using locally available objects like soaps, stones and bottle caps.

11. Instruct trainees to turn to page 340 of the Math Lesson Plan Bank and silently read the weekly lesson plan for week 33. This lesson is from week 33, which means it assumes that students have covered content taught in the previous weeks.

12. Give trainees at least 5 minutes to read in silence.



13. **ASK >** *What are the learning objectives for the week?*

Answer: Measure and compare the capacity using language such as 'holds or contains as much as', 'more' and 'less than'.



14. **ASK >** *What teaching strategies are being used to explore capacity?*

Answer: Measure using bottles, cans or buckets with water or sand.

15. Ask trainees if they have any questions. Address them now or note them on the Notice Board to address later.



Present

Activity: Key messages and teaching strategies | **Time:** 40 minutes

Arrangement: Whole group



1. **SAY >** *In the emerging level, you introduce the concept of length in week 31, the concept of mass in week 32 and the concept of capacity in week 33. The concept of time is examined in week 11. Today we will discuss the specific content to be covered at the emerging level, and the teaching strategies and aids that support this learning."*



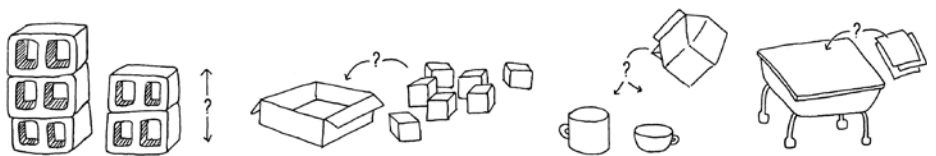
2. Instruct trainees to turn to page 72 of the Math Trainee's Handbook and follow along as you **READ ALOUD >**

TIP > You can invite a trainee to read as well.

- **Why do we learn measurement?**

The ability to measure and compare length, distance, height, weight and volume is essential for daily life and work. Students should also be able to estimate measures, which is a very difficult concept for young students. Using words like 'closer to', 'more or less than', and 'about' in daily activities helps to build foundations for a reasonable range of answers. Everyday experiences help students think about measurement. For example:

- Comparing 2 towers of cement blocks by height.
- Finding whether a collection of blocks will fit inside a box.
- Choosing a large enough glass to hold a small carton of liquid.
- Deciding how many sheets of paper are needed to cover a table.



- *Students know about measurement ideas before formal schooling. In the emerging level, your role is to deepen this understanding. The big ideas for measurement are:*
 - Attributes (length, mass, capacity, time), units (meters, grams, liters, hours, minutes), and measurement sense.
 - Measurement relationships.



3. Clarify any questions regarding this text before continuing.
4. Have trainees turn to page 73 of the Math Trainee's Handbook and inform them that this table summarizes the specific skills covered in the emerging and developing levels for Measurement.



5. Have trainees turn to page 74 of the Math Trainee's Handbook.

Invite a trainee to **READ ALOUD** >

▪ **What is length?**

- *The length of an object can be found by determining the number of units, laid end to end, that make up the distance from one point to another. Length is often what students notice first about an object. In everyday situations, students explore length in objects in their environment.*
- *In the emerging level, students learn about length by comparing objects directly. For example, they might line up 2 objects side by side to see which is longer. They also compare objects indirectly. For example, they might use a string to measure the width of a door, use the same string to measure the width of a desk, and then compare the 2 widths. Students focus first on using sticks, pencils, string and so on. to investigate length before they use standard units such as centimeters or meters. There are many terms that are used interchangeably with length such as width, height, depth and distance, all of which are explored in the emerging level.*
- *Teaching aids play a major role in teaching measurement concepts. Some teaching aids for length are sticks cut in equal lengths, toothpicks, straws, paper clips, pieces of chalk and paper strips of equal lengths.*

6. Show the trainees teaching aids for length that you have collected.
7. Demonstrate example 1 from page 74 of the Math Trainee's Handbook.
8. Clarify any questions regarding this text before continuing.



9. Have trainees turn to page 75 of the Math Trainee's Handbook. Invite a trainee to **READ ALOUD** >

▪ **What is mass? How is it different from weight?**

- *Mass refers to the amount of matter in an object. Students often refer to the weight of an object, rather than its mass. Scientifically,*



weight is a measure of the pull or force of gravity on an object. The weight of an object can vary, depending on its location in space, whereas the mass of the object remains constant. For example, the weight of an object is less on the moon than on the earth, while the mass of the object remains the same. Students do not need to distinguish between mass and weight in the emerging level, but Facilitators can model proper language and can encourage students to refer to mass rather than weight.

- *Students develop concepts of mass through comparison activities. They might hold an object in each hand and determine which object is heavier. In the emerging level, students also use balances to compare objects by mass. For example, they might use a balance to find which of 2 objects is heavier or to find collections of objects that have approximately the same mass. In the developing level, students compare the mass of an object with the mass of the standard unit of a kilogram or part of a kilogram.*
- *A common misconception among students is that large objects have a greater mass than small objects. Opportunities to compare the mass of objects of different sizes informally will allow students to address their misconceptions about relationships between size and mass.*

10. Clarify any questions regarding this text.



11. SAY > *All objects have mass, so any objects can be used by students to compare mass and put objects in order, from lightest to heaviest. This handmade balance can be used for these exercises.*

12. Show the handmade scale.

13. Demonstrate example 2 on page 76 of the Math Trainee's Handbook.



14. Have trainees turn to page 77 of the Math Trainee's Handbook.

Invite a trainee to **READ ALOUD >**

▪ ***What is capacity? How is it different from volume?***

- *Capacity is the amount that a container can hold. Students explore the capacity of containers using materials that can be poured such as water, rice or sand. Students develop concepts about capacity when they compare 2 containers. For example, they might observe that a large water bottle holds more than a small tomato paste container.*



Comparing containers that have approximately the same capacity is more challenging for students. To compare the capacities of the containers, students might fill one container with water, pour the water into the other container, and determine which container holds more water. Students might also use a scoop to fill both containers with rice, and then determine which container holds more scoops of rice.

- A common misconception among students is that taller containers hold more than shorter containers. It is important that Facilitators provide students with opportunities to compare a variety of containers by capacity so that students develop an understanding that 2 containers of different shapes can have the same capacity.
- Volume is the amount of space occupied by a solid object, measured in cubic units such as cubic centimeters. Learning about volume is not a focus in emerging level. However, you should be aware of opportunities to introduce ideas about volume incidentally, such as finding the number of cubes that fit inside a box.
- A common misconception is that volume and capacity are the same. Simply put, capacity answers the question “How much does it hold?” and volume answers the question “How much space does it occupy?” Consider how the volume of a juice box and its capacity differ. The box has volume because it takes up space, and its volume can be measured by finding the number of cubic units that represent its space. The box also has capacity because it can be filled (for example, with 200 ml of juice).

15. Clarify any questions regarding this text before continuing.



16. SAY > *Cups, plastic containers, buckets, bottles or cans can be filled with water or sand and used to teach a lesson on capacity. Students can make estimates and then verify or compare the capacity of 2 given containers.*

17. Show the trainees teaching aids for capacity that you have collected.

18. Demonstrate example 3 on page 77 of the Math Trainee's Handbook.



19. Have trainees turn to page 78 of the Math Trainee's Handbook.

Invite a trainee to **READ ALOUD >**

- ***What is time?***



- *Time is the duration of an event from its beginning to its end. Because time is not something students can touch, it is an abstract concept for students and can be difficult for them to understand. You can help students develop concepts about time by referring to the passing of time. For example, “It took us only two minutes to clean our desks” or “It will be 10:30 in fifteen minutes. At that time, we will go to the school yard.” Activities related to time should help students estimate, measure, and describe the passage of time, using non-standard units (e.g., find the time it takes for students to form a line by counting the number of times the teacher claps his or her hands) and eventually standard instruments such as a watch to find the time it takes to complete a task. Also provide students with opportunities to read digital and analog clocks, and to relate daily events to certain times of the day such as when lunchtime begins and ends.*

20. Clarify any questions regarding this text before continuing.

21. Demonstrate using steady hand claps to measure an activity.

22. Show a stopwatch, clock or calendar as possible teaching aids.



23. Have trainees turn to page 79 of the Math Trainee's Handbook.

Invite a trainee to **READ ALOUD >**

▪ **How do we record a measurement?**

Measurement involves both a number and a unit. To say that the length of a rope is 15 is meaningless unless a unit is specified. So you can say that the length of the rope is 15 sticks or 15cm or 15m. Units can be non-standard or standard. Measuring with non-standard units involves the use of arbitrary units such as sticks, paper clips and chalk sticks. Measuring with standard units involves the use of conventional units such as meters, kilograms or liters. The process of measuring any attribute involves the same steps:

- *Choose a unit of an appropriate size for the given context. For example, kilometers rather than centimeters for measuring the distance between 2 towns.*
- *Compare that unit with the object being measured.*
- *Report the number of units by stating the number of non-standard or standard units and the name of the unit itself. For example: “The length of the pencil is 6 paper clips” or “The capacity of the bottle is 2 liters”.*



- **What is a non-Standard Unit?**

The use of non-standard units allows students to focus on the attribute being measured. For example, using square tiles to measure area emphasizes the idea that area involves finding the number of square units needed to cover a surface. Students should have experiences in using a variety of non-standard units to measure attributes before being introduced to more abstract, standard units.

24. Clarify any questions regarding this text.

Practice

Activity: Practicing a weekly lesson | **Time:** 50 minutes | **Arrangement:** Small groups



1. SAY > *Now we will take 40 minutes to work in small groups to practice teaching 1 lesson from weeks 31, 32 and 33. You will choose 1 lesson from 1 of these 3 weeks. For the role-play, choose someone in the group to play the Facilitator and the rest of you will play students. Teaching aids are available for you to use. You can pick what you need to conduct the lesson.*

2. Form groups of 5 to 8 trainees.

3. Ask trainees in each group to choose their 'Facilitator'.

4. Make all the resources required to complete this activity available to the trainees.

5. Help groups pick the lesson they will present. If there are at least 3 small groups, ensure that each group practices a different lesson from 1 of the 3 weeks. Walk around the room and assist each group with the activity.

6. Give the trainees 40 minutes to complete the role-play.

7. Regroup the trainees.



8. ASK >

- *What strategies are easiest to do in your class?*
- *Which strategies were challenging?*

9. Clarify any questions about the teaching strategies.



Apply

Activity: Reflection on why we teach measurement | **Time:** 10 minutes

Arrangement: Pairs; Whole group



- 1. **SAY >** *We have covered many concepts in measurement and you have practiced some of the teaching strategies for this topic. Now take a few minutes and discuss the following question with the person next to you – ‘In your view, why do we teach measurement to young students?’*
- 2. Give trainees 5 minutes to turn and discuss with the person next to them.
- 3. Share the key messages of the session.



- 4. **SAY >**
 - *Teaching strategies for measurement should include students talking with each other, manipulating objects, doing investigative activities, solving problems and being taught the correct use of math vocabulary.*
 - *Everyday objects should be used as non-standard measuring tools and classroom activities should involve the students working in groups to conduct measuring, estimating and comparing activities.*
- 5. Invite trainees to add their own reflections or comments before closing the session.
- 6. Ask trainees if they have any questions. Address questions or note them on the ‘Notice Board’ to address later.
- 7. Instruct trainees to gather their teaching aids and store them carefully to be used later on in their classroom.
- 8. Thank trainees for their active participation.

15 MINUTE BREAK (OPTIONAL)



Math Training Session 13:

Data

Training session summary | Duration: 1 hour

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Design a data exploration activity to develop students' ability to collect, sort and classify objects into given categories, and to ask questions.

KEY MESSAGES

The big idea in data analysis is the 4-step problem-solving process: 1) Formulate an investigation question that can be addressed with data; 2) Collect data to address the question; 3) Analyze the data; and 4) Interpret the results.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language, and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students

and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Math Trainee's Handbook
- Math Lesson Plan Bank

PREPARATION REQUIRED

Write the objectives of the session on flipchart paper large enough for all trainees to read and mount on the wall.

TRAINING SESSION OVERVIEW

In this session, trainees silently read and reflect on the weekly lesson plans on data. The trainer presents the key messages of the session and models teaching strategies. Then trainees practice role-playing a lesson.



Steps to follow

Warm-up

Activity: Familiarization with weekly lesson plans | **Time:** 10 minutes

Arrangement: Individual

TIP > Trainees can follow along on page 81 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Design a data exploration activity to develop students' ability to collect, sort and classify objects into given categories, and to ask questions.

2. Instruct trainees to turn to page 350 of the Math Lesson Plan Bank and silently read the weekly lesson plan for week 35. As this lesson is from week 35, it assumes that students have covered all content taught in the previous weeks.

3. Give trainees at least 5 minutes to read in silence.



4. **ASK >** *What competency does this lesson focus on?*

Answer: Data.



5. **ASK >** *What are the learning objectives for the week?*

Answer: Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as' and 'as many as'; Classify objects or data points into given categories, count the number of objects in each category and order categories based on count; Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.



6. **ASK >** *What teaching strategies are being used to explore data?*

Answer: Using an investigation question, conducting a class poll, documenting the data in a tally table or bar chart, analyzing the data and answering questions.



7. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

Present

Activity: Key messages of session | **Time:** 30 minutes | **Arrangement:** Whole group



1. **SAY >** *Today we will discuss the specific concepts to be covered at the emerging level and teaching strategies that support this learning.*



2. Instruct trainees to turn to page 81 of the Math Trainee's Handbook and follow along as **READ ALOUD >**

TIP > You can also have a trainee read.

- **Why do we collect and study data?**

*The main purpose of collecting and studying data is to answer questions when the answers are not immediately obvious. Students naturally ask questions and they should be encouraged and nurtured. Data exploration activities help students develop ways to gather information to answer these questions so that they learn when and how to make decisions on the basis of evidence. **The big idea of data analysis is the 4-step problem-solving process to data analysis scenarios, which is:***

- *Formulate an investigation question that can be addressed with data.*
- *Collect data to address the question.*
- *Analyze the data.*
- *Interpret the results.*

In the emerging level, weeks 34 and 35 are dedicated to data exploration activities. During this time, students are introduced to recording information using a tally table, and later using a bar chart. Class polls are conducted on investigation questions that are simple and relate to their daily lives. You can define these questions yourself or with students. In analyzing and interpreting the data, students should be encouraged to ask questions and provide responses using qualifying terms such as 'most', 'least', 'greatest', 'smallest', 'as much as' and 'as many as'.

3. Clarify any questions regarding this text before continuing.





4. Have trainees turn to page 82 of the Math Trainee's Handbook.

Invite a trainee to **READ ALOUD >**

▪ **How to write an investigation question**

An investigation question is a simple question that you are seeking an answer to which can be found using a poll. The question should be asked in a manner so that it gets one answer from each participant in the poll.

Example questions are as follows:

- What is your favorite subject in school?
- What is the most popular type of game you play?
- How many different types of animal have you seen in your life?
- What are the favorite sports of this class?
- What are the favorite foods of this class?
- What is the most popular football team?

▪ **How to collect and document data**

Once the question is defined, the next step is to decide whom to poll to find the answer to the question. For the emerging level, all the activities are conducted amongst the class students themselves – a class poll. A class poll is an easy way to engage students in a data exploration activity using a topic of interest for your students. You can replace the examples of favorite sport and favorite food with any topics that your class will find interesting and fun. You can also expand this to other classes or the community. However, for the emerging level, try not to exceed gathering data from more than 20 participants as it may be difficult for students.

5. Clarify any questions regarding this text before continuing.

6. Demonstrate a class poll and tally table.



7. **SAY >** *We will now practice filling out a tally table when taking a class poll.*

Let us take a class poll amongst us to investigate the following question:

What is our favorite food item?

8. Write down the investigation question on the board – “What is our favorite food item?”

9. Ask trainees to name 5 different food items.

10. Draw a tally table on the board as shown in the example.



11. Instruct trainees that they have a maximum of 2 votes for their favorite food. They cannot raise their hand more than twice.
12. Now, conduct the poll.



13. **SAY >** *Raise your hand if you like the first food item.*

14. Invite a trainee to count the hands and document the count as a tally in the table.

15. Repeat steps 12 and 13 for each of the food items.



16. **ASK >**

- *Which food is the class favorite? Can you explain why?*
- *Which food is not the least favorite? Can you explain why?*
- *Which foods are liked by the same number of people?*
- *What other observations can you make with these results?*
- *Would you expect different results if we collected data from people living in America?*



17. **SAY >** *Another way to document data is using a **bar chart**. The bar heights give a visual picture of which category has more, less or equal amounts. For the emerging level, this concept is introduced in the form of a game, 'I am a bar chart!' Week 35, Lessons 2, 3, 4 and 5 make reference to this game.*

18. Now, use the steps described on page 85 of the Math Trainee's Handbook on ('How to play the game 'I am a bar chart!') to calculate the results of the food question. Have trainees role-play students in the classroom.

19. Clarify any questions on how to conduct this game.

20. After playing the game, draw the representation of the results on the board using a bar chart.

21. Invite trainees to share their impressions about these teaching strategies.



22. Have trainees turn to page 86 of the Math Trainee's Handbook. Invite a trainee to **READ ALOUD >**

▪ ***How to analyze and interpret data***

Once data has been collected and represented in the form of a tally table or bar chart, ask questions that encourage students to use qualifying terms such as 'most', 'least', 'greatest', 'smallest', 'as much as' and 'as many as'. This can be done in the form of small group work, pair



work or as a whole group. Some example questions and answers are given below:

Example 1: Questions about the data collected

- Which sport is the class favorite? Can you explain why?
Example answer: "9 people say they like football, which is the largest number on the table so most people in this class enjoy football."
- Which sport is the least favorite? Can you explain why?
Example answer: "Only 1 person likes gymnastics, which is the smallest number on the table so it is the least favorite sport of this class."
- Which sports are liked by the same number of people?
Example Answer: "4 people like basketball and 4 like swimming. There are as many students who like basketball as swimming."

Example 2: Additional questions

- What other observations can you make with these results?
- Would you expect different results if we collected data from the other class or from the community? Can you explain why?
- How might the results look if we asked the community? Can you explain why?
- What if we collected this data in [insert the name of a country here]? Can you explain why?

23. Clarify any questions regarding this text before continuing.

Practice

Activity: Brainstorming and composing investigation questions | **Time:** 10 minutes

Arrangement: Pairs



- 1. SAY >** Now we will take 10 minutes to work in pairs and compose at least 3 investigation questions which are suitable for our context and fun for students to answer. Keep in mind that these students are at the emerging level.
- 2.** Form pairs and give trainees 10 minutes to complete this exercise.
- 3.** Regroup trainees and invite them to share their investigation questions.



Apply

Activity: Explaining the 4-step process for teaching data analysis | **Time:** 10 minutes

Arrangement: Whole group



1. **ASK >** *In your own words, how would you describe the 4 steps for teaching data analysis and why is it important to teach these concepts to young students?*

2. Call on 2 or 3 trainees to respond.

3. Share the key messages of the session.



4. **SAY >**

- *The big idea in data analysis is the 4-step problem solving process:
1) Formulate an investigation question that can be addressed with data;
2) Collect data to address the question; and 3) Analyze the data and
4) Interpret the results.*
- *Data exploration activities reinforce number sense skills such as counting and ordering. It also develops problem-solving and critical thinking skills through questions and analyzing data. Be sure to select investigation questions that are suitable for your context. The ones provided in the weekly lesson plan are only suggestions.*

5. Invite trainees to add their own reflections or comments before closing the session.

6. Ask trainees if they have any questions. Address them now or write them on the Notice Board to address later.

7. Thank trainees for their active participation.

15 MINUTE BREAK (OPTIONAL)



Math Training Session 14:

Geometry

Training session summary | Duration: 2 hours

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Incorporate teaching aids and games to develop students' spatial sense and their ability to identify the characteristics of 2-dimensional shapes (rectangle, square, circle and triangle).

KEY MESSAGES

- The big ideas in spatial sense and geometry are – properties of 2-dimensional shapes and 3-dimensional figures, geometric relationships, and location and movement.
- Develop students' ability to analyze and describe the geometric properties of shapes and figures, not on their ability to learn the definitions.
- Classroom activities such as games should provide opportunities for students to manipulate, compare, sort, classify, compose and decompose these geometric forms.
- Teaching aids such as cutouts of 2-dimensional geometric shapes and examples from the environment such as boxes, cans and balls should be integrated into classroom activities.

SENSITIVITY NOTE

When trainees present their sample lesson, observe their use of language, body language and activities for inclusion, understanding and gender-sensitivity. Use your judgment to determine when to pause the session activity to remind trainees to be aware of their tendencies toward gender bias or other forms of exclusion. Emphasize the importance of continually practicing and developing habits to shift these tendencies so as to create a learning environment that is positive, inclusive, builds confidence of all students and gives girls equal opportunity to speak, explain and participate in class.

RESOURCES REQUIRED

- Board and chalk/flipchart and markers
- Tape
- Notebook and pen
- Scissors
- Paper, old newspapers or discarded cardboard found in the local environment
- Color pencils
- Glue
- Math Trainee's Handbook
- Math Lesson Plan Bank



PREPARATION REQUIRED

- Write the objectives of the session on flipchart paper large enough for all trainees to read and mount on the wall.
- Make a 'Bag of shapes' (see page 92 of the Math Trainee's Handbook for instructions).

TRAINING SESSION OVERVIEW

In this session, trainees silently read and reflect on lesson plans on geometry. The trainer presents the key messages of the session and models a few strategies to teach spatial reasoning and geometry. Then trainees practice other teaching strategies.

Steps to follow:

Warm-up

Activity: Familiarization with weekly lesson plans | **Time:** 10 minutes

Arrangement: Individual

TIP > Trainees can follow along on page 88 of the Math Trainee's Handbook.

1. Present the objectives of the session to the trainees.

By the end of the session, trainees will be able to:

1. Incorporate teaching aids and games to develop students' spatial sense and their ability to identify the characteristics of 2-dimensional shapes (rectangle, square, circle and triangle).

2. Instruct trainees to turn to page 240 of the Math Lesson Plan Bank and silently read the daily lesson plan for Week 12, Lesson 1. This lesson is from week 12, which means it assumes that students have covered content taught in the previous weeks.
3. Give trainees at least 5 minutes to read in silence.



4. **ASK >** *What competency does this lesson focus on?*

Answer: Geometry.



5. **ASK >** *What is the topic and learning objective of the lesson?*

Answer: Topic is 'Explore geometric shapes' and the learning objective is to identify shapes (circle, rectangle, square, triangle) of different orientation, size and color.





6. **ASK >** *What teaching strategies are being used to explore geometry?*

Answer: Using cutouts of shapes.

7. Instruct trainees to turn to page 255 of the Math Lesson Plan Bank and silently read the weekly lesson plan for week 13. This lesson is from week 13, which means it assumes that students have covered content taught in the previous weeks.
8. Give trainees at least 5 minutes to read in silence.



9. **ASK >** *What teaching strategies are being used during the week?*

Answer: Games and art activities – Bag of shapes, Cut and paste into the shape table, I've lost my shape, Shape neighborhood, What shape am I?

10. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

Present

Activity: Key messages of session | **Time:** 40 minutes | **Arrangement:** Whole group



1. **SAY >** *In the emerging level, you introduce concepts of geometry in weeks 12, 13 and again in week 30. Today we will discuss the specific content to be taught at the emerging level and teaching strategies and aids that support this learning.*



2. Instruct trainees to turn to page 88 of the Math Trainee's Handbook and follow along as you **READ ALOUD >**

▪ **Why do we learn spatial sense and geometry?**

Students need to learn about shape, size, position, direction and movement to describe and classify the physical world we live in. Spatial sense is students' awareness of themselves in relation to the people and objects around them. Spatial sense and geometry are used in art, science, construction, dance, music and reading. For example, reading maps and building houses. Students notice shapes in natural objects of all kinds. Even distinguishing between letters of the alphabet involves attention to shape and position.



- *The big ideas in spatial sense and geometry are:*
 - *Properties of two-dimensional shapes and three-dimensional figures*
 - *Geometric relationships*
 - *Location and movement*
- *Students aged 4–6 years begin to recognize and describe shapes even if their explanations are incomplete. For example, when asked to identify a rectangle, a student might say: “It’s a rectangle, because it looks like a door.” They do not explain, for example, that the shape is a rectangle because it has 4 sides and 4 right angles. They may describe objects using vocabulary related to observable attributes: color, size (big, small, long, thin), texture (smooth, rough, bumpy), movement (slide, roll) or material (wood, plastic).*
- *In the emerging level, focus students’ attention on geometric features of 2-dimensional shapes so that students begin to think about the properties that make a rectangle a rectangle. Also guide them to use positional language to describe the position of objects and their movement using vocabulary such as ‘above’, ‘below’, ‘to the left of’, ‘to the right of’, and so on. In the developing level, we include 3-dimensional shapes. We emphasize developing students’ ability to analyze and describe the geometric properties of shapes and figures, not their ability to learn the definitions.*
- ***What are two-dimensional shapes?***
A shape that only has 2 dimensions (such as width and height) and no thickness are two dimensional objects.

3. Discuss the contents of the tables on pages 90 and 91 in the Math Trainee's Handbook.
4. Clarify any questions regarding this text. Remind trainees that in the emerging level, they only introduce circles, triangles, rectangles and squares.
5. **SAY >** *We will now read about different strategies for teaching geometry.*
6. Have trainees turn to page 92 of the Math Trainee's Handbook.





7. Invite a trainee to **READ ALOUD** >

▪ **What are some games that teach geometry?**

Classroom activities should provide opportunities for students to manipulate, compare, sort, classify, compose and decompose these geometric forms. These types of activities help students to identify and informally describe some attributes and geometrical properties of 2-dimensional shapes and 3-dimensional figures. Teaching aids such as cutouts of 2-dimensional geometric shapes, examples from the environment such as boxes, cans and balls, and games that use shapes should be integrated into classroom activities.

▪ **Game: Bag of shapes**

'Bag of shapes' is a game that encourages all students to reason and communicate how they identify or classify a shape and explain why. Through discussions of a wide variety of shapes, students learn to recognize examples and non-examples of shapes.

8. Now, take 10 minutes to model the 'Bag of shapes' game. Have a trainee pick out a shape from the bag. Ask the trainee to classify the object. The rest of the trainees show a 'thumbs up' if it is correct or a 'thumbs down' if it is not correct. Call on 3–4 trainees to explain why they agree or disagree with the shape identification.

9. Invite trainees to share impressions about this strategy for exploring differences between shapes and non-shapes.

10. Have trainees turn to page 93 of the Math Trainee's Handbook.



11. Invite a trainee to **READ ALOUD** >

▪ **Game: Shape neighborhood**

'Shape neighborhood' is an art activity where students use their creativity to draw a scene using combinations of circles, rectangles, triangles and squares of various sizes. This activity exercises their ability to compose and decompose shapes.

12. Now take 10 minutes to model the activity 'Shape neighborhood' using the instructions provided in the Math Trainee's Handbook.



Practice

Activity: Practicing more teaching strategies | **Time:** 1 hour | **Arrangement:** Small groups



1. SAY >

- *Now we will take 45 minutes to work in small groups to practice the other examples of teaching strategies found on pages 94–99 of the Math Trainee's Handbook.*
- *There are supplies on the table for you to use, such as scissors, paper and so on.*
- *There are 7 examples in the handbook. We have reviewed the first two examples together. You will now read each of the other 5 examples and practice them with each other.*
- *You can role-play where one person is the 'Facilitator' and others are 'students'. In order to complete this activity, do not spend more than 10 minutes on each example.*

2. Form groups of 5 to 8 trainees.

3. Ask trainees in each group to choose their 'Facilitator'.

4. Make available all the resources required to complete this activity.

5. Give the trainees 45 minutes to complete the role-play.

6. Walk around the room and assist each group with the activity.

7. Regroup the trainees to discuss the following questions:

- What strategies are easiest to do in your class?
- Which strategies were challenging?

8. Clarify any questions about the teaching strategies.



Apply

Activity: Reflection on the teaching strategies | **Time:** 10 minutes

Arrangement: Pairs; Whole group



1. **ASK >** *What are your observations about the different teaching strategies discussed in this session? Why is it important to address geometry topics in this way?*

2. Have trainees share their thoughts with the person next to them.

3. Share the key messages of the session.



4. **SAY >**

- *Remember that it is important to develop students' ability to analyze and describe the geometric properties of shapes and figures, not focus on their ability to learn the definitions. When students construct their own understanding and are encouraged to explain their reasoning, they develop self-confidence in their math ability.*
- *Learning in this way encourages exploration and curiosity. Classroom activities such as games and art projects allow students to manipulate, compare, sort, classify, compose and decompose geometric forms. Learning feels more like play and less like something that is boring and tiresome.*
- *Teaching aids such as cutouts of 2-dimensional geometric shapes, examples from the environment such as boxes, cans and balls, and games that use shapes should be integrated into classroom activities.*

5. Invite trainees to add their own reflections or comments before closing the session.

6. Ask trainees if they have any questions. Address questions or note them on the 'Notice Board' to address later.

7. Instruct trainees to gather their teaching aids and store them carefully to be used later on in their classroom.

8. Thank trainees for their active participation.



Math Training Session 15:

Reflection and Conclusion

Training session summary | Duration: 30 minutes

TRAINING SESSION OBJECTIVES

By the end of the session, trainees will be able to:

- Reflect on the training experience and complete the Math Training Post-test.

RESOURCES REQUIRED

- Math Trainee's Handbook
- A football or object to throw around easily

PREPARATION REQUIRED

None.

TRAINING SESSION OVERVIEW

In this session, trainees reflect on the training experience and complete the Math Training Post-test.



Steps to follow

Reflection

Activity: Reflection on training experience | **Time:** 15 minutes | **Arrangement:** Whole group

1. Have trainees stand in a circle.



2. **SAY >**

- *We have come to the end of our training. A lot of key concepts have been covered. Everyone participated actively and energetically. Let us close by sharing 1 key learning or take away from the training and 1 positive quality of each of the trainees in our group.*
- *I will throw the ball randomly to one of you. Share your thoughts and then throw the ball to another trainee. Let me begin by sharing my own reflections.*

3. Share your own key learning and a positive quality of a trainee, and then throw the ball to that trainee.

4. Repeat until everyone has contributed, including the all the trainers.

Post-test

Activity: Math Training Post-test | **Time:** 15 minutes | **Arrangement:** Individual

1. Have trainees turn to page 101 of the Math Trainee's Handbook and complete the Math Training Post-test.

2. Instruct trainees to complete it without using their math resources.

3. Collect the tests to review with the training team later.

4. Ask trainees if they have any remaining questions before the close of the Math Training.

5. Address any remaining questions on the Notice Board. If you do not have time to address them with the whole group, try to talk to the trainee who raised the question and address it before he or she leaves.

6. Thank trainees for their hard work, thoughts, and dedication to their students!



PART 3

Training Resources



1 Resource 1: Proposed Math Training Agenda

PHASE 1–DAY 1

Priority	Session	Duration	Training session objectives <i>By the end of this session, trainees will be able to</i>
Recommended	MATH TRAINING SESSION 1: OPENING THE TRAINING	50 minutes	▪ Define a safe learning environment suitable for an open exchange of ideas.
Required	MATH TRAINING SESSION 2: WHAT IS MATH?	1 hour	▪ Identify 5 key reasons for introducing young students to math. ▪ Name the 4 competencies of math.
Required	MATH TRAINING SESSION 3: EXAMINE THE MATH RESOURCES	1 hour	▪ Use the Math Trainee's Handbook and Math Lesson Plan Bank to conduct daily lessons.
<i>Recommended</i>	<i>Break</i>	<i>15 minutes</i>	
<i>Recommended</i>	<i>Energizer</i>	<i>15 minutes</i>	<i>Trainees warm-up using an energizer activity.</i>
Required	MATH TRAINING SESSION 4: MAKE TEACHING AIDS FOR NUMBER SENSE	2 hours	▪ Incorporate teaching aids to teach students Number Sense and Operations. ▪ Collect counters and make number cards and the band of 10 using locally available materials.
<i>Recommended</i>	<i>Break</i>	<i>1 hour</i>	
Required	MATH TRAINING SESSION 4 (continued)		
Required	MATH TRAINING SESSION 5: ADD AND SUBTRACT WITHIN 20	1 hour, 45 minutes	▪ Use band of 10 and number bonds in daily lessons to teach addition and subtraction within 20.



PHASE 1 – DAY 2

Priority	Session	Duration	Training session objectives <i>By the end of this session, trainees will be able to</i>
Required	MATH TRAINING SESSION 6: ADD AND SUBTRACT BEYOND 20	1 hour, 45 minutes	Use number bonds in daily lessons to teach addition and subtraction beyond 20.
<i>Recommended</i>	<i>Break</i>	<i>15 minutes</i>	
Required	MATH TRAINING SESSION 7: MAKE MATH FUN	1 hour, 30 minutes	Use games and songs to build fluency in Number Sense and Operations.
<i>Recommended</i>	<i>Break</i>	<i>1 hour</i>	
<i>Recommended</i>	<i>Energizer</i>	<i>15 minutes</i>	<i>Trainees warm-up using an energizer activity.</i>
Required	MATH TRAINING SESSION 8: SOLVE WORD PROBLEMS	2 hours	Use real-life or imaginary scenarios and storytelling to present counting, addition and subtraction problems.
Recommended	MATH TRAINING SESSION 9: SOLVE MONEY PROBLEMS	1 hour	- Design activities to teach students about money. - Compose 1-step, real-life addition or subtraction problems involving money.
Required	MATH TRAINING SESSION 10: REFLECTION AND CONCLUSION	30 minutes	Reflect on the training experience and complete the Math Training Post-test.



PHASE 2 – DAY 3

Type	Session	Duration	Training session objectives <i>By the end of this session, trainees will be able to</i>
Recommended	MATH TRAINING SESSION 11: WELCOME AND REFLECTION	1 hour, 50 minutes	- Define a learning environment suitable for an open exchange of ideas. - Reflect and share experiences delivering the math content and brainstorm possible solutions to challenges faced.
Required	MATH TRAINING SESSION 12: MEASUREMENT	2 hours	Incorporate teaching aids and games to teach measurement – comparison of length, mass and capacity using non-standard measures.
<i>Recommended</i>	<i>Break</i>	<i>15 minutes</i>	
Required	MATH TRAINING SESSION 13: DATA	1 hour	Design a data exploration activity to develop students' ability to collect, sort and classify objects into given categories and to ask questions.
<i>Recommended</i>	<i>Break</i>	<i>1 hour</i>	
<i>Recommended</i>	<i>Energizer</i>	<i>15 minutes</i>	<i>Trainees warm-up using an energizer activity.</i>
Required	MATH TRAINING SESSION 14: GEOMETRY	2 hours	Incorporate teaching aids and games to develop students' spatial sense and their ability to identify the characteristics of 2-dimensional shapes (rectangle, square, circle and triangle).
Required	MATH TRAINING SESSION 15: REFLECTION AND CONCLUSION	30 minutes	Reflect on the training experience and complete the Math Training Post-test.



2

Resource 2: Math Training Resource List

The following materials are required for the Math Training:

- Training Resources – documents at the end of the Math Trainer's Manual
- Math Trainee's Handbook (one for each trainee)
- Math Lesson Plan Bank (one for each trainee)
- Board and chalk/flipchart and marker
- Notebook and pen
- Tape
- Small pieces of paper or sticky notes (e.g. Post-it notes; at least 5 per trainee)
- List of questions for the game 'Mingle mingle' in Phase 1 and Phase 2
- Paper, old newspapers or cardboard found in local environment such as discarded boxes
- Ruler
- Glue
- Scissors
- At least 200 counters, 1 set of number cards, at least 4 pieces of notebook size paper or 4 slates with a band of 10 drawn on each.
- 100 number chart
- 100 discarded soda bottle tops (if cardboard, ruler and scissors are not available)
- A football or object to throw around easily
- Teaching aids for measurement such as sticks cut in equal lengths, toothpicks, straws, paper clips, pieces of chalk, paper strips of equal lengths, beads, marbles, stones, empty containers, buckets, bottles, cans, water, sand or other everyday objects found in your local environment.
- Colored pencils



3

Resource 3: Energizers for Math Training

- 1. Defending your side:** In this activity, the trainer comes up with a list of pairs of opposing items or people. Examples are 'Coke or Fanta', 'Rain or Sun', 'Red or Green', 'Math or Reading', 'Long hair or short hair', 'Rice or Bread', 'Tea or Coffee' and 'Airplane or Boat'. The trainer announces a pair and tells people who like the first item to go the right side of the room and the people who like the second item to go to the left side. The groups then meet in the middle and find someone on the opposing side with whom they can defend their position. After 1 minute or when the argument comes to an end, announce a new pair of items. The debate is expected to create an environment of enjoyable and fun exchange of ideas.
- 2. People search:** Give everyone a list of 10 different descriptions that could apply to group members. Write the list on the board. Tell trainees that they have 5 minutes to find someone in the group who fits each description and write down the person's name next to the description. Trainees are expected to mingle and walk around the room to complete their list. Example items for the list are:

Find someone who:

- Is left-handed
- Has traveled to (name of city)
- Knows how to ride a motorcycle
- Likes to eat sweets
- Can speak more than 2 languages

- 3. Rain, wind, storm, sun:** Ask trainees to either stand in a big circle or near where they are sitting. The leader will shout out either 'rain,' 'wind,' 'storm,' or 'sun,' each of which has corresponding movements. When the leader shouts 'rain,' everyone stomps on the ground. When the leader shouts 'wind,' everyone raises their hands up high with a swaying motion. When the leader says 'storm,' everyone stomps and waves their hands in the air. When the leader says sun, everyone stretches their arms out to the side and lets out a sigh of relief.
- 4. Skip 6:** Ask trainees to stand in a big circle. Then they count in a circle as fast as possible starting from 1 but skipping every multiple of 6



and any number that contains 6. Anyone who calls out a multiple of 6 or a number that contains the digit 6 is disqualified from the game. Continue until there is only one person left standing. The list of accepted numbers are 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 17, 19, 20, 21, 22, 23, 25, 27, 28, 29, 31, 32, 33, 34, 35, 37, 38, 39, 40, 41, 43, 44, 45, 47, 49 and so on.

- 5. Questions Ball:** Have trainees stand in a circle and throw the questions ball to someone. The person with the ball unwraps the outer layer, reads the question on the paper aloud and provides an answer to the question. Then the person throws the ball randomly to another trainee. Repeat the game of throwing the ball and answering questions until the ball is no more or 15 minutes have passed. When a question is read aloud and the trainee answers, you or others in the group can add to or clarify the response as well.

To make the questions ball you need pieces of A4 size paper or larger, and tape.

- Write each review question on a piece of paper.
- Make a ball of the first paper and put tape around it.
- Wrap the second paper around it and put tape around it.
- Repeat until all the papers are balled around each other and the ball is big enough to throw around.

Example questions for the ball:

- Why should children learn about money at an early age?
- Why are word problems or real-life problem-solving important when teaching math topics?
- Name some basic mental strategies for developing Number Sense before teaching the standard way of adding or subtracting in vertical columns.
- What should be taught before teaching adding and subtracting two 2-digit numbers with carry or borrow?
- What is the band of 10 and how should it be used?
- Why is the number bond helpful with teaching Number Sense and Operations?
- Name the math resources and which one you think is most useful for you. Are you allowed to adapt or modify the tools?
- Why is it important to introduce math at an early age?
- Name the 4 Math Competencies.
- Name some of the teaching aids we discussed during the training and explain how they can be used.



4a

Resource 4a: Math Scope and Sequence – Emerging Level

Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
1	Know your class	Positive Social Skills	- Know each other by name - Practice small group activities on finding patterns	'Get to know each other' games - Small group activities
2	Develop number sense within 10	Number Sense	- Count up to 5 - Recognize numbers 1 to 5 - Read and write numerals 1 to 5 with corresponding words - Count forward and backward within 5 - Use concrete objects and pictorial representation to compare, order and estimate	- Songs - Storytelling - Drawing - Games (I spy, Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing - Small group activities using teaching aids - Teaching aids include number cards, number-picture cards, drawings or pictures, counters and objects found in environment
3	Develop number sense within 10	Number Sense	- Count up to 10 - Recognize numbers up to 10 - Read and write numerals up to 10 with corresponding words - Count forward and backward within 10, starting at any number less than 10 - Recognize 0 as representing an empty set - Use concrete objects and pictorial representation to compare, order and estimate	- Songs - Storytelling - Drawing - Games (I spy, Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing - Small group activities using teaching aids - Teaching aids include number cards, number-picture cards, drawings or pictures, counters and objects found in environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
4	Develop number sense within 10	Number Sense	- Count up to 10 - Recognize numbers up to 10 - Read and write numerals up to 10 with corresponding words - Count forward and backward within 10, starting at any number less than 10 - Recognize 0 as representing an empty set - Use concrete objects and pictorial representation to compare, order and estimate	- Songs - Storytelling - Drawing - Games (I spy, Simon says, Answers to Slate, True or false, Fill in the blank) - Role-playing - Small group activities using teaching aids - Teaching Aids include number cards, number-picture cards, drawings or pictures, counters, band of 10, number bond and objects found in environment
5	Add and subtract within 10	Operations	- Add and subtract within 10 using concrete objects or images - Solve 1-step word problems using addition or subtraction - Recognize and use plus (+), minus (-) and equals (=) symbols appropriately - Add and subtract within 10 mentally	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching Aids include number cards, number-picture cards, drawings or pictures, counters, band of 10, number bond and objects found in environment
6	Add and subtract within 10	Operations	- Add and subtract within 10 using concrete objects or images - Solve 1-step word problems using addition or subtraction - Recognize and use plus (+), minus (-) and equals (=) symbols appropriately - Add and subtract within 10 mentally	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching Aids include number cards, number-picture cards, drawings or pictures, counters, band of 10, number bond and objects found in environment
7	Add and subtract within 10	Operations	- Add and subtract within 10 using concrete objects or images - Solve 1-step word problems using addition or subtraction - Recognize and use plus (+), minus (-) and equals (=) symbols appropriately - Add and subtract within 10 mentally	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching Aids include number cards, number-picture cards, drawings or pictures, counters, band of 10, and objects found in environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
8	Develop number sense within 20	Number Sense	- Count up to 20 - Recognize numbers up to 20 - Read and write numerals up to 20 with corresponding words - Count forward and backward within 20, starting at any number less than 20 - Use concrete objects and pictorial representation to compare, order and estimate - Understand the ten and ones place values	- Songs - Storytelling - Drawing - Games (I spy, Simon says, Answers to Slate, True or false, Fill in the blank) - Role-playing - Small group activities using teaching aids - Teaching aids include number cards, number-picture cards, drawings or pictures, counters and objects found in environment
9	Add and subtract within 20	Operations	- Add and subtract within 20 using concrete objects or images - Solve word problems using addition or subtraction - Recognize and use plus (+), minus (-) and equals (=) symbols appropriately - Add and subtract within 20 mentally	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number-picture cards, drawings or pictures, counters and objects found in environment
10	Add and subtract within 20	Operations	- Add and subtract within 20 using concrete objects or images - Solve word problems using addition or subtraction - Use plus (+), minus (-) and equals (=) symbols appropriately - Add and subtract within 20 mentally	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number-picture cards, drawings or pictures, counters and objects found in environment
11	Develop concepts of time	Measurement and Data	- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, days of week) - Identify tools that measure time (analog clock, digital clock, calendar) - Name the days of the week - Identify the time (to the nearest hour) of everyday events (lunchtime is 12 o'clock, bedtime is 8 o'clock at night)	- Songs - Storytelling - Drawing - Role-playing or charades - Small group activities using teaching aids - Teaching aids include digital clock on cellphone, analog clock, calendar



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
12	Explore geometric shapes	Geometry	- Describe the relative position or orientation of objects, using language such as 'on', 'under', 'over', 'in front', 'behind', 'between', 'next to', 'inside', 'outside', 'far', 'near', 'to the right of', 'to the left of' - Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color - Build and draw shapes (circle, rectangle, square, triangle) with defining attributes - Combine shapes to form larger shapes	- Drawing - Making shapes out of found objects - Games (Shape hunt, I spy, What am I?, Human shapes, Shape sort) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, shape cut-outs and objects found in environment
13	Explore geometric shapes	Geometry	- Describe the relative position or orientation of objects using language such as 'on', 'under', 'over', 'in front', 'behind', 'between', 'next to', 'inside', 'outside', 'far', 'near', 'to the right of', 'to the left of' - Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color - Build and draw shapes (circle, rectangle, square, triangle) with defining attributes - Combine shapes to form larger shapes	- Drawing - Making shapes out of found objects - Games (Shape hunt, I spy, What am I?, Human shapes, Shape sort) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, shape cut-outs and objects found in environment
14	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments
15	Develop number sense within 50	Number Sense	- Count up to 50 - Recognize numbers up to 50 - Read and write numerals up to 50 with corresponding words - Count forward and backward within 50, starting at any number less than 50 - Understand the tens and ones place values - Use concrete objects and pictorial representation to compare, order and estimate - Predict what comes next in a number pattern - Skip count by 10s to 50	- Songs - Storytelling - Drawing - Games (I spy, Simon says, Answers to Slate, True or false, Fill in the blank) - Role-playing - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment



Week	Topic	Competency	Objectives <i>Children should be able to...</i>	Example activities
16	Develop number sense within 50	Number Sense	- Count up to 50 - Recognize numbers up to 50 - Read and write numerals up to 50 with corresponding words - Count forward and backward within 50, starting at any number less than 50 - Understand the tens and ones place values - Use concrete objects and pictorial representation to compare, order and estimate - Predict what comes next in a number pattern - Skip count by 10s to 50	- Songs - Storytelling - Drawing - Games (I spy, Simon says, Answers to Slate, True or false, Fill in the blank) - Role-playing - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment
17	Add and subtract within 50	Operations	- Add and subtract within 50 using concrete objects or images or place value chart, with and without regrouping - Use plus (+), minus (−) and equals (=) symbols appropriately - Add and subtract within 50 using the standard way in vertical columns - Solve 1-step word problems using addition or subtraction	- Songs, storytelling, art or drawing, playing games, role-playing and small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment
18	Add and subtract within 50	Operations	- Add and subtract within 50 using concrete objects or images or place value chart, with and without regrouping - Use plus (+), minus (−) and equals (=) symbols appropriately - Add and subtract within 50 using the standard way in vertical columns - Solve 1-step word problems using addition or subtraction	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment
19	Add and subtract within 50	Operations	- Add and subtract within 50 using concrete objects or images or place value chart, with and without regrouping - Use plus (+), minus (−) and equals (=) symbols appropriately - Add and subtract within 50 using the standard way in vertical columns - Solve 1-step word problems using addition or subtraction	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
20	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments
21	Introduce concept of multiply	Operations	- Work with equal groups of objects (foundations for multiplication) - Recognize concepts of multiplication - Recognize and use multiply ($\times$) symbol appropriately - Multiply up to 10 - Multiplication table and mental calculation of multiply by 2, 3, 5, 10 - Solve 1-step word problems with multiply using picture representation	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, arrays, drawings or pictures and objects found in environment
22	Introduce concept of multiply	Operations	- Work with equal groups of objects (foundations for multiplication) - Recognize concepts of multiplication - Recognize and use multiply ($\times$) symbol appropriately - Multiply up to 10 - Multiplication table and mental calculation of multiply by 2, 3, 5, 10 - Solve 1-step word problems with multiply using picture representation	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, arrays, drawings or pictures and objects found in environment
23	Develop number sense within 100	Number Sense	- Count up to 100 - Recognize numbers up to 100 - Read and write numerals up to 100 with corresponding words - Count forward and backward within 100, starting at any number less than 100 - Understand the hundreds, tens and ones place values - Use concrete objects and pictorial representation to compare, order and estimate - Predict what comes next in a number pattern - Skip count by 10s to 100	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment



Week	Topic	Competency	Objectives <i>Children should be able to...</i>	Example activities
24	Add and subtract within 100	Operations	- Add and subtract within 100 using concrete objects or images or place value chart, with and without regrouping - Use plus (+), minus (–) and equals (=) symbols appropriately - Add and subtract within 100 using the standard way in vertical columns - Solve 1-step word problems using addition or subtraction	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment
25	Add and subtract within 100	Operations	- Add and subtract within 100 using concrete objects or images or place value chart, with and without regrouping - Use plus (+), minus (–) and equals (=) symbols appropriately - Add and subtract within 100 using the standard way in vertical columns - Solve 1-step word problems using addition or subtraction	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment
26	Add and subtract within 100	Operations	- Add and subtract within 100 using concrete objects or images or place value chart, with and without regrouping - Use plus (+), minus (–) and equals (=) symbols appropriately - Add and subtract within 100 using the standard way in vertical columns - Solve 1-step word problems using addition or subtraction	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures and objects found in environment
27	Understand money within 100	Operations	- Recognize coins or bills/notes within 100 - Count an amount of money within 100 - Compare amounts of money - Solve 1-step addition or subtraction word problems involving money set in real life	- Solving real-life word problems (e.g. going to the store) - Games - Role-playing - Small group activities using teaching aids - Teaching aids include money cards, drawings or pictures and objects found in environment
28	Understand money within 100	Operations	- Recognize coins or bills/notes within 100 - Count an amount of money within 100 - Compare amounts of money - Solve 1-step addition or subtraction word problems involving money set in real life	- Solving real-life word problems (e.g. going to the store) - Games - Role-playing - Small group activities using teaching aids - Teaching aids include money cards, drawings or pictures and objects found in environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
29	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments
30	Explore geometric shapes	Geometry	- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color - Build and draw shapes (circle, rectangle, square, triangle) with defining attributes - Combine shapes to form larger shapes	- Drawing - Making shapes out of found objects - Games (Shape hunt, I spy, What am I?, Human shapes, Shape sort) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, shape cut-outs and objects found in environment
31	Explore concepts of length	Measurement and Data	- Measure lengths of different objects or images of objects using non-standard measures - Compare lengths using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than'	- Real-world problem solving - Measuring using different length objects - Game (Who is longer?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, and objects found in the environment
32	Explore concepts of mass	Measurement and Data	Measure and compare mass using language such as 'heavy as', 'heavier than', 'as light as', 'lighter than'	- Real-world problem solving - Measuring using objects of different mass - Game (Who weighs more?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, and objects found in the environment
33	Explore concepts of capacity	Measurement and Data	Measure and compare capacity using language such as 'holds or contains as much as', 'more than', 'less than'	- Real-world problem solving - Measuring using different size containers - Game (What holds more?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, containers of different sizes, water and sand



Week	Topic	Competency	Objectives <i>Children should be able to...</i>	Example activities
34	Collect, sort and represent data	Measurement and Data	- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as' - Classify objects into given categories, count the number of objects in each category and order categories based on count - Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another	- Real-world problem solving - Small group activities - Collect and sort objects based on one characteristic - Class poll - Teaching aids include objects found in the environment
35	Collect, sort and represent data	Measurement and Data	- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as' - Classify objects into given categories, count the number of objects in each category and order categories based on count - Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another	- Real-world problem solving - Small group activities - Collect and sort objects based on one characteristic - Class poll - Teaching aids include objects found in the environment
36	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments



4b Resource 4b: Math Scope and Sequence – Developing Level

Week	Topic	Competency	Objectives <i>Children should be able to...</i>	Example activities
1	Know your class	Positive Social Skills	- Know each other by name - Practice small group activities on finding patterns	'Get to know each other' games - Small group activities
2	Develop number sense within 100	Number Sense	- Count up to 100 - Recognize numbers up to 100 - Read and write numerals up to 100 with corresponding words - Count forwards and backward within 100, starting at any number less than 100 - Understand the hundreds, tens and ones place value - Use concrete objects and pictorial representation to compare, order and estimate - Compare 2-digit numbers using the symbols $>$, $<$ and $=$ - Predict what comes next in a number pattern - Skip count by 10s to 100	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
3	Develop number sense within 100	Number Sense	- Count up to 100 - Recognize numbers up to 100 - Read and write numerals up to 100 with corresponding words - Count forward and backward within 100, starting at any number less than 100 - Understand the hundreds, tens and ones place value - Use concrete objects and pictorial representation to compare, order and estimate - Compare 2-digit numbers using the symbols $>$, $<$ and $=$ - Predict what comes next in a number pattern - Skip count by 10s to 100	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
4	Add and subtract within 100	Operations	- Add and subtract within 100 without regrouping using place value chart - Add and subtract within 100 with regrouping using place value chart - Solve 1-step word problems using addition or subtraction - Add and subtract within 100 using the standard way in vertical columns - Use plus (+), minus (−) and equals (=) symbols appropriately - Understand and apply properties of operations and the relationship between addition and subtraction - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
5	Add and subtract within 100	Operations	- Add and subtract within 100 without regrouping using place value charts - Add and subtract within 100 with regrouping using place value chart - Solve 1-step word problems using addition or subtraction - Add and subtract within 100 using the standard way in vertical columns - Use plus (+), minus (−) and equals (=) symbols appropriately - Understand and apply properties of operations and the relationship between addition and subtraction - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
6	Understand concepts of multiply	Operations	- Develop fluency with addition facts - Recognize concepts of multiplication - Multiplication table and mental calculation of multiply by 2, 3, 5, 10 - Recognize and use multiply (×) symbol appropriately - Solve 1-step word problems with multiply using picture representation	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, arrays, drawings or pictures and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
7	Understand concepts of multiply	Operations	- Develop fluency with addition facts - Recognize concepts of multiplication and division - Multiplication table and mental calculation of multiply up to 10 - Recognize and use multiply ($\times$) symbol appropriately - Relationship between multiply and divide - Solve 1-step word problems with multiply using picture representation	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, arrays, drawings or pictures and objects found in the environment
8	Understand concepts of divide	Operations	- Concepts of divide - Multiplication table and mental calculation of multiply up to 10 - Recognize and use divide ($\div$) symbol appropriately - Relationship between multiply and divide - Solve 1-step word problems with divide using picture representation	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, arrays, drawings or pictures and objects found in the environment
9	Develop number sense within 500	Number Sense	- Count up to 500 - Recognize numbers up to 500 - Read and write numerals up to 500 with corresponding words - Understand the hundreds, tens and ones place values - Use concrete objects and pictorial representation to compare, order and estimate - Compare 3-digit numbers using the symbols $>$, $<$ and $=$ - Predict what comes next in a number pattern - Skip count by 10s and 100s	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, drawings or pictures, place value chart and objects found in the environment
10	Add and subtract within 500	Operations	- Add and subtract within 500 without regrouping using place value chart - Add and subtract within 500 with regrouping using place value chart - Solve 1-step word problems using addition or subtraction - Add and subtract within 500 using the standard way in vertical columns - Use plus ($+$), minus ($-$) and equals ($=$) symbols appropriately - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
11	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments
12	Develop number sense within 1,000	Number Sense	- Count up to 1,000 - Recognize numbers up to 1,000 - Read and write numerals up to 1,000 with corresponding words - Understand the thousands, hundreds, tens and ones place values - Use concrete objects and pictorial representation to compare, order and estimate - Compare 3-digit numbers using the symbols $>$, $<$ and $=$ - Predict what comes next in a number pattern - Skip count by 2s, 5s, 10s and 100s	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, drawings or pictures, place value chart and objects found in the environment
13	Develop number sense within 1,000	Number Sense	- Count up to 1,000 - Recognize numbers up to 1,000 - Read and write numerals up to 1,000 with corresponding words - Understand the thousands, hundreds, tens and ones place values - Use concrete objects and pictorial representation to compare, order and estimate - Compare 3-digit numbers using the symbols $>$, $<$ and $=$ - Predict what comes next in a number pattern - Skip count by 2s, 5s, 10s and 100s	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, drawings or pictures, place value chart and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
14	Add and subtract within 1,000	Operations	- Add and subtract within 1,000, without regrouping, using place value chart - Add and subtract within 1,000, with regrouping, using place value chart - Solve 1-step word problems using addition or subtraction - Add and subtract within 1,000 using the standard way in vertical columns - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
15	Add and subtract within 1,000	Operations	- Add and subtract within 1,000, without regrouping, using place value chart - Add and subtract within 1,000, with regrouping, using place value chart - Solve 1-step word problems using addition or subtraction - Add and subtract within 1,000 using the standard way in vertical columns - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
16	Understand money within 1,000	Operations	- Recognize coins or bills/notes within 1,000 - Count amount of money within 1,000 - Compare amounts of money - Solve 1-step addition or subtraction word problems involving money set in real life	- Solving real-life word problems (e.g. going to the store) - Games (Which costs more? How much? How much altogether?) - Role-playing - Small group activities using teaching aids - Teaching aids include money cards, drawings or pictures, place value chart and objects found in the environment
17	Understand money within 1,000	Operations	- Recognize coins or bills/notes within 1,000 - Count amount of money within 1,000 - Compare amounts of money - Solve 1-step addition or subtraction word problems involving money set in real life	- Solving real-life word problems (e.g. going to the store) - Games (Which costs more? How much? How much altogether?) - Role-playing - Small group activities using teaching aids - Teaching aids include money cards, drawings or pictures, place value chart and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
18	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments
19	Develop concepts of time	Measurement and Data	- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, week, month, year) - Identify tools that measure time (analog clock, digital clock, calendar) - Name the days of the week - Identify the time (to the nearest hour and half hour)	- Songs - Storytelling - Drawing - Role-playing or charades - Small group activities using teaching aids - Teaching aids include digital clock on cellphone, analog clock, calendar
20	Develop concepts of time	Measurement and Data	- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, week, month, year) - Identify tools that measure time (analog clock, digital clock, calendar) - Name the days of the week - Identify the time (to the nearest hour and half hour)	- Songs - Storytelling - Drawing - Role-playing or charades - Small group activities using teaching aids - Teaching aids include digital clock on cellphone, analog clock, calendar
21	Explore geometric shapes	Geometry	- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color - Build and draw shapes (circle, rectangle, square, triangle) with defining attributes - Combine shapes to form larger shapes - Identify, name, describe and classify: cube, cuboid, cone, cylinder and sphere	- Drawing - Making shapes out of found objects - Games (Shape hunt, I spy, What am I?, Human shapes, Shape sort) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, shape cut-outs and objects found in the environment
22	Explore geometric shapes	Geometry	- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color - Build and draw shapes (circle, rectangle, square, triangle) with defining attributes - Combine shapes to form larger shapes - Identify, name, describe and classify: cube, cuboid, cone, cylinder, sphere	- Drawing - Making shapes out of found objects - Games (Shape hunt, I spy, What am I?, Human shapes, Shape sort) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, shape cut-outs and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
23	Explore geometric shapes	Geometry	- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color - Build and draw shapes (circle, rectangle, square, triangle) with defining attributes - Combine shapes to form larger shapes - Identify, name, describe and classify: cube, cuboid, cone, cylinder, sphere	- Drawing - Making shapes out of found objects - Games (Shape hunt, I spy, What am I?, Human shapes, Shape sort) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, shape cut-outs and objects found in the environment
24	Add and subtract within 1,000	Operations	- Solve 1-step word problems using addition or subtraction - Solve word problems that call for adding 3 whole numbers whose sum is less than or equal to 20 - Add and subtract within 1,000 using the standard way in vertical columns - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number - Work with equal groups of objects to gain foundations for multiplication	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
25	Add and subtract within 1,000	Operations	- Solve 1-step word problems using addition or subtraction - Solve word problems that call for adding 3 whole numbers whose sum is less than or equal to 20 - Add and subtract within 1,000 using the standard way in vertical columns - Use mental calculation to find 10 more or 10 less than a 2-digit number, 1 more or 1 less than a 2-digit number - Work with equal groups of objects to gain foundations for multiplication	- Real-world problem solving or storytelling - Drawing - Games (Simon says, Answers to slate, True or false, Fill in the blank) - Role-playing or charades - Small group activities using teaching aids - Teaching aids include number cards, number bonds, band of 10, drawings or pictures, place value chart and objects found in the environment
26	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build students' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments



Week	Topic	Competency	Objectives <i>Children should be able to...</i>	Example activities
27	Understand money within 1,000	Operations	- Recognize coins or bills/notes within 1,000 - Count amount of money within 1,000 - Compare amounts of money - Solve 1-step addition or subtraction word problems involving money set in real life (e.g. going to the store)	- Solving real-life word problems (e.g. going to the store) - Games - Role-playing - Small group activities using teaching aids - Teaching aids include money cards, drawings or pictures, place value chart and objects found in the environment
28	Explore concepts of length	Measurement and Data	- Measure lengths of different objects or images of objects using non-standard measures - Compare lengths of different objects or images of objects using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than' - Order 3–5 objects by length - Estimate lengths - Measure lengths using a ruler or other non-standardized measurement tool (e.g. bottle caps, string) - Compare 2 items (or images of items) based on length - Solve word problems with length - Measure lengths in centimeters (cm) and meters (m) - Use appropriate units and abbreviations for centimeters (cm) and meters (m)	- Real-world problem solving - Measuring using different length objects - Game (Who is longer?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, and objects found in the environment
29	Explore concepts of length	Measurement and Data	- Measure lengths of different objects or images of objects using non-standard measures - Compare lengths of different objects or images of objects using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than' - Order 3–5 objects by length - Estimate lengths - Measure lengths using a ruler or other non-standardized measurement tool (i.e. bottle caps, string) - Compare 2 items (or images of items) based on length - Solve word problems with length - Measure lengths in centimeters (cm) and meters (m) - Use appropriate units and abbreviations for centimeters (cm) and meters (m)	- Real-world problem solving - Measuring using different length objects - Game (Who is longer?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, and objects found in the environment



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
30	Explore concepts of mass	Measurement and Data	- Measure and compare mass of different objects using language such as 'as heavy as', 'heavier than', 'as light as' or 'lighter than' another object - Solve word problems with mass - Measure mass in grams (g) and kilograms (kg) - Use appropriate units and abbreviations for grams (g) and kilograms (kg) - Compare and order objects according to their mass	- Real-world problem solving - Measuring using different mass objects - Game (Who weighs more?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, and objects found in the environment
31	Explore concepts of mass	Measurement and Data	- Measure and compare mass of different objects using language such as 'as heavy as', 'heavier than', 'as light as' or 'lighter than' another object - Solve word problems with mass - Measure mass in grams (g) and kilograms (kg) - Use appropriate units and abbreviations for grams (g) and kilograms (kg) - Compare and order objects according to their mass	- Real-world problem solving - Measuring using different mass objects - Game (Who weighs more?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, drawings or pictures, and objects found in the environment
32	Explore concepts of capacity	Measurement and Data	- Measure and compare capacity using language such as 'holds or contains as much as', 'more than', 'less than' - Solve word problems with capacity - Measure capacity in liters - Use appropriate units and abbreviations for liters (l) - Compare and order objects according to their capacity	- Real-world problem solving - Measuring using different size containers - Game (What holds more?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, containers of different sizes, water and sand
33	Explore concepts of capacity	Measurement and Data	- Measure and compare capacity using language such as 'holds or contains as much as', 'more than', 'less than' - Solve word problems with capacity - Measure capacity in liters (l) - Use appropriate units and abbreviations for liters (l) - Compare and order objects according to their capacity	- Real-world problem solving - Measuring using different size containers - Game (What holds more?) - Small group activities using teaching aids - Teaching aids include vocabulary cards, containers of different sizes, water and sand



Week	Topic	Competency	Objectives <i>Children should be able to ...</i>	Example activities
34	Collect, sort and represent data	Measurement and Data	- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as' - Classify objects into given categories, count the number of objects in each category and order categories based on count - Organize, represent and interpret data with up to three categories - Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another - Represent collected data in simple picture graphs - Read and interpret data from picture graphs	- Real-world problem solving - Small group activities - Collect and sort objects based on one characteristic - Class poll - Sorting Bag - Attendance Graph - Observational Graph - Weather Graph - Teaching aids include objects found in the environment
35	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build pupils' fluency, speed and accuracy - Support students who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments	- Small group work - Individual exercises - Oral or written rapid assessments
36	Review Build fluency Assess		- Review all objectives covered in previous weeks - Build pupils' fluency, speed and accuracy - Support pupils who are struggling with the content by pairing them with those who are strong with the content - Conduct assessments - Close program	- Small group work - Individual exercises - Oral or written rapid assessments



5 Resource 5: Math Competencies – Emerging, Developing

NUMBER SENSE

To recognize numbers, identify their relative values, count, order, measure and estimate

Emerging

- Count up to 100
- Recognize numbers up to 100
- Read and write numerals up to 100 with corresponding words
- Count forward and backward within 100, starting at any number less than 100
- Understand the hundreds, tens and ones place values
- Use concrete objects and pictorial representation to compare, order and estimate
- Predict what comes next in a number pattern
- Skip count by 10s to 100

Developing

- Count up to 1,000
- Recognize numbers up to 1,000
- Read and write numerals up to 1,000 with corresponding words
- Understand the thousands, hundreds, tens and ones place values
- Use concrete objects and pictorial representation to compare, order and estimate
- Compare 3-digit numbers using the symbols $<$, $>$ and $=$
- Predict what comes next in a number pattern
- Skip count by 2s, 5s, 10s and 100s

OPERATIONS

To manipulate numbers using mathematical processes such as addition, subtraction, multiplication and division

Emerging

- Add and subtract within 100 using concrete objects or images with band of 10 or number bonds
- Solve 1-step word problems using addition or subtraction
- Recognize and use plus (+), minus (−) and equals (=) symbols appropriately
- Add and subtract within 100 using standard way in vertical columns
- Understand and apply properties of operations and the relationship between addition and subtraction
- Work with equal groups of objects (foundations for multiplication)
- Recognize concepts of multiplication
- Recognize and use multiply ($\times$) symbol appropriately
- Multiply up to 10
- Multiplication table and mental calculation of multiplying by 2, 3, 5 and 10
- Solve 1-step word problems with multiply using picture representation

Money

- Recognize coins or bills/notes within 100
- Count an amount of money within 100
- Compare amounts of money
- Solve 1-step addition or subtraction word problems involving money set in real life



OPERATIONS

To manipulate numbers using mathematical processes such as addition, subtraction, multiplication and division

Developing

- Add and subtract within 1,000, without regrouping, using number bonds or place value chart
- Add and subtract within 1,000, with regrouping, using number bonds or place value chart
- Solve 1-step and 2-step word problems using addition or subtraction
- Solve word problems that call for adding 3 whole numbers whose sum is less than or equal to 20
- Add and subtract within 1,000 using standard way in vertical columns
- Use mental calculation to find 10 more or 10 less than a 2-digit number, one more or one less than a 2-digit number
- Develop fluency with addition facts
- Introduce concepts of multiply and divide
- Multiply up to 10 and beyond
- Multiplication table and mental calculation of multiplying and dividing by 2, 3, 5 and 10
- Recognize and use multiply ($\times$) and divide ($\div$) symbols appropriately
- Introduce relationship between multiply and divide
- Solve 1-step word problems with multiply and divide using picture representation

Money

- Recognize coins or bills/notes within 1,000
- Count amount of money within 1,000
- Compare amounts of money
- Solve 1-step addition or subtraction word problems involving money set in real life

MEASUREMENT AND DATA

To explore concepts of measurement such as length, distance, mass and capacity and to collect, sort and represent data and make decisions

Emerging

Measurement

- Measure lengths of different objects or images of objects using non-standard measures
- Compare lengths using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than'
- Measure and compare mass using language such as 'heavy as', 'heavier than', 'as light as', 'lighter than'
- Measure and compare capacity using language such as 'weighs as much as', 'more than', 'less than'

Time

- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, week, year)
- Identify tools that measure time (analog clock, digital clock, calendar)
- Name the days of the week
- Identify the time (to the nearest hour) of everyday events (lunchtime, bedtime etc.)



MEASUREMENT AND DATA

To explore concepts of measurement such as length, distance, mass and capacity and to collect, sort and represent data and make decisions

Emerging

Data

- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as'
- Classify objects into given categories, count the number of objects in each category and order categories based on count
- Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another

Developing

Measurement

- Measure lengths of 3 to 5 different objects or images of objects using standardized measures
- Measure, order, estimate and compare lengths using language such as 'as long as', 'as short as', 'longer than', 'shorter than', 'as tall as', 'taller than'
- Measure, order, estimate and compare mass using language such as 'heavy as', 'heavier than', 'as light as', 'lighter than'
- Measure, order, estimate and compare capacity using language such as 'weighs as much as', 'more than', 'less than'

Time

- Understand concept of time (morning, afternoon, evening, today, yesterday, tomorrow, week, year)
- Identify tools that measure time (analog clock, digital clock, calendar)
- Name the days of the week
- Identify the time (to the nearest hour and half hour)

Data

- Collect objects or data points, sort, and describe using language such as 'most', 'least', 'greatest', 'smallest', 'as much as', 'as many as'
- Classify objects into given categories, count the number of objects in each category and order categories based on count
- Organize, represent and interpret data with up to three categories
- Ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another
- Represent collected data in simple picture graphs
- Read and interpret data from picture graphs



GEOMETRY

To identify characteristics, measurement, orientation, size and relationships of objects and shapes in space

Emerging

- Describe objects in the environment using names of shapes
- Describe the relative position or orientation of objects, using language such as 'on', 'under', 'over', 'in front', 'behind', 'between', 'next to', 'inside', 'outside', 'far', 'near', 'to the right of', 'to the left of'
- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color
- Build and draw shapes (circle, rectangle, square, triangle) with defining attributes
- Combine shapes to form larger shapes

Developing

- Describe objects in the environment using names of shapes
- Describe the relative position or orientation of objects, using language such as 'on', 'under', 'over', 'in front', 'behind', 'between', 'next to', 'inside', 'outside', 'far', 'near', 'to the right of', 'to the left of'
- Identify shapes (circle, rectangle, square, triangle) of different orientation, size and color
- Build and draw shapes (circle, rectangle, square, triangle) with defining attributes
- Identify, name, describe and classify: cube, cuboid, cone, cylinder and sphere



6

Resource 6: Math Training

Post-test Phase 1 – Answer Key

1. Why is it important for students to learn math?

It is important for students to learn math for the following 5 reasons: 1) It predicts students' later success in school; 2) It makes students more intelligent; 3) It builds students' self-confidence; 4) It develops mathematical thinking and problem-solving skills; and 5) It is useful for everyday living.

2. Identify and explain the 4 Math Competencies.

- **NUMBER SENSE** – develops counting, one-to-one correspondence with an object, knowing the next number in a sequence and comparing quantities.
- **OPERATIONS** – involves the manipulation of objects to join them together which is addition or take them apart which is subtraction. It also includes multiplication and division.
- **MEASUREMENT AND DATA** – introduces students to using non-standard measurement tools to understand length or height, weight and volume and standard tools such as rulers and scales to measure precisely.
- **GEOMETRY** – includes shape recognition and naming. For example: "That's a triangle." Spatial sense involves knowing location, distance and direction using terms such as 'over', 'under', 'above', 'below' and so on.

3. Explain the 3 different styles of how students learn math.

Students learn by seeing, listening and manipulating.

4. Name 3 teaching aids used in math

Band of 10, counters and number bonds, number cards, number chart (any 3 are correct)

5. Explain the difference between boys and girls ability to learn math, if any.

There is no difference between boys and girls in their ability to learn math. Research shows that mathematical ability/performance is not determined by gender, but by the social expectations and gender roles that students grow up with. Therefore, it is important to develop a mindset that all students can learn through perseverance and practice.

6. Name and explain 3 teaching techniques for teaching Number Sense and Operations.

Using problems in the form of stories in context that captivate a student's imagination, using band of 10 or number bonds and using songs, storytelling and games.

7. Name and explain 2 teaching techniques for building fluency with numbers in a fun way.

Skip counting and counting forward and backward in song builds fluency with numbers. Other games include 'Simon says' and 'Who am I?'



7

Resource 7: Math Training Post-test Phase 2 – Answer Key

1. Name and explain the measurement attributes taught in the emerging level.

■ **LENGTH** – *The length of an object can be found by determining the number of units, laid end to end, that make up the distance from one point to another.*

■ **MASS** – *Mass refers to the amount of matter in an object. Students often refer to the weight of an object, rather than its mass.*

■ **CAPACITY** – *Capacity is the greatest amount that a container can hold. Students explore the capacity of containers, using materials that can be poured such as water, rice or sand.*

2. Identify at least 2 teaching aids used for measurement activities.

ATTRIBUTE	Examples of non-standard unit
LENGTH	Sticks cut in equal lengths, toothpicks, straws, paper clips, pieces of chalk, paper strips of equal lengths
MASS	Beads, marbles, stones, everyday objects
CAPACITY	Cups, plastic containers, buckets, bottles, cans
TIME	Steady hand claps, sand timers, stopwatch, analog clock, digital clock, calendar

3. Name the 4 steps of the problem-solving process for data activities.

The big idea in data analysis is the 4-step problem solving process: 1) Formulate an investigation question that can be addressed with data; 2) Collect data to address the question; 3) Analyze the data; and 4) Interpret the results.

4. Name some examples of how to record data during a class poll.

Using a tally table or a bar chart.

5. Name and explain 2 activities that teach geometry

Here are 2 examples, but there are 7 in the Facilitator Handbook:

'Bag of shapes' is a game that encourages all students to reason and communicate how they identify or classify a shape and explain why. Through discussions of a wide variety of shapes, students learn to recognize examples and non-examples of shapes.

'Shape neighborhood' is an art activity where students use their creativity to draw a scene using combinations of circles, rectangles, triangles and squares of varying sizes. This activity exercises their ability to compose and decompose shapes.

6. Identify at least 2 teaching aids useful for geometry

Cut-outs, tessellations, everyday objects found in the environment.



8

Resource 8: Math Glossary

COMPETENCIES

The knowledge, skills and attitudes developed progressively over a long period of time from early childhood, through primary school into high school and beyond formal schooling.

OBJECTIVE

The aim that the training session or lesson plan is designed to achieve.

SCOPE AND SEQUENCE

The Scope and Sequence is a detailed plan of what to teach, how to teach it and in what order in the nine months of the Math intervention.

MATH COMPETENCIES

The Math Intervention seeks to strengthen 4 Math Competencies.

1. **Number Sense** – This competency develops the verbal counting sequence. Number words are tied to objects as students mentally connect each number word in one-to-one correspondence with an object. Other important aspects of counting include knowing the next number in a sequence and comparing quantities.

2. **Operations** – This competency involves the manipulation of objects to join them together (addition) or to take them apart (subtraction). For example, “We have 3 girls and 4 boys in our group. How many students do we have altogether?” Subtraction for young students is a separation activity. For example: “If you have 5 blocks and you give me 2, how many will you have left?” It also includes multiplication and division.
3. **Measurement and Data** – This competency introduces students to using non-standard measurement tools to understand length, height, weight and volume. Later, they can use standard tools such as rulers and scales to measure precisely.
4. **Geometry** – This competency includes shape recognition and naming. For example, “That’s a triangle.” Spatial sense involves knowing location, distance and direction using terms such as ‘over’, ‘under’, ‘above’, ‘below’ etc.

MATH SKILLS

The specific capabilities and abilities that build one or more of the Math Competencies.

