

03-DAY TRAINING MODULE MATHEMATICS (NUMERACY)



**BALUCHISTAN STUDENT LEARNING
IMPROVEMENT PROGRAMME (BSLP)**

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Teacher Training Manual

Background and Development

This manual is designed to equip primary school teachers in Balochistan with comprehensive knowledge and practical skills in general pedagogy and assessment. Developed as part of the UNICEF Balochistan Student Learning Improvement Programme (BSLP), the 16-hour training programme aims to enhance teachers' understanding of pedagogical and assessment principles as well as strategies, ultimately improving student learning outcomes through an immersive practical experience. The development of this manual was a rigorous and meticulous process, and it was informed by a snap assessment conducted in selected districts of Balochistan.

This assessment evaluated primary school students' numeracy and literacy levels and their teachers' pedagogical practices through student achievement tests and classroom observations, respectively. The findings from these assessments have been instrumental in shaping the content of this manual. Developed by the Aga Khan University Institute for Educational Development faculty, we believe this manual will be a useful resource for trainers to deliver contextually relevant, high-quality training for primary school teachers in the province, enabling them to teach with enhanced competence and confidence.



Notes for Facilitators

Facilitators are requested to consider the following points while using Teaching Manual for Mathematics:

- The manual has been developed for a 16-hour training programme spread over three days. Each day focuses on key concepts from the different strands of mathematics and teaching strategies for engaging learning in hands-on and minds-on activities.
- The manual contains multiple teaching aids, such as PowerPoint presentations, activity worksheets, and website links, which are included as appendices.
- All the teaching aids must be prepared before the training session, including the lesson plan [The BOPPPS - Bridge-in, Outcome, Pre-assessment, Participatory Learning, Post-assessment, and Summary (See Annexure 1.1 for detailed BOPPPS explanation in Pedagogy and Assessment teacher training manual), activity worksheets, and other resource materials such as charts, multimedia equipment, markers, and pictures. If multimedia is unavailable, facilitators may use charts or other relevant materials to facilitate the activities.
- It is recommended that facilitators visit the training venue one day prior to the workshop. This pre-visit allows them to arrange materials, make necessary adjustments for displays, and review the seating arrangements, ensuring a smooth start to the training. Additionally, the number and composition of groups for various sessions of the TMM may be adjusted based on the nature and demographics (e.g., number and gender mix) of the participants.

By adhering to these guidelines, facilitators can effectively deliver a comprehensive and enriching training experience for primary school mathematics teachers, fostering improved mathematical knowledge, skills to promote effective mathematics learning in classroom.

Overall Learning Outcomes of Mathematics Module

By the end of this three-day workshop, participants will be able to:

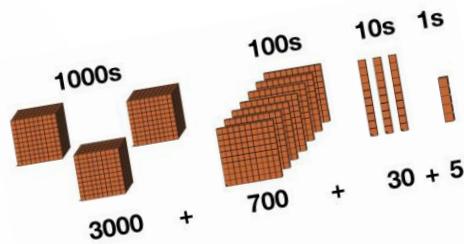
1. **Explore** key features of National Curriculum of Mathematics (goal/vision, standards, benchmarks, SLOs, assessment, resources, etc. and logical connection between these) and textbooks;
2. **Reflect** on their own teaching and learning practices of mathematics;
3. **Examine** and broaden their own conceptions of learning and teaching mathematics;
4. **Enhance** their knowledge and conceptual understanding of the selected mathematical concepts from primary level;
5. **Demonstrate** an enhanced understanding of a variety of teaching and assessment strategies applicable in the primary classrooms;
6. **Explore** TaRL (Teaching at the Right Level) as an evidence-based approach to improving foundational mathematical skills;
7. **Identify** areas where textbook content can be supplemented with additional instructional material to best achieve curriculum standards and develop processes and skills involved in creating specific instructional materials;
8. **Design** mathematics lessons to promote students' conceptual understanding; and,
9. **Implement** their lesson plans and receive feedback for improvement.

DAY 01

LET'S LEARN NUMBERS AND
OPERATIONS FOR CONCEPTUAL
UNDERSTANDING



PLACE VALUE



52



Numbers and Operation Strand

Detailed Training Plan of Place Value

Time	Activities (Procedural details)	Resources and Annexures																																			
5 mins	Welcome, Introductions <i>Welcome participants to the workshop and give brief introduction of the facilitators and ask participants to introduce themselves</i>	Marker and white board																																			
15 mins	<p>Key Mathematics Curriculum – Components [Standards, benchmark, Student Learning Outcomes, Objectives]</p> <p>The participants would be engaged in brainstorming the key terms used in mathematics curriculum. The following will then be discussed</p> <p>The curriculum for Mathematics is comprised of five strands / domains - Numbers and Operations, Algebra, Geometry and Measurement, Statistics & Probability and is underpinned by reasoning and logical thinking.</p> <p>Based on the given table the participants will be able to differentiate standards, benchmarks, SLOs, objectives and see how place value concept is depicted in the mathematics curriculum, progression grid and textbook.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="6" style="text-align: center;">Standard Grade 1-5</td> <td>Standards describe, in general terms, what all students should study, and they should be able to demonstrate from Grade 1 to Grade 12.</td> </tr> <tr> <td colspan="3" style="text-align: center;">Benchmark Grade 1-3</td> <td colspan="3" style="text-align: center;">Benchmark Grade 4-6</td> <td>Benchmarks further elaborates on standards and describe, in some detail, the skills students should be able to demonstrate at appropriate development level, typically by the end of grade 3,5,8,10,12.</td> </tr> <tr> <td style="text-align: center;">SLOs Grade 1</td> <td style="text-align: center;">SLOs Grade 2</td> <td style="text-align: center;">SLOs Grade 3</td> <td style="text-align: center;">SLOs Grade 4</td> <td style="text-align: center;">SLOs Grade 5</td> <td style="text-align: center;">SLOs Grade 6</td> <td>Student Learning Outcomes (SLOs) help to 'unpack' a benchmark by describing, in greater detail, the skills students should be able to demonstrate at each grade level for the Benchmark.</td> </tr> <tr style="background-color: #00a651; color: white;"> <td colspan="6" style="text-align: center;">Grade-Wise Mathematics Textbooks</td> <td></td> </tr> <tr> <td colspan="6" style="text-align: center;">Grade I Lesson Objectives</td> <td>Learning Objective defines the purpose of the lesson. A well-written Learning Objective lays the foundation for a great lesson.</td> </tr> </table>	Standard Grade 1-5						Standards describe, in general terms, what all students should study, and they should be able to demonstrate from Grade 1 to Grade 12.	Benchmark Grade 1-3			Benchmark Grade 4-6			Benchmarks further elaborates on standards and describe, in some detail, the skills students should be able to demonstrate at appropriate development level, typically by the end of grade 3,5,8,10,12.	SLOs Grade 1	SLOs Grade 2	SLOs Grade 3	SLOs Grade 4	SLOs Grade 5	SLOs Grade 6	Student Learning Outcomes (SLOs) help to 'unpack' a benchmark by describing, in greater detail, the skills students should be able to demonstrate at each grade level for the Benchmark.	Grade-Wise Mathematics Textbooks							Grade I Lesson Objectives						Learning Objective defines the purpose of the lesson. A well-written Learning Objective lays the foundation for a great lesson.	
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5 mins

Ice-breaking Activity: Guess Three-digit Number

Pre-requisite: Participants should be aware of odd numbers; Even numbers, Prime numbers; multiples to participate in this activity. First start with finding out one digit number by asking questions that can only be answered in Yes or No

Example: The participant would be asked to find out what facilitator has thought of one digit. They can ask the following questions if the secret number is 8

- Is the number more than 5? YES (they know the number is more than 5)
- Is the number odd number? NO (they know the number is even number i.e., 6 or 8)
- Is the number multiple of 3? NO (now they know it is not 6 so this should be 8)
- Number is 8winner

Now the game starts. The facilitator thinks of a secret 3-digit number and draws a row with three columns on the board.

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- The participants need to guess the digits by asking specific place value related questions [maximum 8 questions] that can only be answered in YES/NO. No direct question such as "is 4 in a hundred place" is allowed.
- Based on the facilitator's response, participants for each correct guess of a digit will come and write it in the appropriate box on the board or will frame the next question.
- The game continues until all three digits of the number are correctly guessed.
- The winner is who identifies the secret number.

Example: The secret number is 472

Possible questions:

"Is the digit in the hundreds place greater than 5?" NO (number is 1, 2, 3, 4, 5)

"Is the digit in the hundreds place an even number?" YES (number is 2 and 4)

"Is the digit in the hundreds place greater than 3?" YES (number is 4)

One of the participants comes and writes 4 at hundreds place.

4		
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"The digit in the tens place is greatest one-digit prime number." YES

One of the participants comes and writes 7 at tens place.

4	7	
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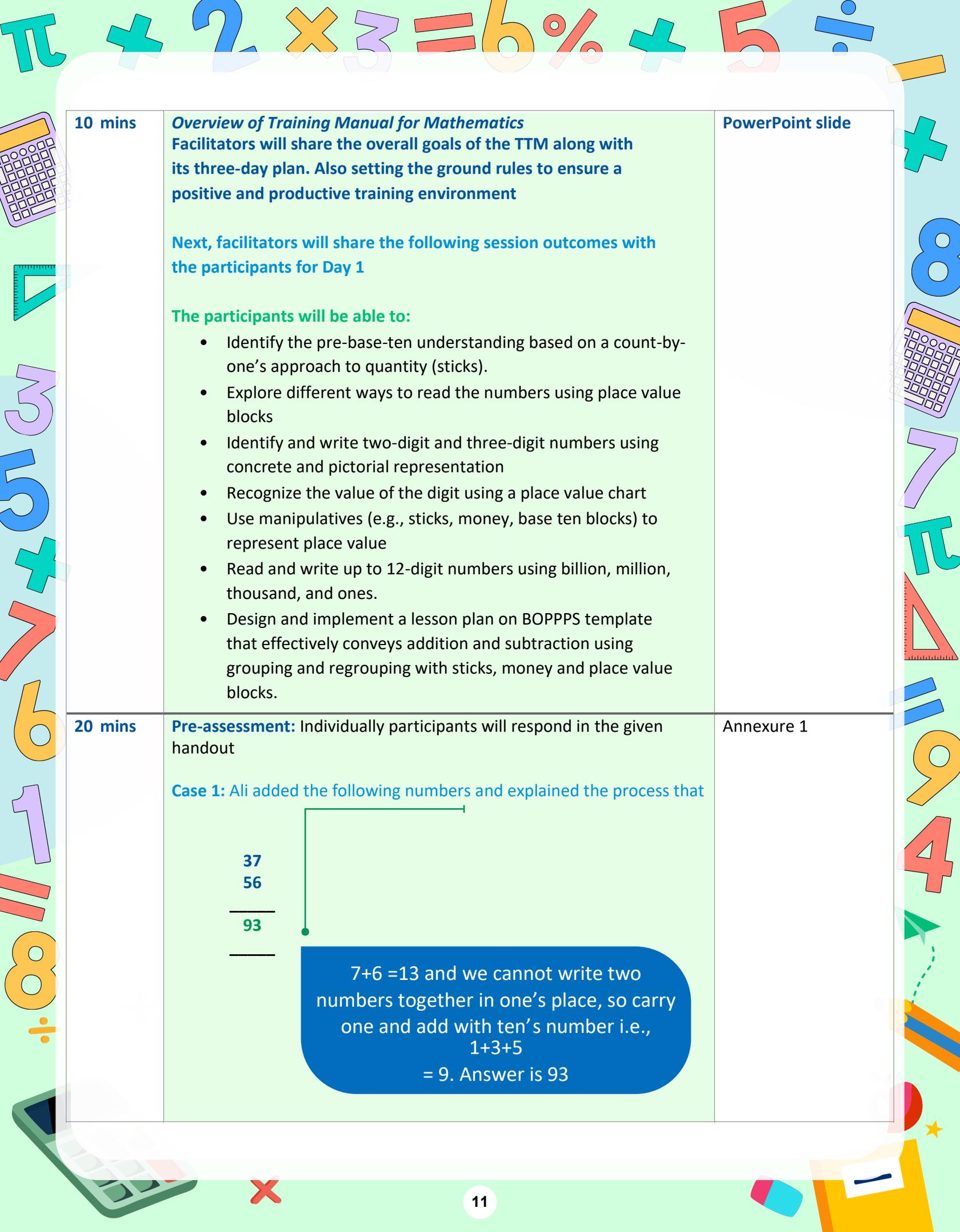
"The digit in the ones place is even." YES

"The digit in the ones place is less than both the numbers." YES

One of the participants comes and writes 2 at one's place. The one who completes the number is winner

4	7	2
---	---	---

Note: The groups can select a secret number and set the range of questions and terms such as odd, even, greater, smaller, prime, multiple, factor and play with the class.



10 mins

Overview of Training Manual for Mathematics

Facilitators will share the overall goals of the TTM along with its three-day plan. Also setting the ground rules to ensure a positive and productive training environment

PowerPoint slide

Next, facilitators will share the following session outcomes with the participants for Day 1

The participants will be able to:

- Identify the pre-base-ten understanding based on a count-by-one's approach to quantity (sticks).
- Explore different ways to read the numbers using place value blocks
- Identify and write two-digit and three-digit numbers using concrete and pictorial representation
- Recognize the value of the digit using a place value chart
- Use manipulatives (e.g., sticks, money, base ten blocks) to represent place value
- Read and write up to 12-digit numbers using billion, million, thousand, and ones.
- Design and implement a lesson plan on BOPPPS template that effectively conveys addition and subtraction using grouping and regrouping with sticks, money and place value blocks.

20 mins

Pre-assessment: Individually participants will respond in the given handout

Annexure 1

Case 1: Ali added the following numbers and explained the process that

$$\begin{array}{r}
 37 \\
 56 \\
 \hline
 93 \\
 \hline
 \end{array}$$

7+6 =13 and we cannot write two numbers together in one's place, so carry one and add with ten's number i.e., 1+3+5 = 9. Answer is 93

Case 2: Anum subtracted 56 from 75 and explained the process That

$$\begin{array}{r} 75 \\ - 56 \\ \hline 19 \end{array}$$

As we cannot subtract 6 from 5, we borrow 1 from the left hand side number and write before 5 so now from 15 we subtract 6 and write 9 and then subtract 5 from 6 and not 7 as given 1 to the one's place. Answer is 19

Task:

- 1) Read Ali's and Anum's response thoroughly in both cases. What can you say about their understanding of the place value.
- 2) What terms / vocabulary you will introduce in your teaching to build their concept of place value?

After participants submit their response, the whole class discussion on some of the key factors that hinder children to develop concept understanding.

40 min

**Participatory Learning: Pre-place-value concept:
From Counting to Grouping Activity- Bundle and Stick Activity**



This activity uses sticks to help strengthen children's understanding of place value and is just one of the many TaRL activities using bundles and sticks to introduce place value concept.

- 1) Show a pile of sticks and ask participants to estimate the number of sticks. Ask them to write their response in the notebook
- 2) Then ask, if we want to count them, what strategies can we use to count them comfortably?
- 3) Invite participants to demonstrate their strategy by grouping sticks.
- 4) Finally introduce grouping in tens as a pre-place value strategy - "ten sticks make a bundle."

Pile of Sticks; rubber bands or string, chalk, thick thread roll

TaRL numeracy teaching strategy

www.youtube.com/watch?v=hOLqImJBVGk



- 5) Draw a number frame on the table/ground, with a column for bundles and another for sticks. Place the sticks and bundles in their respective columns and ask how many bundles and how many sticks are there? writing the response.

For example, 3 bundles of ten sticks and seven single sticks makes $30 + 7 = 36$

Bundles	Sticks
	
3	6

- 6) In small groups, use the sticks to solve two-digit addition and subtractions using appropriate terms such as grouping and regrouping and demonstrate to the class.

- i) $22 + 13$
- ii) $25 - 23$
- iii) $21 + 19$
- iv) $15 - 8$

Note for Facilitators

The place value system is based on groups of tens. Initially, we teach students to count in ones. Grouping with sticks is one of the TaRL activities for developing place value concept. At the beginner and 1-digit recognition level, children practice counting with sticks and begin learning the basic operations. Having tangible objects to count helps to build a stronger understanding of the concepts. At the 2-digit recognition level and above, children use bundles and sticks to better understand place value, using the bundle rule: ten sticks make one bundle. They also manipulate bundles and sticks to understand how to use grouping and regrouping in addition and subtraction tasks. Since counting in groups can be non-intuitive for students, it's essential to create situations in the classroom where students naturally feel the need to count in groups before formally introducing place value. In the place value system, values can be anywhere between zero and nine on any place value. When the value of a digit increases past nine, regrouping happens. This fundamental idea remains consistent even while dealing with big numbers.

40 mins

Teaching Place Value Using Pakistani Currency Notes

Start the discussion by explaining how currency is application of place value concept and can serve as an excellent real-life example to introduce and reinforce the concept. Each denomination of currency, whether coins or notes represents a specific value, much like digits in a number system represent different place values.

Distribute the currency notes in groups. On a table keep the place value chart and invite a group to complete the tasks as per the discussion given in the first column placing currency notes placing them in appropriate column.

Research-based activity- TaRL

Currency notes - laminated copies of Rs 1 coins; Rs 10 (fifty), 100(twenty), 1000 (ten)

Annexure 2 (use which ever you feel comfortable)

Chart with place value

Amount (in Rs)	Hundreds	tens	ones
257			
175			
Add 257+175			

Then ask participants to complete the task

Number	Thousands	Hundreds	Tens	Ones
2385				
1640				
Add both the numbers				
Subtract 1640 from 2385				

Teachers will gain practical experience in using a familiar, real-world tool—Pakistani currency notes—to teach the abstract concept of place value. This task will help them create engaging and relatable lessons that can improve students' understanding of place value and its application in everyday life.

Discuss strengths and challenges that might arise in the classroom-when currency notes are used to teach place value concept.

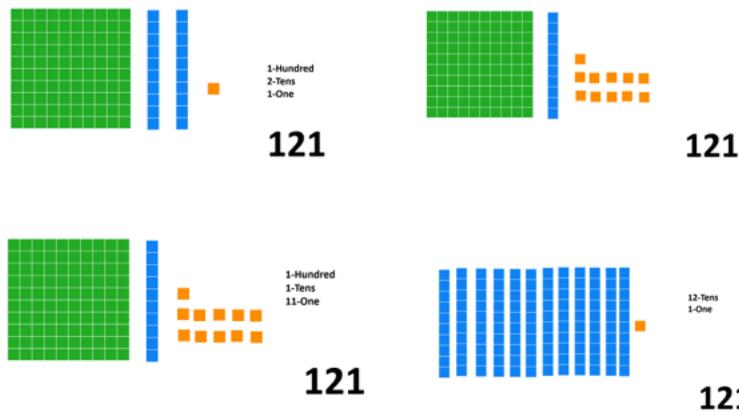
40 Mins

Teaching Place Value Using Place Value Blocks

Ask participants to see the four different representations of number 121 and discuss in a group – what do they understand?

<https://www.tiktok.com/@reason4math/video/7411220445934177582>
(meaning of each place value block)

Arrangements of number 121 (PPT)



Ask participants to work in groups and make different representations of '25' using base-ten material (Annexure 3).

After they finish working with the multiple representation of the given number, to further strengthen their understanding, engage the participants in solving the riddle mentally

1. I have 23 ones and 4 tens. Who am I?
2. I have 4 hundreds, 12 tens and 6- ones. Who am I?
3. I have 30 ones and 3 hundreds? Who am I?
4. I have 4 hundreds, 16 tens and 11 ones. Who am I?
5. I am 340. I have 24 tens. How many hundreds do I have?
6. If you put three more tens with me, I would be 125. Who am I?

Answers

1. I have 23 ones and 4 tens. Who am I? **63**
2. I have 4 hundreds, 12 tens and 6- ones. Who am I? **526**
3. I have 30 ones and 3 hundreds? Who am I? **330**
4. I have 4 hundreds, 16 tens and 11 ones. Who am I? **571**
5. I am 340. I have 24 tens. How many hundreds do I have now?
1 hundreds
6. If you put three more tens with me, I would be 145. Who am I? **115**

Addition and Subtraction (regrouping)

Watch the video and then engage participants in solving addition and subtraction using place value block through regrouping

Mental Mathematics:

Additional Activity – To strengthen Mental Mathematics skills while teaching addition and multiplication facts

Base Ten Resource Annexure 3

Video link:
<https://www.youtube.com/watch?v=F63kWrYg6fY&t=17s>

Task: Use the fact you already know to help you solve each of the following facts without counting

- a) $6 + 6 = 12$
- b) $6 + 7 = \underline{\quad}$
- c) $6 + 8 = \underline{\quad}$

Hint for addition facts

- d) $6 + 7$ is one more than $6 + 6$ given
- e) $6 + 8$ is one more than $6 + 7$ or two more than $6 + 6$

Task: Use the fact you already know to help you solve each of the following facts without multiplying

- a) $2 \times 8 = 16$
- b) $3 \times 8 = \underline{\quad}$
- c) $6 \times 8 = \underline{\quad}$
- d) $7 \times 8 = \underline{\quad}$

Hint:

- b) add 8 to 2×8 fact as 3 is one more group of 8
- c) double the fact 3×8 as 6 is double the group of 8
- d) add 8 to 6×8 facts as 7 is more group of 8.

Planning
20 mins

Learning in Action: Planning a learning activity [BOPPPS] and Micro-Teaching

Annexure 4
BOPPPS Template

110
mins
Micro-
teaching

Divide participants into small groups

Assign each group one of the place value concepts from the list provided below. Each group will then be responsible for designing a 10-minute task that includes real life word problems¹ and step-by-step instructions. These instructions should be detailed enough that anyone can easily understand and teach the plan confidently.

1. Multiple representation of numbers [using sticks]
2. Multiple representation of numbers [using Currency notes]
3. Multiple representation of numbers [using place value blocks]
4. Adding numbers [with regrouping using sticks]
5. Adding numbers [with regrouping using Currency notes]
6. Adding numbers [with regrouping using place value blocks]
7. Subtracting numbers [with regrouping using sticks]
8. Subtracting numbers [with regrouping using Currency notes]
9. Subtracting numbers [with regrouping using place value blocks]

¹ Alina had 4 boxes. Each box had 6 pencils in it. How many pencils did Alina have?

10. Mental mathematics – given facts

Ask each group to demonstrate their understanding through Micro teaching.

After each demonstration, facilitators will engage participants by asking them to reflect on the delivery of the lesson and provide constructive feedback. This structured reflection and feedback ensures that participants not only learned the concepts of place value but also practiced the lesson planning and teaching of concepts of place value.

25 mins

After learning through concrete and pictorial representation, now read and write up to 12-digit numbers using the Place Value Grid

Annexure 5

Show the number written on place value grid and ask them to read

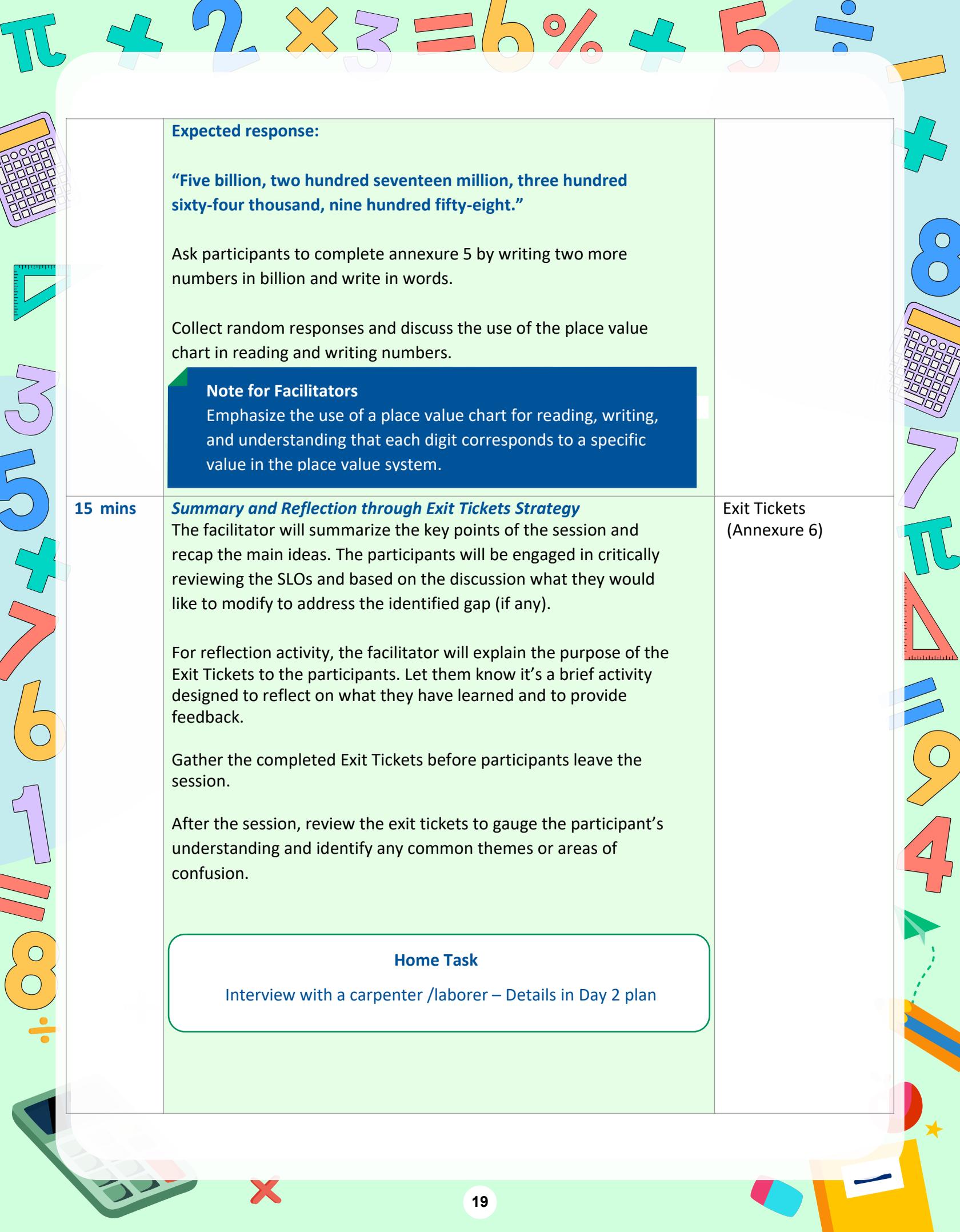
Billions			Millions			Thousands			Units		
		4	0	2	8	3	6	0	4	0	0

Facilitator’s Notes: Correct way to read is Four billion, twenty-eight million, three hundred sixty thousand, four hundred i.e., not to use ‘and’ when reading the whole number. ‘and’ is used when we read decimal numbers

Billions			Millions			Thousands			Units		
		4	0	2	8	3	6	0	4	0	0

Then ask teachers to read 5,217,364,958 using place value grid

Billions			Millions			Thousands			Ones		
Hundred Billions	Ten Billions	Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
		5	2	1	7	3	6	4	9	5	8



Expected response:

“Five billion, two hundred seventeen million, three hundred sixty-four thousand, nine hundred fifty-eight.”

Ask participants to complete annexure 5 by writing two more numbers in billion and write in words.

Collect random responses and discuss the use of the place value chart in reading and writing numbers.

Note for Facilitators
Emphasize the use of a place value chart for reading, writing, and understanding that each digit corresponds to a specific value in the place value system.

15 mins

Summary and Reflection through Exit Tickets Strategy
The facilitator will summarize the key points of the session and recap the main ideas. The participants will be engaged in critically reviewing the SLOs and based on the discussion what they would like to modify to address the identified gap (if any).

For reflection activity, the facilitator will explain the purpose of the Exit Tickets to the participants. Let them know it’s a brief activity designed to reflect on what they have learned and to provide feedback.

Gather the completed Exit Tickets before participants leave the session.

After the session, review the exit tickets to gauge the participant’s understanding and identify any common themes or areas of confusion.

Exit Tickets
(Annexure 6)

Home Task

Interview with a carpenter /laborer – Details in Day 2 plan

Geometry and Measurement Strand

Part A) Detailed Training Plan of Developing Geometric Thinking - Angles

[185 min]

Time	Activities (Procedural details)	Resources and Annexures
15 min	<p>Many skilled workers, like carpenters, potters, laborers, and tailors, use angles in their everyday work without formal education in mathematics. A day prior to this session, teachers would be asked to interview a local carpenter, potter, laborer, or tailor. The interview should focus on how they use angles in their work. The suggested questions is given below.</p> <p>Carpenter: How might a carpenter need to measure or estimate angles when cutting wood or building furniture? (e.g., making a chair, aligning beams for stability)</p> <p>Potter: How does a potter control the angle of their hands or tools while shaping a pot on the wheel? How might they intuitively create symmetrical designs that involve angles?</p> <p>Tailor: How does a tailor use angles when cutting fabric to fit body shapes or design garments? Discuss how tailors use angles to create collars, sleeves, or pleats, and how accuracy impacts the final fit and appearance of the clothing.</p> <p>Laborer (Construction Worker): When laying bricks or working with tiles, how might a laborer use angles to ensure correct alignment or achieve a particular design?</p> <p>Divide participants into small groups.</p> <ol style="list-style-type: none"> Ask them to consider how do these professionals determine angles without using formal measuring tools, like protractors? The participants can discuss their interview findings in their respective groups. What challenges might arise if angles are not measured or estimated correctly while exploring angles in school curriculum? 	

5 min Sharing the Day Learning Outcomes

min

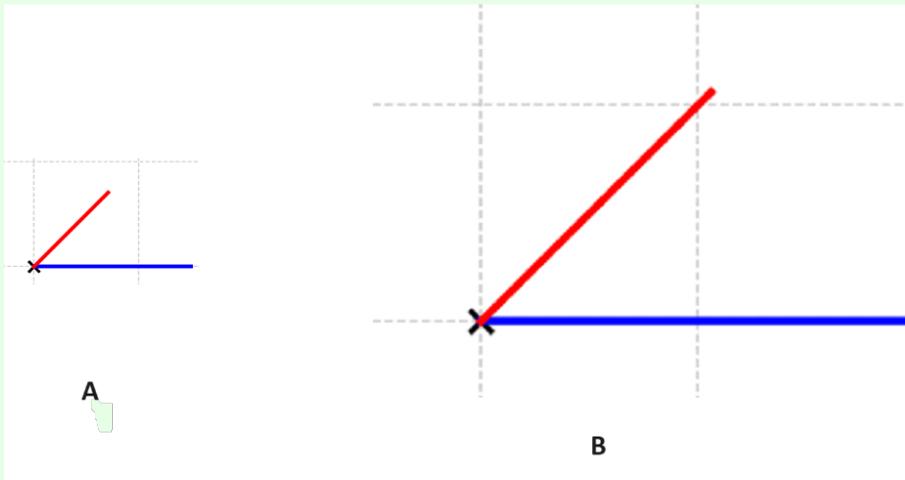
The participants will be able to:

- Connect daily life experience of different professional use of angles in their work.
- Explore children's misconceptions in measurement.
- use non-standard units of measurement which helps them understand the concept of measurement and the importance of consistency;
- identify the appropriate unit of measurement in angle, length, weight, and volume;
- Convert between units of measurements using the metric system for length, weight, and volume;
- Apply their learning about units of measurement in daily life situations.

10 min

Pre-assessment

1. Kaif was asked to identify which angle is smaller/bigger?



Kaif - Angle B is bigger than A because B has long arms and A has short arms

Task: Is Kaif's thinking appropriate? Why? Why not?

Facilitator Notes:

Students may think that the size of the rays determine the angle. Also think that a wide angle with short rays is smaller than a narrow angle with long rays. This is a common misconception among students. They need to be supported to experience that the rotation or how wide the arms are from each other determine the angle measurement.

The participants need to be aware that the attribute of angle size is often misunderstood, and protractors are commonly introduced and used without children understanding the concept behind how they work. Hence, we need to engage children in meaningful tasks to facilitate them in building understanding of angle concepts.

2. Why angle at a point is 360° and not any other number such as 100° ?

Can show video to see the logic behind why angle at a point is 360° ?

Video:

<https://www.youtube.com/watch?v=WzkW3P7HPvs>

5
min

How would you Define Angles in Geometry?

Ask the participants to discuss the definition of angles in group and share with the class

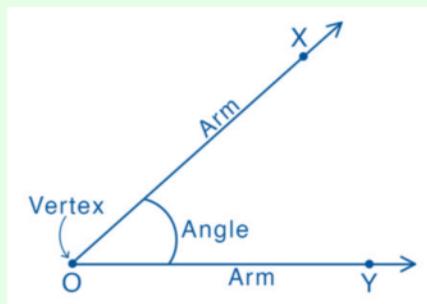
Facilitator Notes:

An angle is defined as a figure that forms when two rays meet at a common point. It is represented by the symbol \angle . An angle is usually measured in degrees, denoted with $^\circ$. The term 'angle' comes from the Latin word 'angulus', meaning 'corner'.

Angle is measured in degrees. A degree is a **measure of rotation**. A full rotation around a point gives us a full circle which measures 360° , a half rotation gives us a half-circle, which is 180° , and a quarter rotation gives us a right-angle measuring 90° .

Facilitate participants to focus on the dynamic perspective in angles i.e., rotation rather view static

Discuss parts of an angle – angle, arms and vertex



20
min

Understanding that Rotation Matters, Not the Length of the Arms

Draw an angle on the floor. The facilitator stands at the vertex and asks two participants to stand on the arms of the angle, close to the vertex. The facilitator then rotates their hand from one participant to the other, emphasizing the degree of rotation.

Next, ask the participants to move further away from the vertex while staying on the same arms. The facilitator again rotates their hand from one participant to the other, noting that the degree of rotation remains the same.

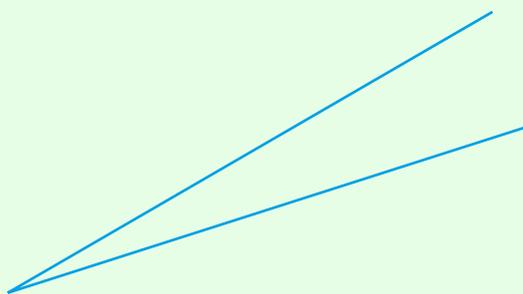
Let participants do a similar experiment and explore the concept.

30
min

Angle Measurement: Non-Standard Unit of Measure

Engage the participants in designing a non-standard unit to measure angles using scale and a transparent thick plastic /paper. This task encourages creativity and reinforces understanding of angle measurement.

For example – The participants can design the following as measuring unit



Ask participants to measure a set of angles given in the handout (Annexure 1).

Participants now should place their designed unit at the vertex of each angle and count how many of their units fit within the angle. If their unit does not fit perfectly, they can estimate or calculate fractions of their unit. The expected responses could be 1 unit and half; 2 units and one-fourth of a unit; 3 units etc

After they measure ask them to show their unit of measurement and angles measured in their group and discuss the relationship between the unit of measurement and the measurement of angle.

transparent thick plastic sheet; pair of scissors, scale

Annexure 1

Facilitator's Notes:

The expected generalization is that when measuring a given angle with a smaller unit of measurement, the resulting measurement will be higher compared to when a larger unit of measurement is used.

Measuring angles with different non-standard units is like measuring length using hand spans. Just as the length of a hand span varies from person to person, resulting in different measurements for the same length, using different non-standard units for measuring angles can lead to inconsistent results.

For example, if one person uses a smaller hand span and another uses a larger one to measure the same length, their measurements will differ, even though the actual length hasn't changed. Similarly, when different students use their own designed units to measure the same angle, they might get different results depending on the size of their unit.

This variation highlights the importance of using standard units of measurement, such as a ruler for length and protractor for angles. Standard units allow us to communicate measurements accurately and consistently, ensuring that everyone is on the same page. While creating and using your own unit of measurement can be a fun and creative exercise, it's crucial to understand that standard units are essential for clear and precise communication in mathematics and beyond.

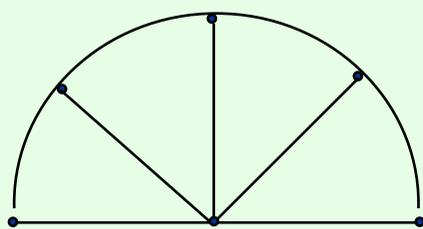
40 min

Design a Paper Protractor

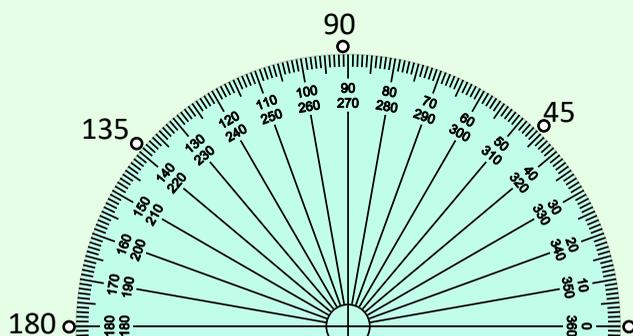
Start by engaging participants in making paper protractor

Steps to Create a Paper Protractor

- Cut a semicircle from the handout (annexure 4). Fold the base i.e., touch both the end and now the semicircle is divided into two equal parts with a crease. Open it and write '90' on the midpoint and mark it as the center point 'O'. This point is where the vertex of the angle will be placed when measuring.
- Draw the Baseline: Draw a straight line across the diameter of the semicircle. This will be the baseline of your protractor.
- First divide the semicircle into two equal halves. write the degree values along the edge of the semicircle. Ensure that the numbers are clear and easy to read. Write 90° Draw a line. Also write 0° and 180°
- Second, fold the half semicircle into further half keeping the same. Open the semicircle and now you see two more creases as shown below.



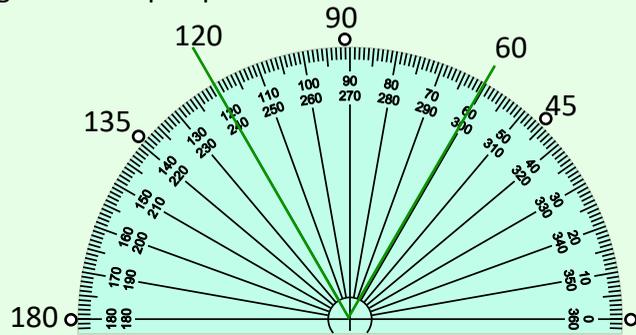
- Label the crease as follows (hint - half of 90° is 45°)



Watch <https://www.youtube.com/watch?v=43XwJ7i7dN4&t=73s> for alternative way to design paper protractor

Annexure 4

- Now open the semicircle and from the vertex as center fold in such a way to get three equal parts. Label them as follows



- Encourage the participants to make 30° and 150° and share the steps with the class.

Now you can use your paper protractor to mark key angles such as 30° , 45° , 60° , 90° , 120° , 135° and 150° .

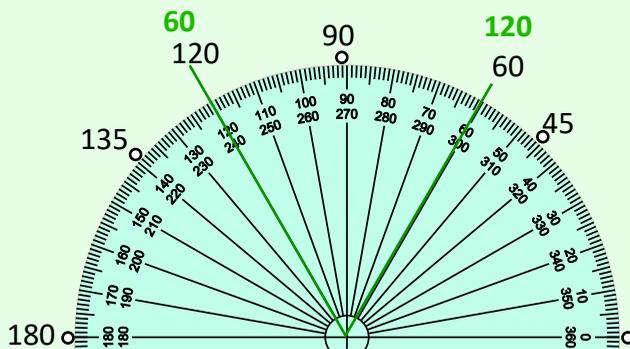
Task: Use your paper protractor to draw the following:

- $\angle PQR = 30^\circ$
- $\angle MNO = 45^\circ$
- $\angle XYZ = 150^\circ$

Task: Measure the angles (Annexure 1) using paper protractor. If you do not get the angle measure of the degrees marked on the paper protractor, write the estimate such as $120^\circ + 10^\circ \text{ more} = 130^\circ$

5 min Marking Degrees on Protractor – Inside and Outside

Now mark 0° on the baseline where earlier you marked 180° and from there start marking the angles. You will get the marking as follows. Use different color to identify the inner numbers and outer numbers. Always start observing the measurement of angle from 0° to correctly record the angle measurement.

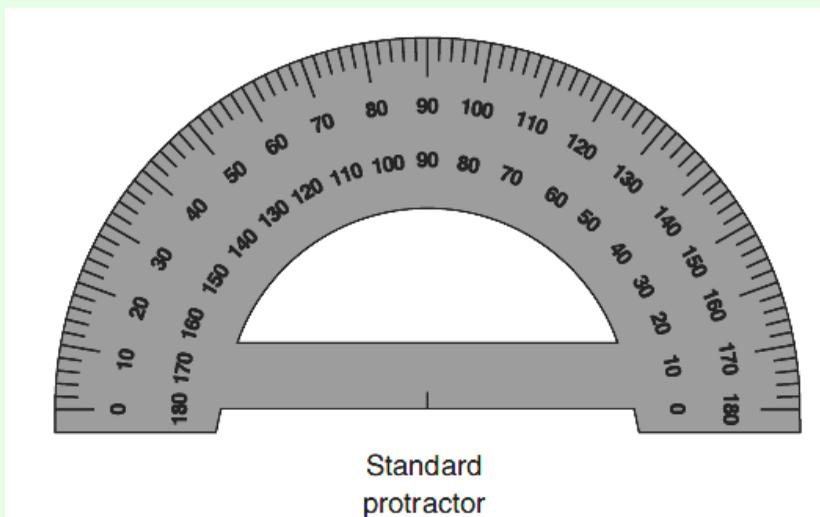


25 min Use Standard Protractor to Measure and Draw Angles

min

How to measure angles

<https://studyjams.scholastic.com/studyjams/jams/math/geometry/measure-angles.htm>



Drawing angles
<https://studyjams.scholarastic.com/studyjams/math/geometry/construct-angles.htm>

Measure the angles in the handout (Annexure 3) using standard protractor.

Use textbook tasks to draw a few angles using standard protractor.

10 min

Types of Angles

Refer the math textbook to define acute angle, right angle, obtuse angle, straight angle, and reflex angle

In the handout (annexure 3) add the type of angle based on the angle measurement.

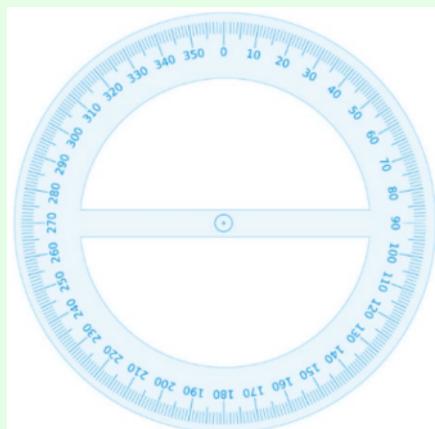
20 min

Constructing a Triangle when ASA (Angle Side Angle) given

Ask participants to identify ASA task from the grade V mathematics textbook and draw a few and label them.

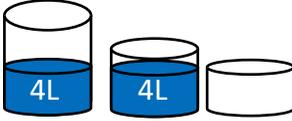
Home Task: Using 360° Protractor:

Encourage participants to measure angles greater than 180° using a 360° circle protractor. Mark the angles – both inner and outer side of the protractor.

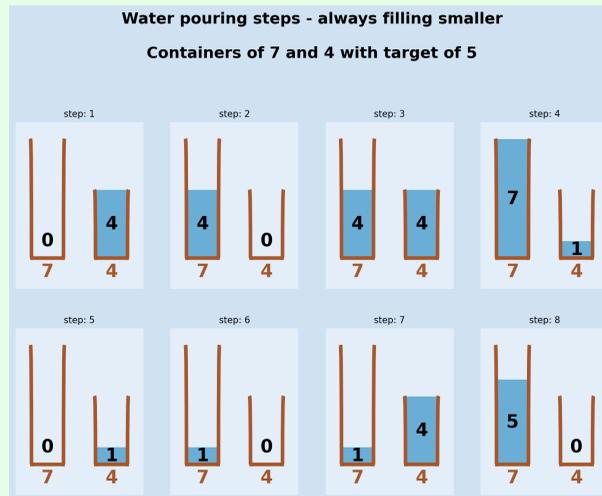


Part B) Detailed Training Plan of Units of Measurements

[115 min]

Time	Activities (Procedural details)	Resources and Annexures
	<p>Bridge In: Warm-up Activity: Problem-solving and logical thinking</p> <p>Task: How do you divide 8 liters of liquid into two equal parts of 4L each, if all you have is three containers with 8L, 5L and 3L capacity?</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Container I (3L) <empty></p> </div> <div style="text-align: center;">  <p>Container II (5L) <empty></p> </div> <div style="text-align: center;">  <p>Container III (8L) full</p> </div> </div> <p>The fewest number of moves made will be the winner!</p>	<p>White board and markers</p>
	<div style="display: flex;"> <div style="flex: 1; padding-right: 10px;"> <p>Expected Solution: 1</p> <pre> 8 5 3 --- 8 0 0 ↘ 3 5 0 ↘ 3 2 3 ↘ 6 2 0 ↘ 6 0 2 ↘ 1 5 2 ↘ 1 4 3 ↘ 4 4 0 </pre> </div> <div style="flex: 1;"> <p>Expected Solution: 2</p> <p>The 4 liter challenge</p> <p>Answer : 7</p> <ol style="list-style-type: none"> 1. Pour 5L into the 5L jar. 2. Pour 3L from the 5L jar into 3L jar. 3. Pour 3L into the 8L jar. 4. Pour 2L in the 5L jar into the 3L jar. 5. Pour 5L jar from the 8L jar into the 5L jar. 6. Pour 1L from the 5L jar into the 3L jar. 7. Pour the 3L jar into the 8L jar. </div> </div>	

Expected Solution:3 <https://swdevnotes.com/algorithms/2021/water-pouring-puzzle/>



There can be more combinations.

Note for Facilitators

Engaging in activities like creating and measuring shapes with dough helps young students develop several important skills:

Spatial Awareness: By creating and measuring shapes, students enhance their understanding of spatial relationships and geometric concepts.

Measurement Skills: Using non-standard and standard units for measurement introduces students to the concept of quantifying and comparing sizes, which is fundamental in mathematics.

Critical Thinking: Converting measurements from non-standard to standard units requires students to apply logical reasoning and problem-solving skills.

Fine Motor Skills: Manipulating dough and using measuring tools helps improve hand-eye coordination and fine motor control.

Communication Skills: Reflecting on the activity and discussing their observations encourages students to articulate their thoughts and engage in collaborative discussions.

Suggested Bridge: Warm-up Activity 2 [if you are doing with young children the following warm-up can be done]

Playdough is versatile and fun, making it perfect for measurement activities. Kids can roll the dough into snake-like shapes and then use non-standard units, such as paper clips, to measure their lengths.

Participants will create three different shapes using dough, measure them using non-standard units, and then convert those measurements into standard units.

Ask participants to:

- Make the three shapes of your choice from dough (e.g., snake, pencil etc)



- Choose non-standard unit of measurement (e.g., paper clips, thread, fingers, stick etc)
- Measure the length of the shapes with that non-standard unit
- Record the length of shapes in your non-standard unit in the given table in annexure 1
- Measure your non-standard unit in cm through scale
- Convert your non-standard measurement in standard measurement in cm
- Record standard measurement in the given table.

Once the participants have finished their tasks, invite them to share their reflections on the activity. Encourage a discussion about the skills young students can develop through such practices. Summarize the activity by providing feedback based on the information shared by the facilitator with the earlier warm-up activity.

Playdough, Scales, measuring tape, paper clips, thread, Annexure 1.

20 min

Activity: Identify units of measurement

Units of measurement are a way to quantify the size, length, weight, and volume of objects. Understanding these units is essential for many everyday activities.

Ask participants to watch the video related to the introduction of units of measurement and their use in real life situations. Ask them to keep in mind the following four questions while watching the video.

1. What are the four units of measure?
2. How do you define measurement?
3. What kind of problems the world would face without proper measurement?
4. What is the Metric SI system of measurement?

After the participants have watched the video, collect responses on the guided questions and summarize the activity. To reinforce their understanding of units of measurement, the facilitator will also ask to complete annexure 2 – first estimate the length and then measure using standard unit.

Note for Facilitators:

in real life, we use units of measurement to:

Measure Length: We use centimeters, meters, and kilometers to measure how long or tall something is. For example, we measure the height of a door in centimeters or the distance to the park in kilometers.

Measure Weight: We use grams and kilograms to find out how heavy something is. For example, we weigh fruits and vegetables in grams and kilograms.

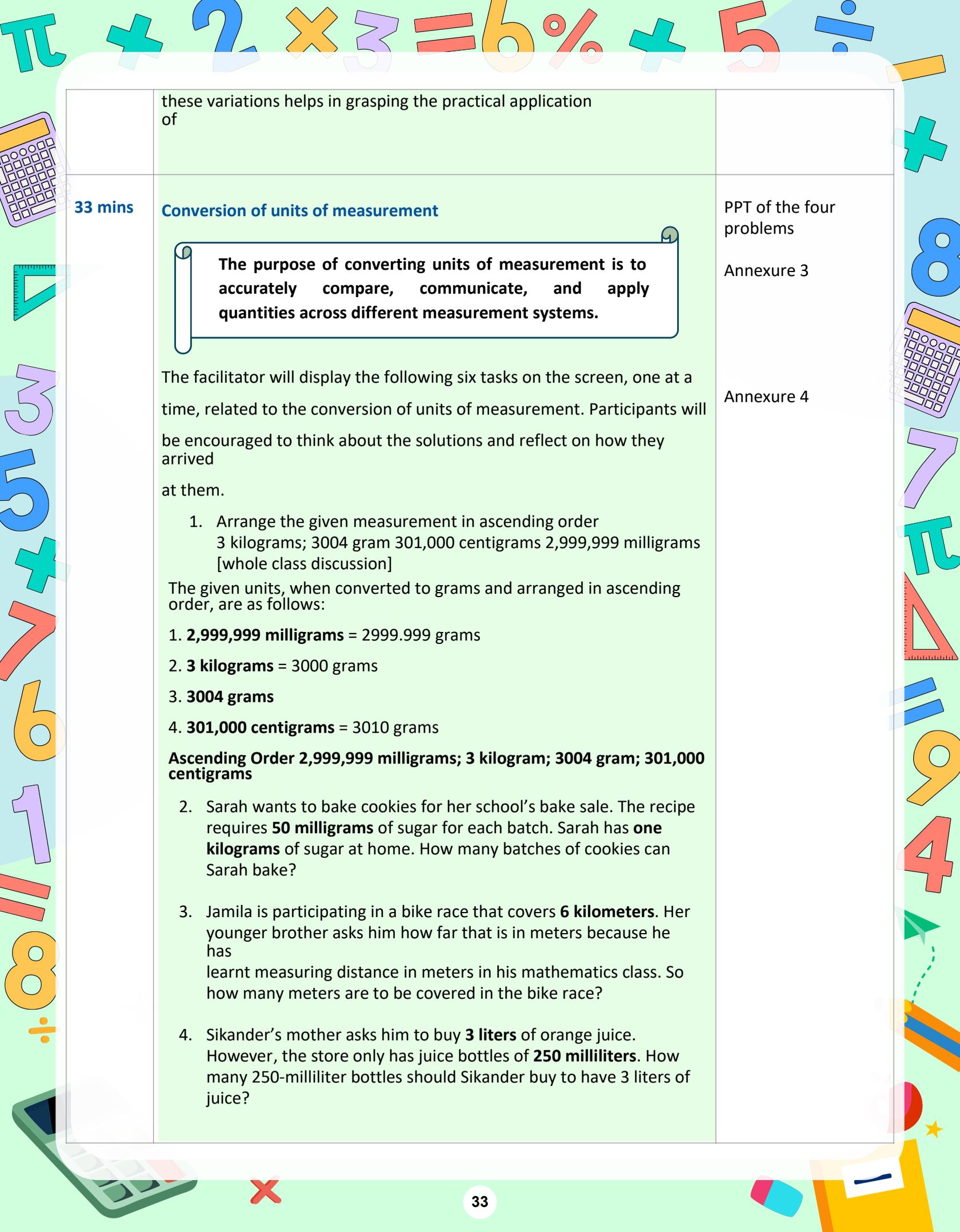
Measure Volume: We use milliliters and liters to measure liquids. For instance, we measure the amount of water in a bottle in liters.

Note: It's important to highlight that the unit of measurement can vary depending on the context. For instance, when purchasing dress material at a fabric store, it's typically measured in meters. On the other hand, towel pieces might be sold by weight, using kilograms and grams. Similarly, while bananas are commonly sold by the dozen, in some countries they are sold by weight, measured in kilograms and grams. Understanding

Video Link:

<https://studyjams.scholarastic.com/studyjams/jams/math/measurement/units-of-measurement.htm>

Annexure 2



these variations helps in grasping the practical application of

33 mins

Conversion of units of measurement

The purpose of converting units of measurement is to accurately compare, communicate, and apply quantities across different measurement systems.

The facilitator will display the following six tasks on the screen, one at a time, related to the conversion of units of measurement. Participants will be encouraged to think about the solutions and reflect on how they arrived

at them.

1. Arrange the given measurement in ascending order
3 kilograms; 3004 gram 301,000 centigrams 2,999,999 milligrams
[whole class discussion]

The given units, when converted to grams and arranged in ascending order, are as follows:

1. **2,999,999 milligrams** = 2999.999 grams
2. **3 kilograms** = 3000 grams
3. **3004 grams**
4. **301,000 centigrams** = 3010 grams

Ascending Order 2,999,999 milligrams; 3 kilogram; 3004 gram; 301,000 centigrams

2. Sarah wants to bake cookies for her school's bake sale. The recipe requires **50 milligrams** of sugar for each batch. Sarah has **one kilograms** of sugar at home. How many batches of cookies can Sarah bake?
3. Jamila is participating in a bike race that covers **6 kilometers**. Her younger brother asks him how far that is in meters because he has learnt measuring distance in meters in his mathematics class. So how many meters are to be covered in the bike race?
4. Sikander's mother asks him to buy **3 liters** of orange juice. However, the store only has juice bottles of **250 milliliters**. How many 250-milliliter bottles should Sikander buy to have 3 liters of juice?

PPT of the four problems

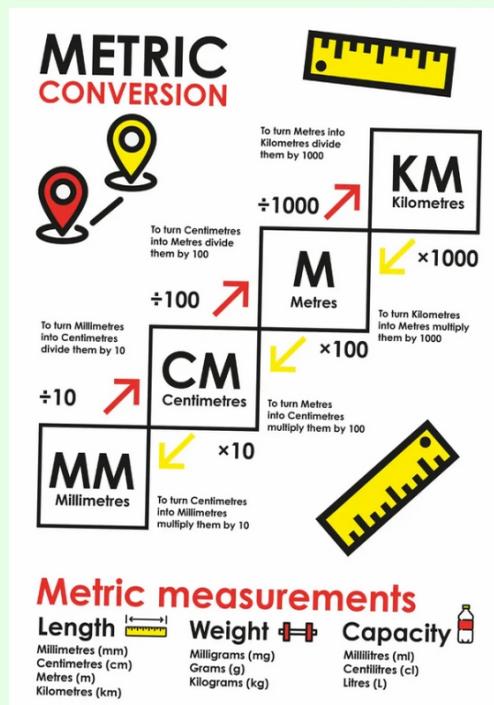
Annexure 3

Annexure 4

5. Salim is planting flowers in his garden. He has a garden bed that is **3 meters** long. Each flower needs to be planted **30 centimeters** apart. How many flowers can Salim plant along the length of the garden bed?

6. Dr. Ahmed requires **5 milliliters (ml)** of medication for each patient. The total medicine administered is **2 centiliters (cl)**. How many patients visited Dr Ahmed's clinic?

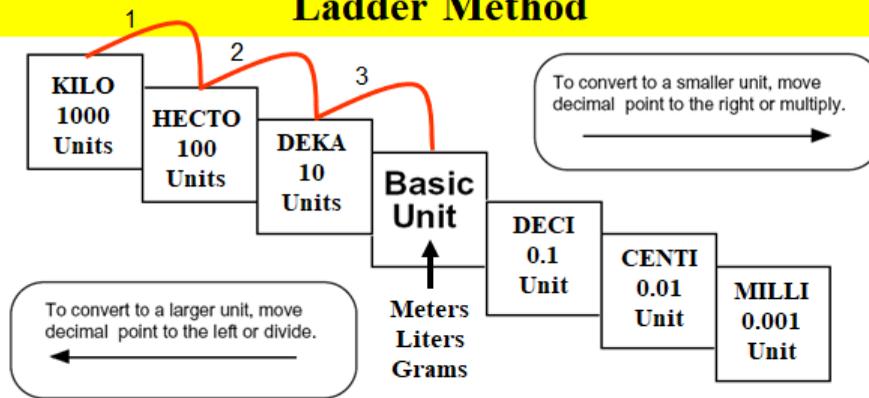
The facilitator will collect the responses and write them on the board and then distribute the unit conversion diagram to discuss in their groups and determine the process of unit conversions.



Ask participants to explain the unit conversion process (such as Kilo to deka, Deci to milli, gram to milligram) and explain how unit conversion is performed.

Then the facilitator will show and explain the following unit conversion process to convert length, weight and volume in different units.

Ladder Method



How do you use the “ladder” method?

1st – Determine your starting point.

2nd – Count the “jumps” to your ending point.

3rd – Move the decimal the same number of jumps in the same direction.

$$4 \text{ km} = \underline{\quad\quad} \text{ m}$$

↑
↑
 Starting Point Ending Point

How many jumps does it take?

$$4.\underbrace{\quad\quad\quad}_{1\ 2\ 3} = 4000 \text{ m}$$

Note for Facilitators

We need to convert units of measurement in daily life for several reasons:

1. **Consistency and Standardization:** Ensuring that measurements are consistent and standardized, especially when communicating with others or comparing objects.
2. **Compatibility:** Making different systems of measurement compatible, such as converting metric units to imperial units or vice versa.
3. **Practicality:** Using the most practical unit for the task at hand, such as using liters for liquids and grams for small weights.
4. **Accuracy:** Achieving more accurate measurements in specific contexts, such as scientific experiments or cooking.
5. **Convenience:** Simplifying calculations and making measurements more understandable and easier to work with.
6. **Global Communication:** Facilitating global trade, travel, and communication where different regions use different measurement systems.

30 Mins

Measurement in Real Life

Annexure 5

Measurements play a crucial role in our daily lives, allowing us to quantify and compare various aspects of the world around us.

Participants will enhance their understanding of real-life measurements by identifying suitable units for various objects and practicing unit conversions.

Briefly discuss the importance of choosing appropriate units for measuring different objects. For example, you wouldn't measure the length of a pencil in kilometers or the volume of water in liters for a swimming pool.

Explain the activity and how participants will engage with real-life examples to practice selecting units and converting them.

- In the first column, a list of different real-life objects or shapes is provided (e.g., a water bottle, a pencil etc.).
- Participants should quickly review the objects listed and think about what each represents.
- In the second column, participants must identify the most appropriate unit of measurement for each object. For example, if the object is a water bottle, the suitable unit might be liters or milliliters.
- Encourage participants to think critically about what they are measuring (e.g., length, weight, volume) and choose the unit that is most commonly used in real life for that type of object.
- In the third column, participants will convert the unit they've selected into another appropriate unit of the same type. For example, if the object is a textbook, and the selected unit of measurement is centimeters (cm), participants might convert that measurement to meters or millimeters).

After participants have completed the task, collect their responses.

10 mins

Summary and Reflection through Group Discussion

Gather participants in a circle or small groups.

Pose the following questions to the group:

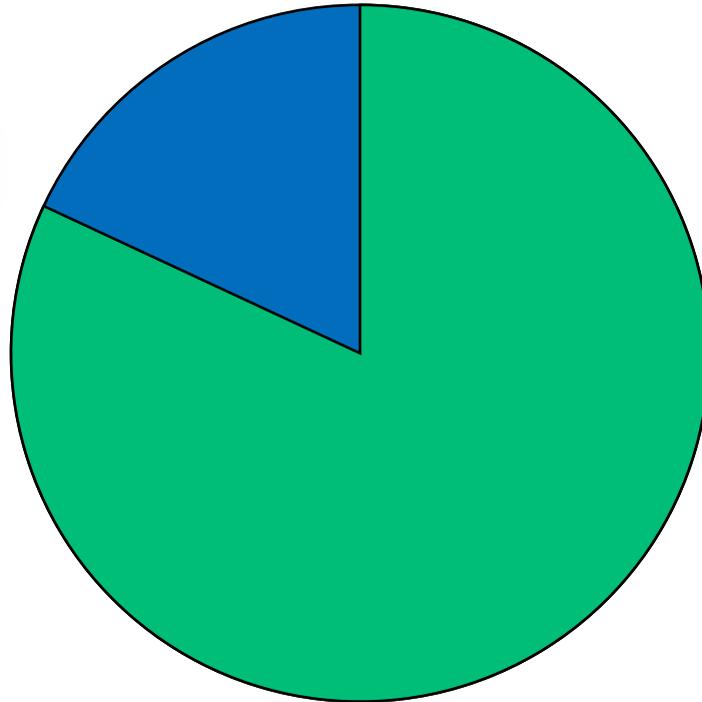
- What are some real-life examples where you need to choose the correct unit of measurement?
- Which units of measurement were most familiar to you, and which were new or challenging?
- How did you approach converting units? Was there a particular conversion that was tricky?

Encourage participants to share their thoughts and experiences.

Summarize the main points discussed, focusing on the importance of choosing appropriate units and the practical skill of converting them.

DAY 03

FRACTIONS



Number & Operation Strand – Fractions

Detailed Training Plan for Teaching Fractions

	Activities (Procedural details)	
	<p>Learning Objectives: By the end of the session, the participants will be able to:</p> <ul style="list-style-type: none"> recognize and articulate how an understanding of ‘unit’ supports students in comprehending both proper and improper. explore and create multiple visual representations using sticks, money and area models to illustrate both proper and improper fractions explain and apply methods for identifying and computing equivalent fractions, focusing on simplifying fractions and determining equivalence using visual model using paper folding. perform operations with two or more fractions, solving problems that involve different contexts and types of fractions (proper, improper, and mixed numbers) solve real-life problems that involve fractions, and design similar tasks that can be used to contextualize fractions to apply them in everyday situations 	PPT
10 min	<p>Activity 1: Grouping Strategy</p> <p>This activity will help the participants to recap the fractions size based on the benchmark such as less than a quarter, a quarter, more than a quarter but less than a half, more than a half but less than a whole and more than a whole.</p> <ul style="list-style-type: none"> Place the benchmark: Stick the benchmark on each table or on the floor, depending on the setup. Prepare the fractions: Cut out the fraction pieces and place them in a bowl or basket. Select and identify: Ask the participants to pick a fraction, read it aloud, and identify the group that corresponds to the benchmark. Verify alignment: Have the teachers compare the fractions within their group to ensure they all align with the given benchmark. <p>Engage teachers in discussing the strengths of such activity such as appropriate for mental math with whole class/individuals. Encourage them to list ways of adopting/modifying the activity to be implemented in the real classroom.</p>	Annexure 1
10 min	<p>Different models to explore fractions</p> <p>The participants will be asked to cut the different representations into three groups. After they complete, introduce area model, line model and set model.</p>	Annexure 2

45
min

Equivalent Fractions

This activity will help the teachers to use hands-on tasks to make sense of equivalent fractions.

- Give A4 size paper to all
- Fold the paper lengthwise to show half (one crease). See the following fold



- Fold to show one-quarter (3 crease) and write $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$ on it
- Continue to show one-eighth and one-sixteenth

Task 1: Now ask them to write a few equivalent fractions evident through paper folding activity.

Different expected responses such as (there are lot many combinations of two and more fraction evident)

$$\frac{1}{4} = \frac{2}{8}$$

$$\frac{1}{2} = \frac{2}{4}$$

Task 2: What pair of fractions can be added to give the total of $\frac{12}{16}$

Find as many pairs as you can. This task will help them to add both like and unlike fraction, that usually is a challenge for children to grasp the concept and understand why we first make the fractional parts equal and then add or subtract.

Expected answers: There are many combinations. A few combinations are as follows:

A) $\frac{5}{8} + \frac{2}{16}$ (Five-eighths + two-sixteenth)

B) $\frac{3}{8} + \frac{6}{16}$ (Three-eighths + six-sixteenth)

C) $\frac{1}{2} + \frac{1}{4}$ (Half + one-Quarter)

Show the video after they performed the guided task so see the different way of using paper strips

<https://www.youtube.com/watch?v=PVFyMSgqUw>

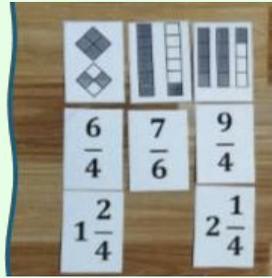
A4 size paper
Color pencils
Chart

20 min

Fractions Greater than 1

This activity will help the participants to use hands-on tasks to make sense of improper fractions and their representation using pictorial representation (area model).

- **Distribute the cut-outs:** Hand out the fraction cut-outs to each participant.
- **Create a matching set:** Instruct the teachers to create a set where each improper fraction is represented both symbolically (as an improper fraction and/or a mixed number) and pictorially.
- **Provide examples:** if needed, ensure that two examples are provided to illustrate the expected outcome.



Annexure 3

20 min

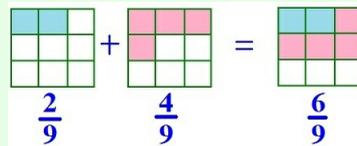
Adding Like Fractions

Task 1: Asif had two-ninth kilogram of chopped walnuts. Anam brought four-ninth kilogram of chopped walnuts. How many kilograms of chopped walnuts did they have together? Show this using area model

- **Collect teachers' responses and if anyone showed correctly used their work.**

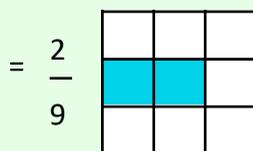
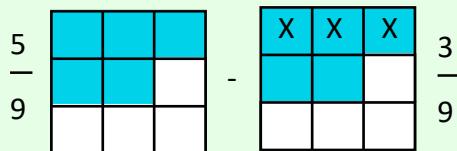
Expected answer:

$$\frac{2}{9} + \frac{4}{9}$$



20 min

Subtracting Like Fractions: Task:



Subtracting three-ninths from five-ninths

$$\frac{5}{9} - \frac{3}{9}$$

$$\frac{5}{9} - \frac{3}{9} = \frac{2}{9}$$

30 min

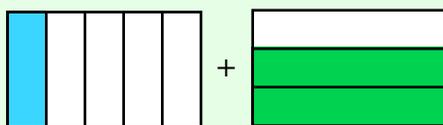
Adding Unlike fractions

Task: Asif had one-fifth kilogram of chopped walnuts. Anam brought two-third kilograms of chopped walnuts. How many kilograms of chopped walnuts did they have together?

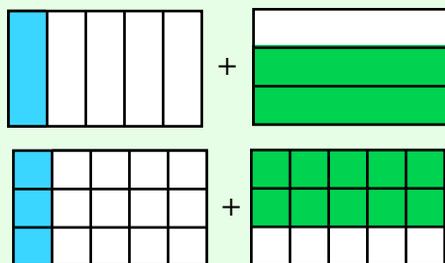
- Ask teachers to use area model to show the unlike fraction addition.

Demonstrate how unlike fractions are added

- First draw one-fifth using vertical lines in a rectangular shape figure
- Next draw three-fourth using horizontal lines in the same sized rectangular shape.



- replicate the vertical lines on figure with horizontal lines
- replicate the horizontal lines on figure with vertical lines



- Now you can see the parts are equal in both the figures. Now you can add them

$$\frac{1}{5} + \frac{2}{3} = \frac{3}{15} + \frac{10}{15} = \frac{13}{15}$$

Result: Asif and Anum have $\frac{13}{15}$ kilograms of chopped walnuts together

Note: you can encourage the participants to solve using equivalent fractions

20 min

Subtraction Unlike Fractions

Engage teachers in designing real life problem for subtracting unlike fractions. Select two that are appropriate and engage them in showing the solution using area model.

180
min

**Learning in Action: Planning a learning activity [BOPPPS] and
Micro-Teaching**

- Divide the class into four groups and assign number and operation to first group: Angles to the next followed by unit conversion to third group and finally Fractions to fourth group.
- Ask each group to write one concept on a paper strip for assigning micro-teaching to other groups.
- Divide the class into small groups and let them pick a chit and develop a lesson plan for the micro teaching (5 min activity)
- Micro-teaching, peer and course facilitators' feedback

Mathematics 3-day session conclusion

Ask participants to share two key learning and one suggestion to further

DAY 01

ANNEXURES

Annexure 1

Name: _____

Case 1: Ali added the following numbers and explained the process to his teacher in one-to-one assessment that

$$\begin{array}{r} 37 \\ + 56 \\ \hline 93 \end{array}$$

7+6 =13 and we cannot write two numbers together as answer, so put one above the left hand number and add with the numbers i.e.,
1+3+5 = 9

Case 2: Anum subtracted 56 from 75 and explained the process that

$$\begin{array}{r} 75 \\ - 56 \\ \hline 19 \end{array}$$

As we cannot subtract 6 from 5, we borrow 1 from the left hand side number and write before 5 so now from 15 we subtract 6 and write 9 and then subtract 5 from 6 and write 1

Task:

- 1) Read Ali's and Anum's response thoroughly in both cases. What can you say about their understanding of the place value.
- 2) What feedback (if any) you would give to Ali and Anum?
- 3) What are the appropriate terms used for such tasks?

Annexure 2



10

10

10

100

100

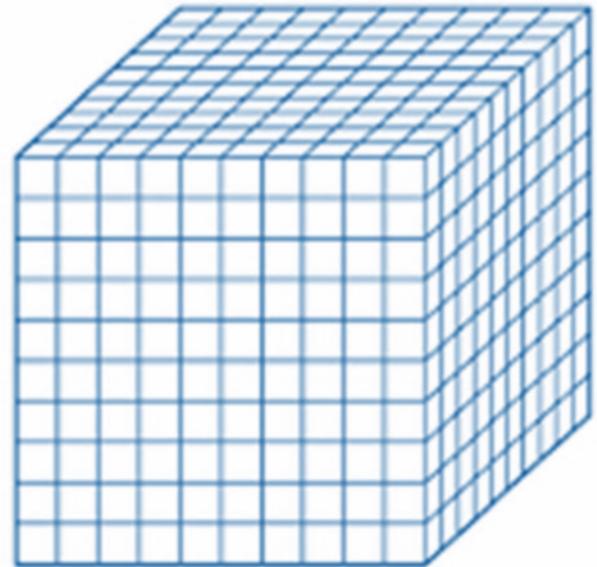
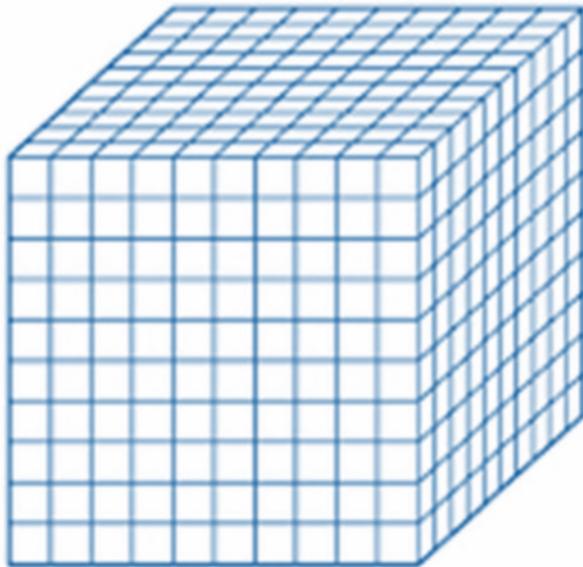
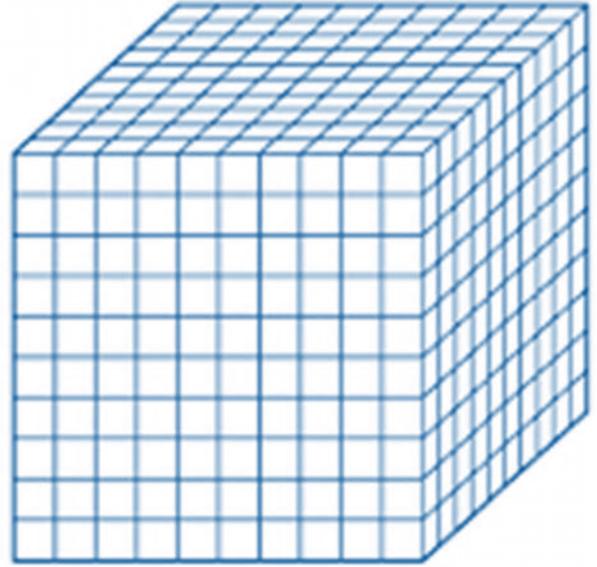
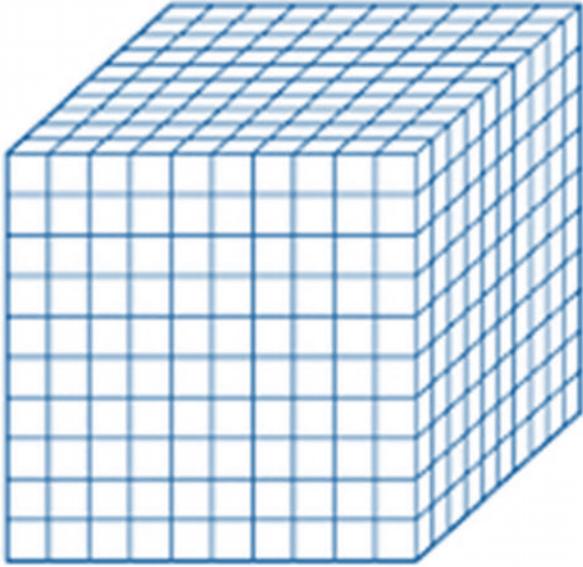
100

1000

1000

1000

If want to introduce 1000 using pictorial representation, you could use the 1000 place value block with the earlier model



Annexure 4

BOPPS Lesson Planning Template
B O P P S Lesson Planner

Lesson title:		Instructor:										
BRIDGE-IN: <ul style="list-style-type: none"> • Provide motivation 												
Value of lesson to learner			TIME*									
LEARNING OUTCOMES: Describe what the learners will know, be able to do, or value at the completion of the lesson <ul style="list-style-type: none"> 1. By the end of this lesson, students will be able to... 												
PRE-ASSESSMENT: <ul style="list-style-type: none"> • Identify prior knowledge • Assess whether or not the learner can already accomplish outcome 												
			TIME*									
PARTICIPATORY LEARNING: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Learner Activities</th> <th style="width: 33%;">Instructor Activities</th> <th style="width: 33%;">Tools and Resources</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • What learner does to actively achieve outcome </td> <td> <ul style="list-style-type: none"> • How instructor facilitates learning. </td> <td> <ul style="list-style-type: none"> • Resources the learner needs to achieve outcome </td> </tr> <tr> <td style="text-align: right;">TIME*</td> <td style="text-align: right;">TIME*</td> <td></td> </tr> </tbody> </table>				Learner Activities	Instructor Activities	Tools and Resources	<ul style="list-style-type: none"> • What learner does to actively achieve outcome 	<ul style="list-style-type: none"> • How instructor facilitates learning. 	<ul style="list-style-type: none"> • Resources the learner needs to achieve outcome 	TIME*	TIME*	
Learner Activities	Instructor Activities	Tools and Resources										
<ul style="list-style-type: none"> • What learner does to actively achieve outcome 	<ul style="list-style-type: none"> • How instructor facilitates learning. 	<ul style="list-style-type: none"> • Resources the learner needs to achieve outcome 										
TIME*	TIME*											
POST-ASSESSMENT: <ul style="list-style-type: none"> • Did the learner demonstrate the outcome? • Formative assessment 												
			TIME*									
SUMMARY: <ul style="list-style-type: none"> • Conclude the learning experience • Provide a sense of closure or completion, or set up for future lessons. 												
			TIME*									

Use the "TIME" box to estimate how long each component will take during your microteach.

Annexure 5

Billion			Million			Thousands			Ones			Write in Words
Hundred Billion	Ten Billion	Billion	Hundred Million	Ten Million	Million	Hundred Thousand	Ten Thousand	Thousand	Hundred	Tens	Ones	
7	3	1	0	0	0	4	1	3	4	0	6	
2	0	0	1	2	3	2	5	6	0	0	4	

Exit Ticket

Name: _____

3: Three things I learnt

2: Two words/terms I learnt

1: One question still I have



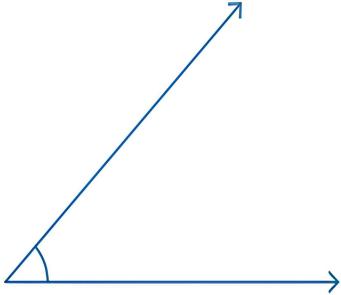
DAY 02

ANNEXURES PART A

Annexure 1

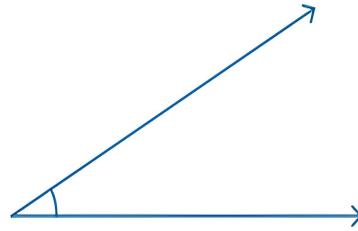
Design your own unit of measurement and use it to measure the given angles

1)



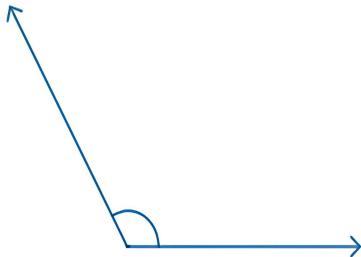
Angle: _____

2)



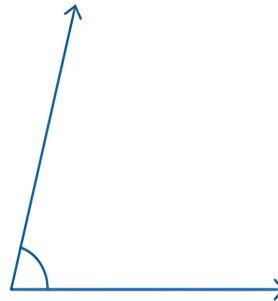
Angle: _____

3)



Angle: _____

4)



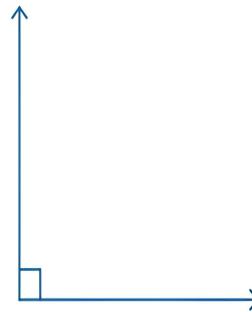
Angle: _____

5)



Angle: _____

6)

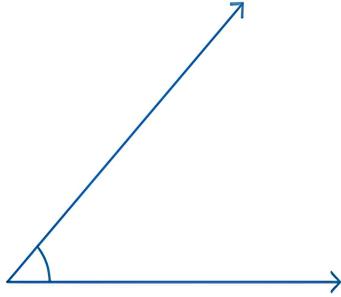


Angle: _____

Annexure 2

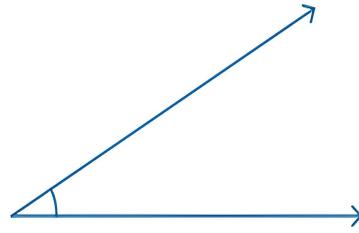
Design your own paper protractor and use it to measure the given angles

1)



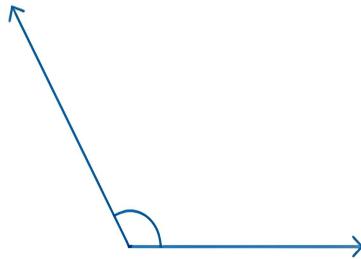
Angle: _____

2)



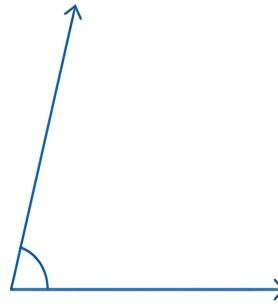
Angle: _____

3)



Angle: _____

4)



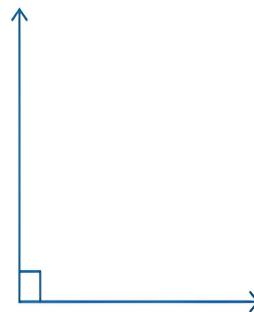
Angle: _____

5)



Angle: _____

6)

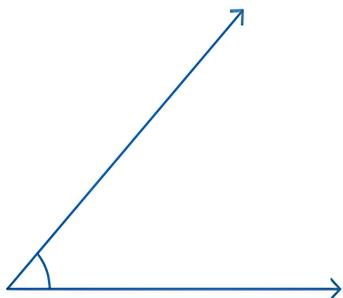


Angle: _____

Annexure 3

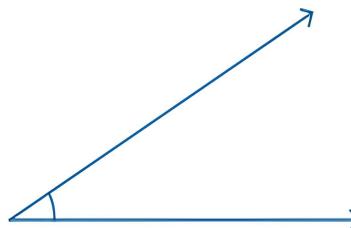
Use protractor and measure the given angles

1)



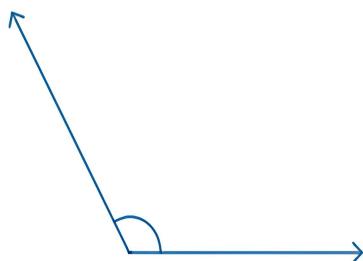
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2)



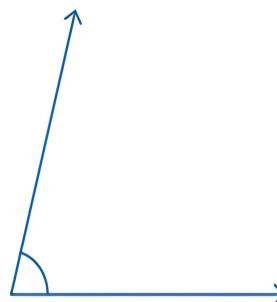
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3)



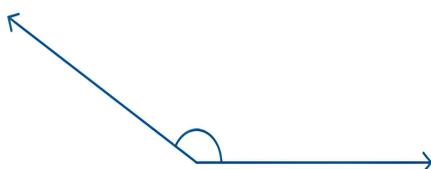
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4)



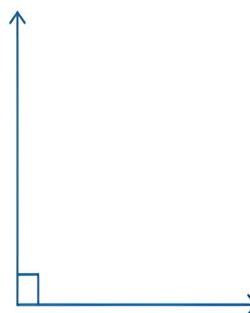
Angle: _____

5)



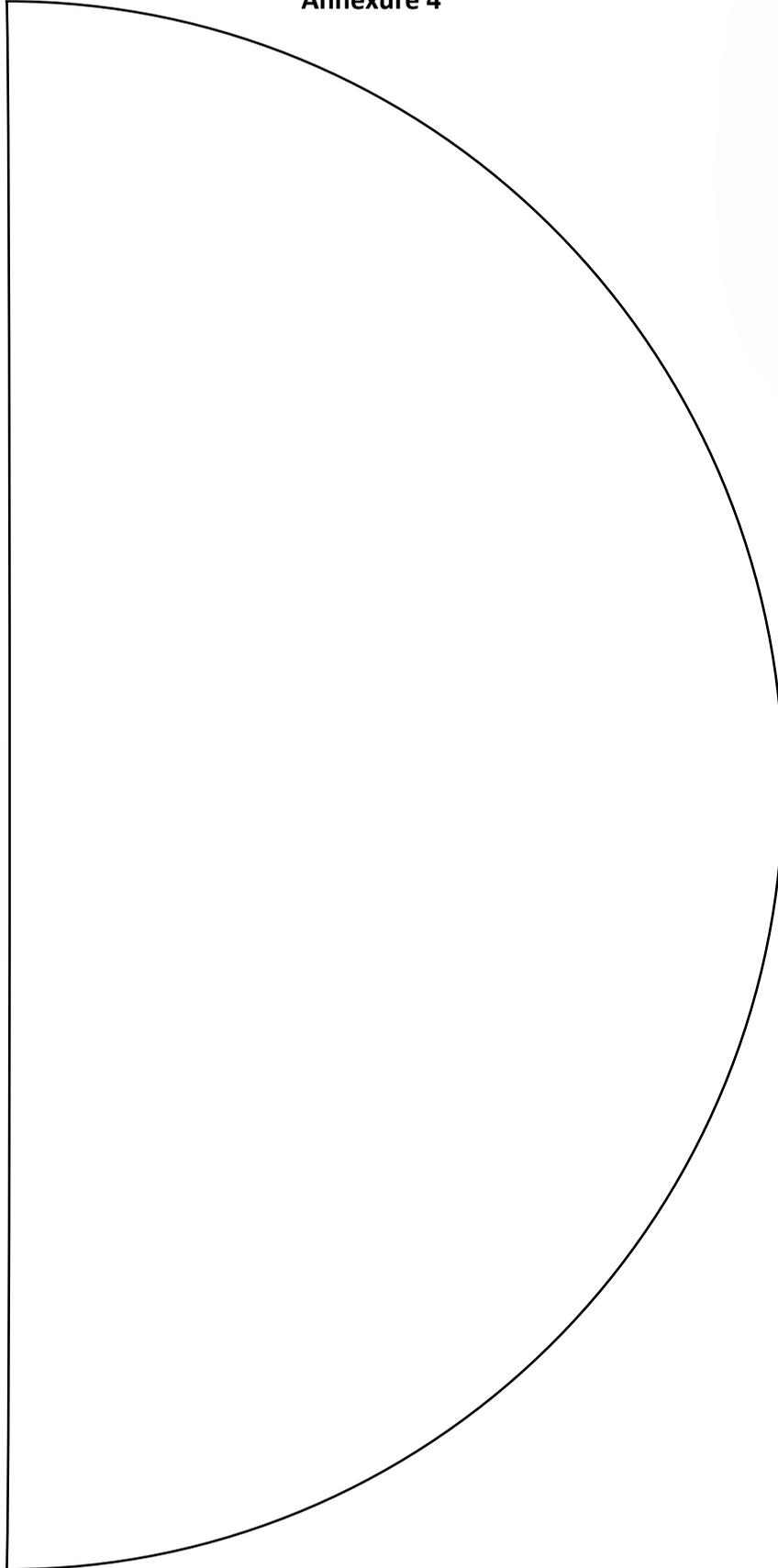
Angle: _____

6)



Angle: _____

Annexure 4



DAY 02

ANNEXURES PART B

ANNEXURE 1

MEASUREMENT SKILLS

INSTRUCTIONS

- Make the three shapes of your choice from dough (e.g., snake, pencil etc)
- Choose non-standard unit of measurement (e.g., paper clips, thread, fingers etc)
- Measure the length of the shapes with that non-standard unit
- Record the length of shapes in your non-standard unit in the given table in annexure 1
- Measure your non-standard unit in cm through scale
- Convert your non-standard measurement in standard measurement in cm
- Record standard measurement in the given table.



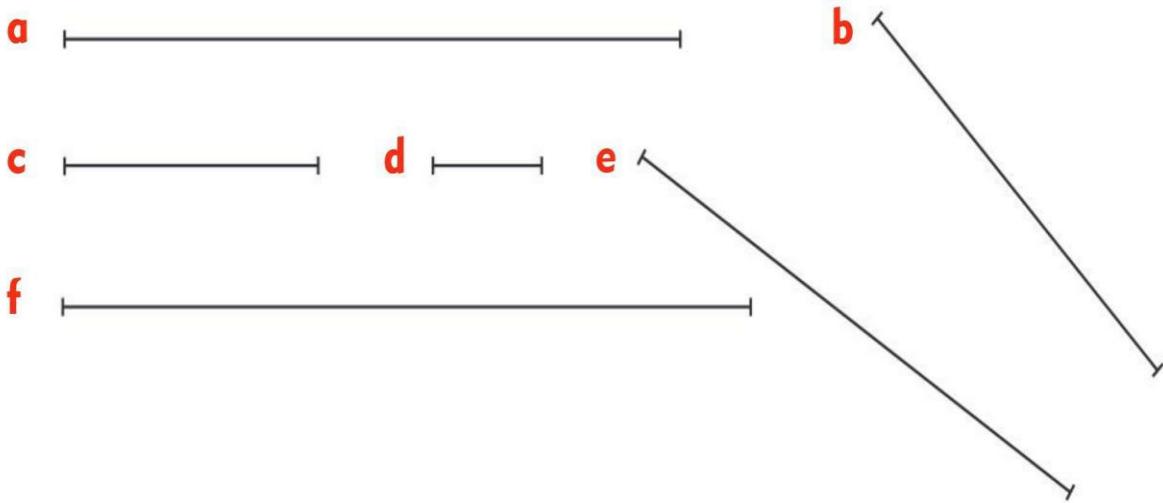
Your non-standard measurement tool =		
Draw Shape	Measurement in Non-Standard Unit	Measurement in Standard Unit of cm

ANNEXURE 2

Estimation

Estimate the length of bars 'a' and 'b' in centimeters. Write down your estimate and then measure with standard scale to the nearest centimeter. Find the difference between them. Then estimate the length of bars 'c' 'd' followed by measuring with standard scale to the nearest centimeter. Is the difference becoming less? Now estimate the length of bars 'e' and 'f' in centimeters.

Write down your estimate and then measure with standard scale and write the actual measurement.



Line	Estimate (in cm)	Actual (in cm)
a		
b		
c		
d		
e		
f		

Please write your learning:

ANNEXURE 3

1. Arrange the given measurement in ascending order
3 kilograms; 3004 gram 301,000 centigrams 2,999,999 milligrams
2. Sarah wants to bake cookies for her school's bake sale. The recipe requires **50 milligrams** of sugar for each batch. Sarah has **one kilograms** of sugar at home. How many batches of cookies can Sarah bake?
3. Jamila is participating in a bike race that covers **6 kilometers**. Her younger brother asks him how far that is in meters because he has learnt measuring distance in meters in his mathematics class. So how many meters are to be covered in the bike race?
4. Sikander's mother asks him to buy **3 liters** of orange juice. However, the store only has juice bottles of **250 milliliters**. How many 250-milliliter bottles should Sikander buy to have 3 liters of juice?
5. Salim is planting flowers in his garden. He has a garden bed that is **3 meters** long. Each flower needs to be planted **30 centimeters** apart. How many flowers can Salim plant along the length of the garden bed?
6. Dr. Ahmed requires **5 milliliters (ml)** of medication for each patient. The total medicine administered is **2 centiliters (cl)**. How many patients visited Dr Ahmed's clinic?

ANNEXURE 5

Measurement in the Real life

INSTRUCTIONS:

- Look at the pictures given in the first columns of the table
- Write the suitable/appropriate unit of measurement in the blank in the second column of the table
- Convert the unit of measurement of your own choice and write in the third column of the table

Item	What could be the Current measurement unit	I can convert it to...
	1.5	
	12	
	750 _____ -	
		
	25	

	15	
	1.75	
	1500	

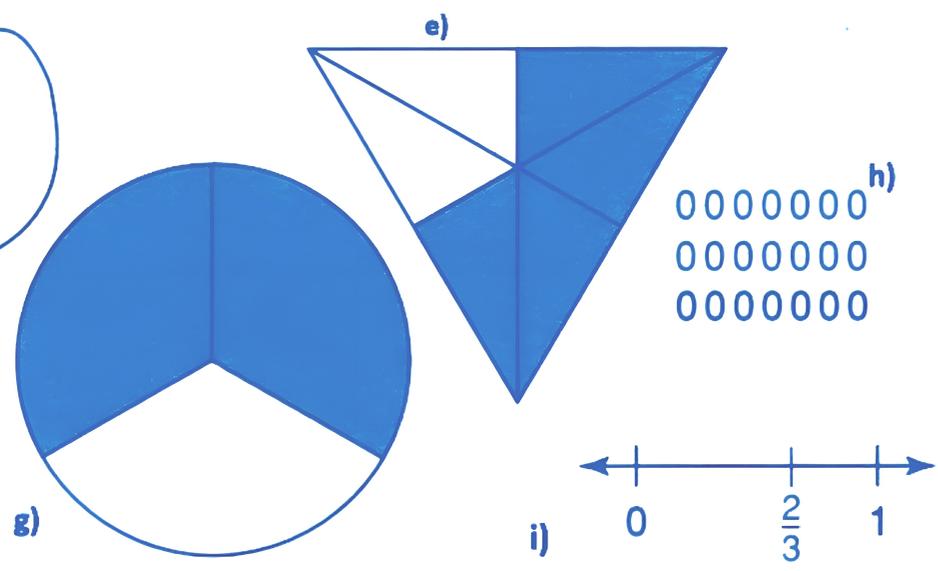
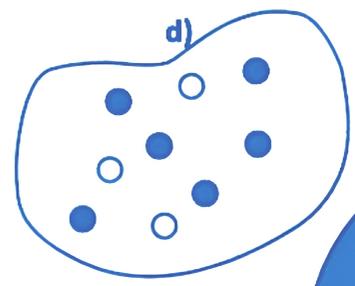
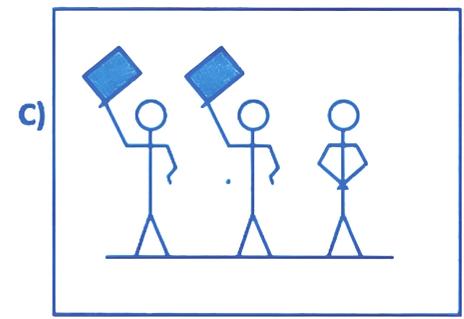
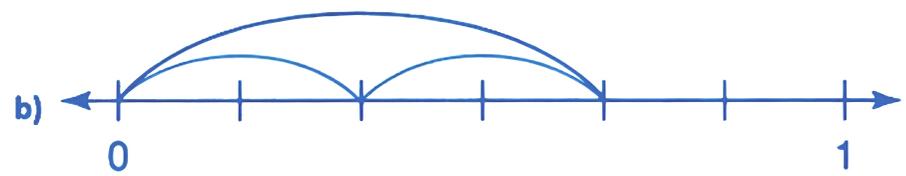
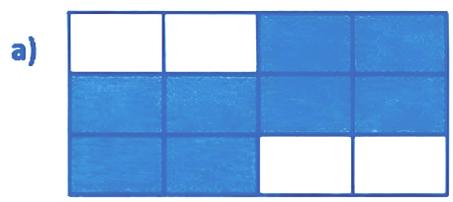
DAY 03

ANNEXURES

Annexure 1
Grouping Strategy

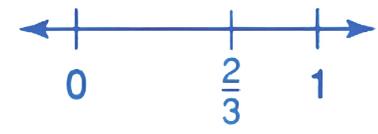
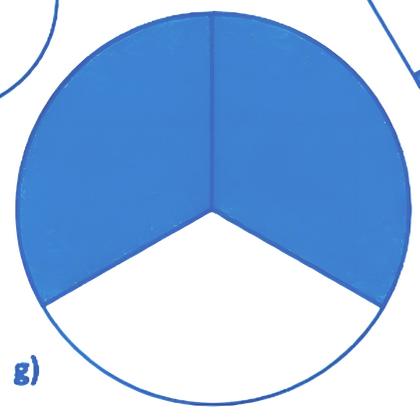
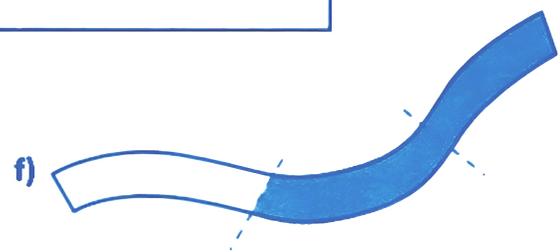
Less than a quarter	A quarter	More than a quarter but less than a half	More than a half but less than a whole	More than a whole
$\frac{1}{8}$	$\frac{2}{8}$	$\frac{3}{8}$	$\frac{7}{8}$	$\frac{9}{8}$
$\frac{5}{24}$	$\frac{6}{24}$	$\frac{9}{24}$	$\frac{15}{24}$	$\frac{25}{24}$
$\frac{1}{6}$	$\frac{1}{4}$	$\frac{2}{6}$	$\frac{3}{4}$	$\frac{7}{4}$
$\frac{2}{12}$	$\frac{3}{12}$	$\frac{5}{12}$	$\frac{7}{12}$	$\frac{15}{12}$
$\frac{3}{16}$	$\frac{4}{16}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{17}{16}$
$\frac{4}{20}$	$\frac{5}{20}$	$\frac{9}{20}$	$\frac{13}{20}$	$\frac{21}{20}$

Annexure 2



h)

0000000
0000000
0000000



Annexure 3

Construction Guide for Fraction Flashcards (Fractions greater than 1)

Ref: <https://gece.edu.pk/academics/teaching-aid/>

Manipulative	Fraction ($1 <$) Flashcards
Materials	A4 paper
	Scissors
	Hard Lamination
Details of 1 set	44 cards (24 numeral cards + 20 picture model cards)

Guidelines:

1. Print designs on white or colored A4 sheets (the design file below will produce 2 sets).
2. Cut out the fraction cards along the dotted lines.
3. Laminate the cut-out fraction cards.

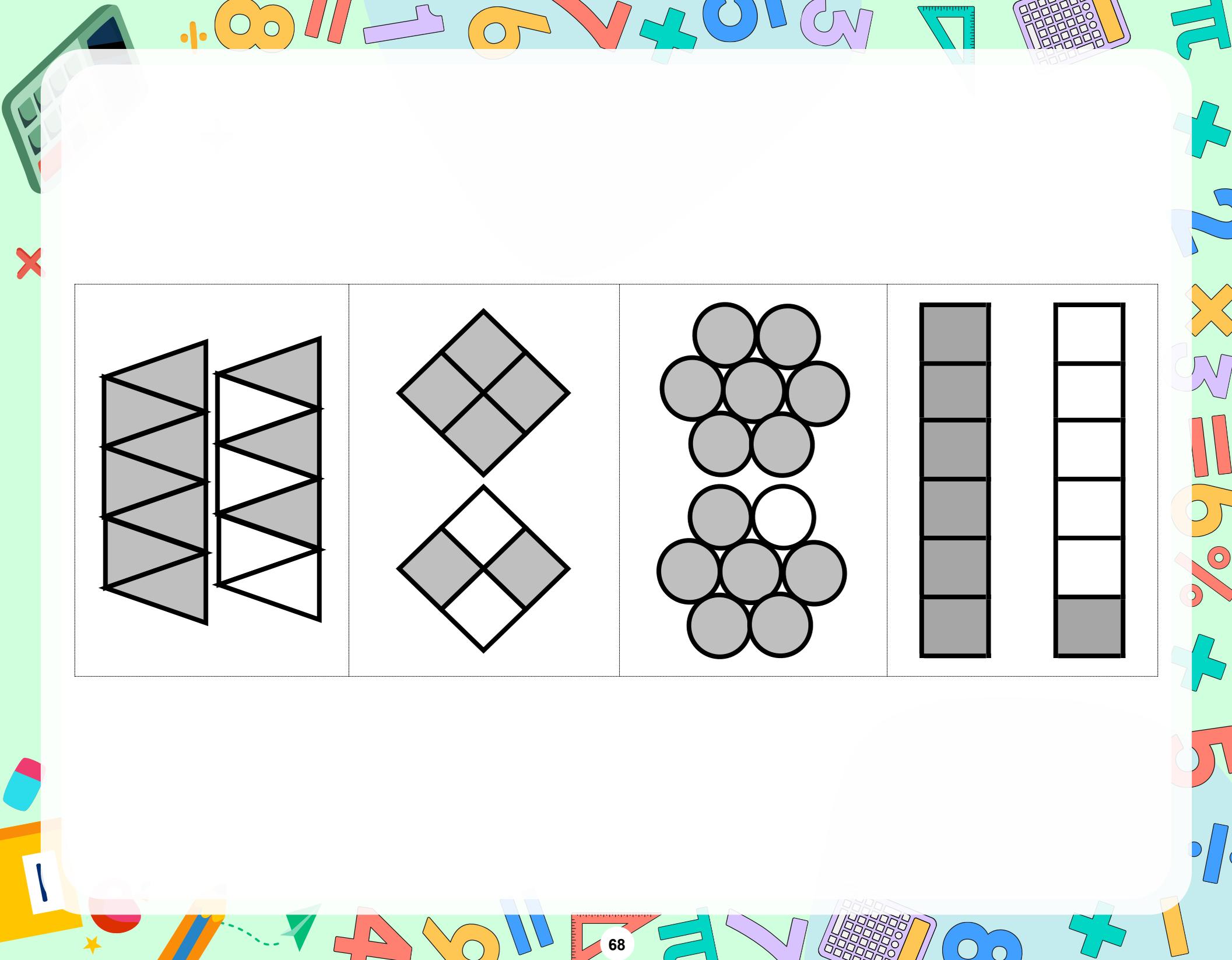


$$\frac{10}{7}$$

$$\frac{6}{4}$$

$$\frac{13}{4}$$

$$\frac{7}{6}$$



Two identical large triangles, each composed of 10 smaller triangles. The left triangle is shaded gray, and the right one is white with black outlines.	Two identical squares, each composed of 4 smaller squares. The top square is shaded gray, and the bottom one is white with black outlines.	Two identical groups of 10 circles. The top group is shaded gray, and the bottom one is white with black outlines.	Two identical vertical bars, each composed of 6 smaller rectangles. The left bar is shaded gray, and the right one is white with black outlines.
---	--	--	--

$$\frac{10}{6}$$

$$\frac{3}{2}$$

$$\frac{19}{11}$$

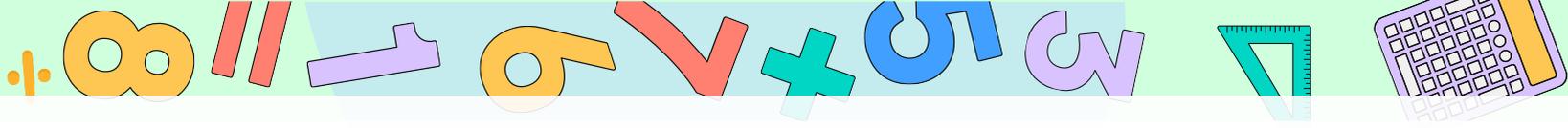
$$\frac{16}{5}$$

$$2 \frac{1}{4}$$

$$1 \frac{1}{2}$$

$$4 \frac{1}{3}$$

$$3 \frac{1}{4}$$

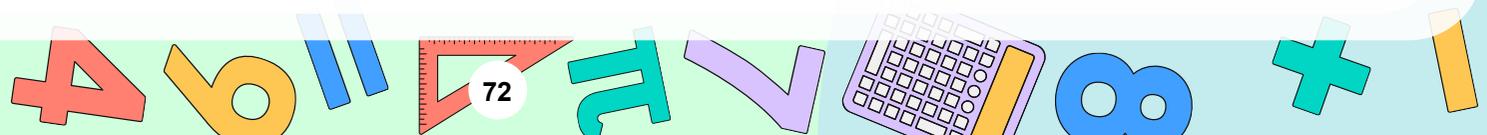
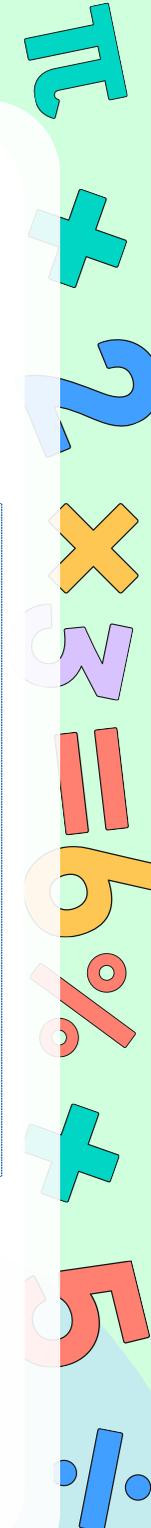


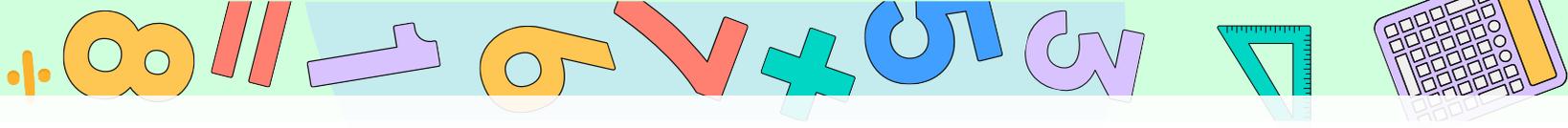
$$\frac{17}{9}$$

$$\frac{15}{10}$$

$$\frac{12}{10}$$

$$\frac{13}{4}$$



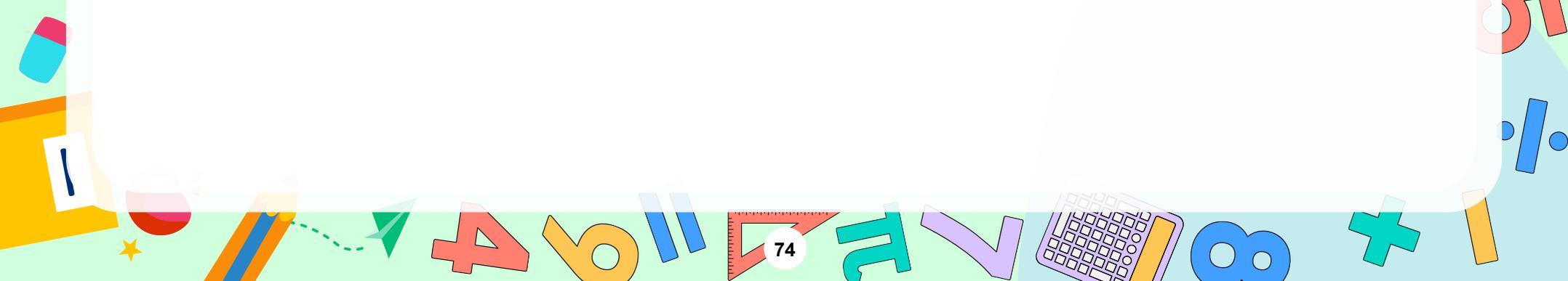
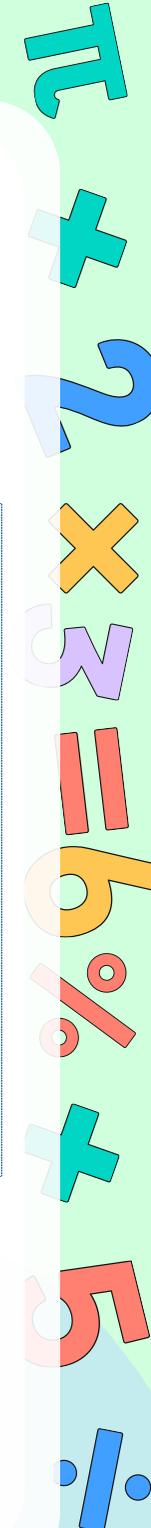


$$\frac{9}{4}$$

$$\frac{5}{2}$$

$$\frac{8}{5}$$

$$\frac{7}{3}$$

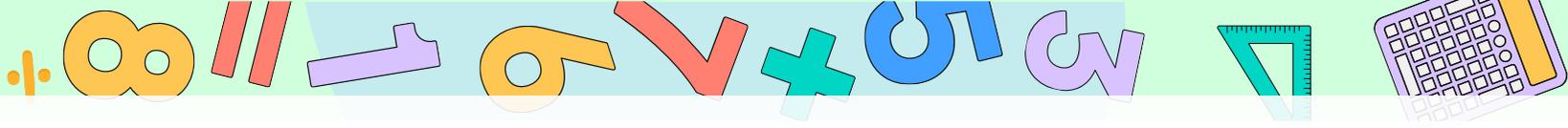


$$\frac{13}{5}$$

$$\frac{7}{2}$$

$$\frac{5}{3}$$

$$\frac{13}{3}$$

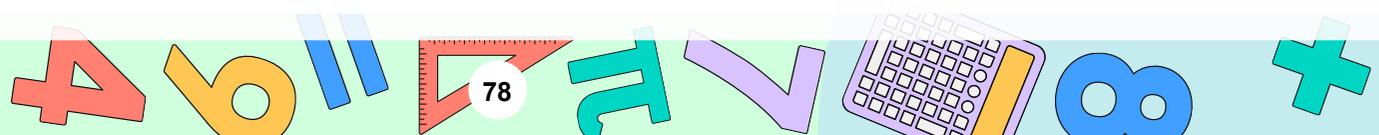
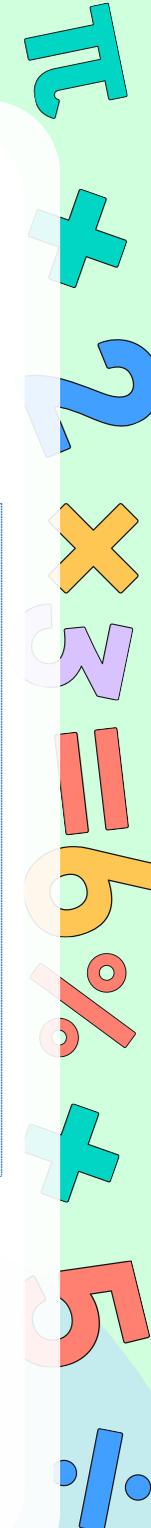


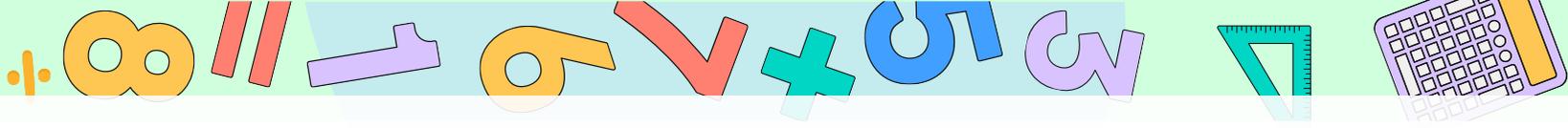
$$\frac{10}{7}$$

$$\frac{6}{4}$$

$$\frac{13}{7}$$

$$\frac{7}{6}$$



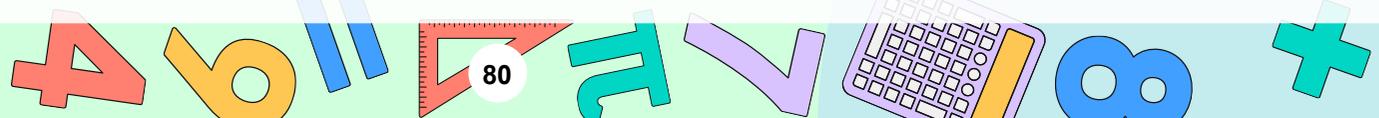
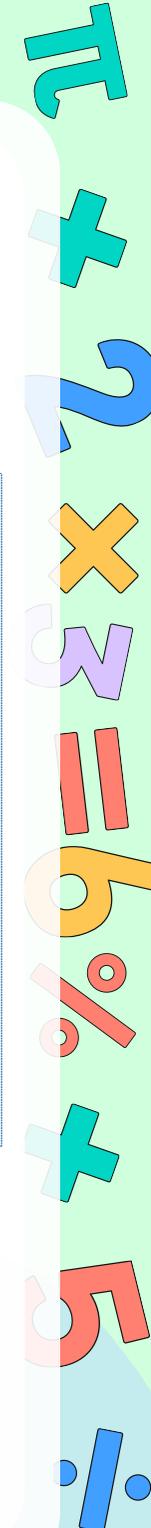


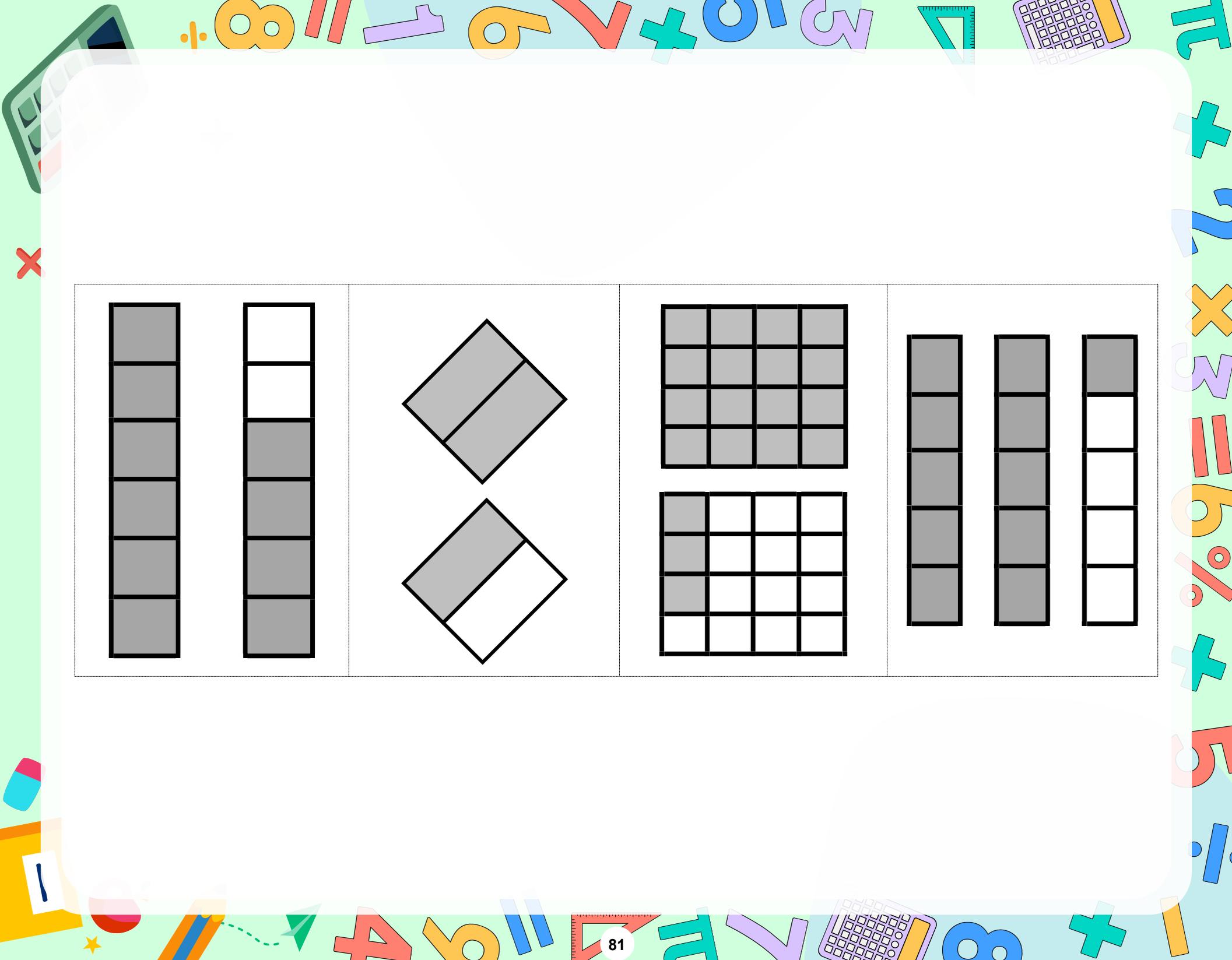
$$\frac{10}{6}$$

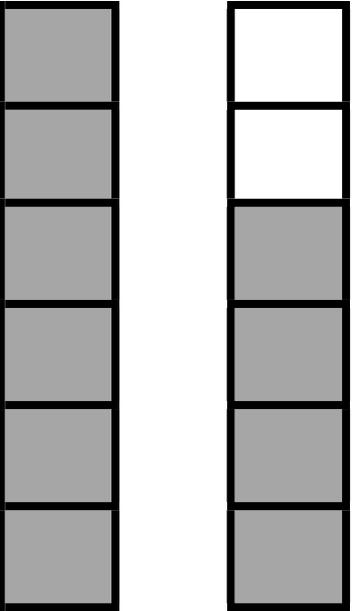
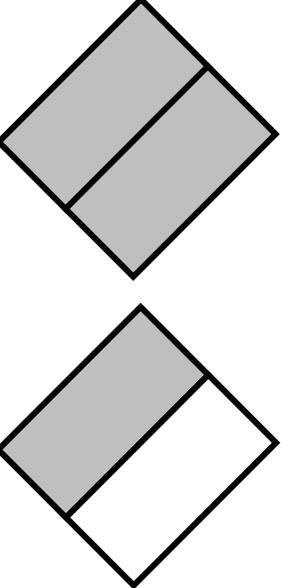
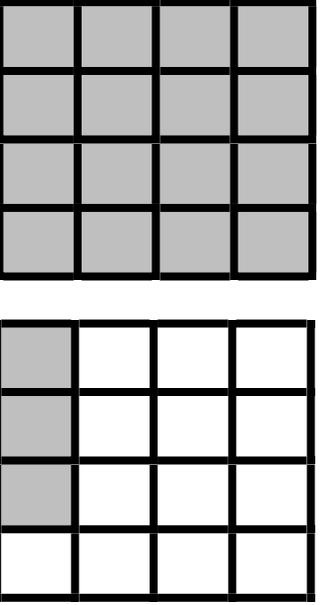
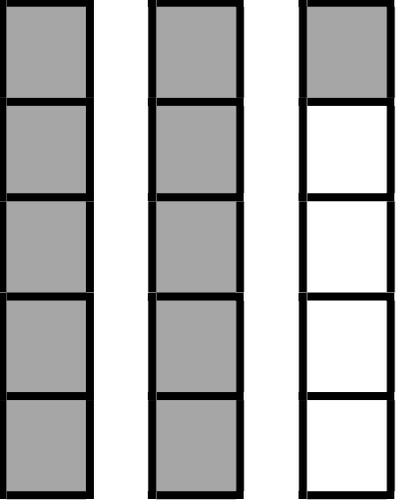
$$\frac{3}{2}$$

$$\frac{19}{16}$$

$$\frac{11}{5}$$





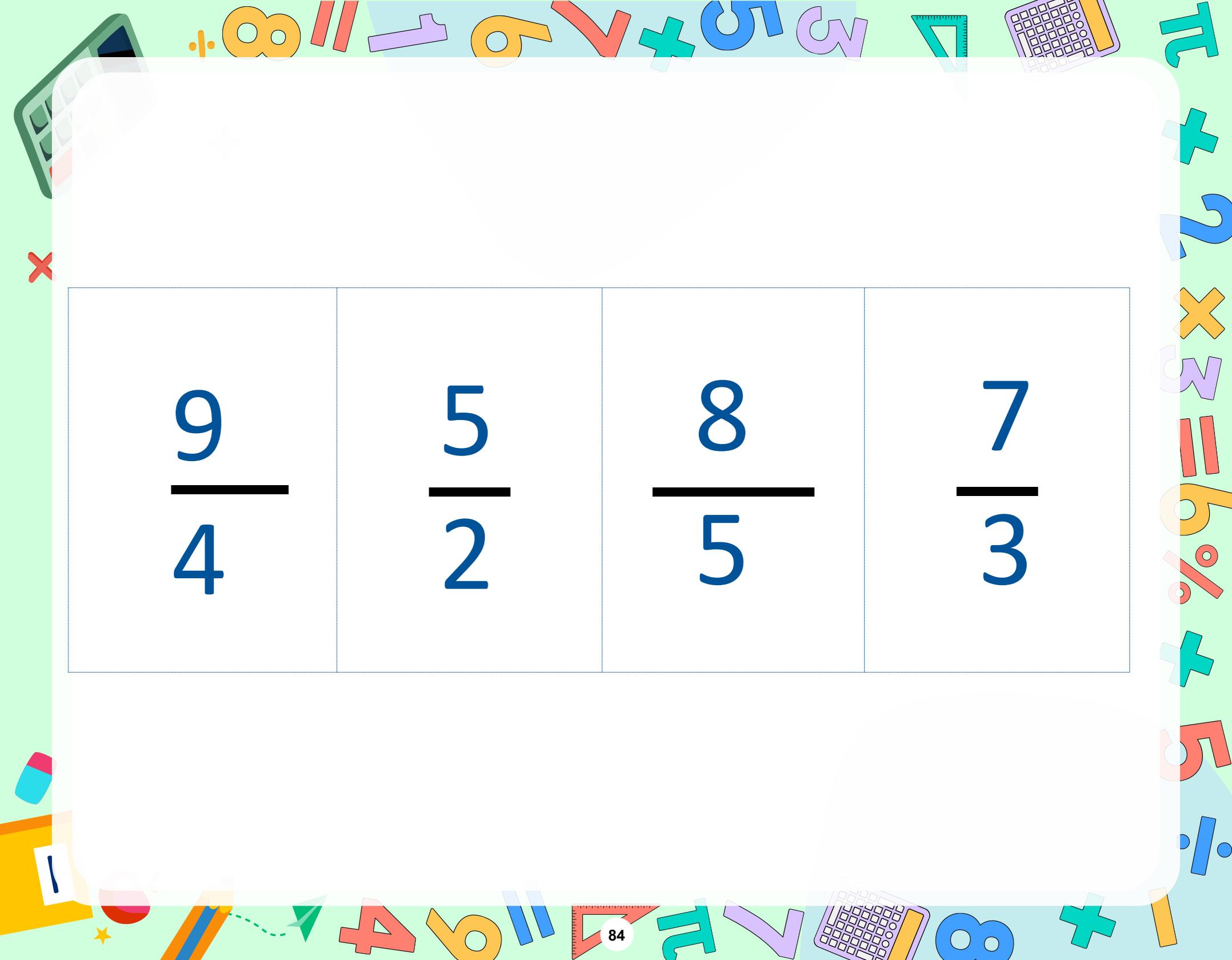
			
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$$\frac{17}{9}$$

$$\frac{15}{10}$$

$$\frac{12}{10}$$

$$\frac{13}{4}$$


$$\frac{9}{4}$$

$$\frac{5}{2}$$

$$\frac{8}{5}$$

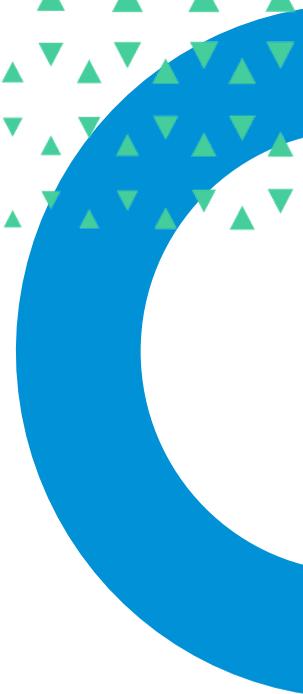
$$\frac{7}{3}$$

$$\frac{13}{5}$$

$$\frac{7}{2}$$

$$\frac{5}{3}$$

$$\frac{13}{3}$$



**BALUCHISTAN STUDENT LEARNING
IMPROVEMENT PROGRAMME (BSLP)**