

Draft

Module 1.6



**Teaching –Learning of
Mathematics at primary
level**

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1. Overview-

Mathematics teaching-learning in primary classes need to be joyful. Children need to learn mathematics in a conducive learning environment. This module will help teachers to create learner-friendly environment in the classroom and transact textbooks developed by the NCERT with learner-centric approaches. The module written for teachers to get an idea about the area of mathematics at the primary stage, develop an understanding about the importance of learning outcomes and will bale to address diverse needs of children.

2. Objectives of the Module:

The module will enable teachers to

- Provide learning opportunities to all the children related to Mathematics of Primary classes.
- Organize activity to make learning of Mathematics joyful for the children.
- Integrate assessment and other discipline with learning of Mathematics.
- Engage children, physically and mentally in learning Mathematics.
- Develop techniques of investigation and problem solving strategies among the learners.
- Develop positive attitude towards Mathematics among the learners.

3. Brief introduction about the area of mathematics in primary level:

Concept of numbers and the fundamental operation of numbers and their application in daily life situation, concept of length, area and volume, identification of shapes and solid objects and their properties, various geometrical concepts, collection of data and their representation and interpretation, concept of fraction as part of a whole , equivalent fraction , fundamental operations of fraction, finding patterns in numbers, shapes, objects are included in mathematics of primary level.

4. Class specific Learning Outcomes in the area of mathematics in primary level – An overview:-

Students will be able to learn and apply the numbers up to two digits in class I which will extend in higher classes, their operation to solve the simple numeric and word problem related to his/her contextual area and daily life situation. Students read and write numbers up to two digits. Students will understand, identify and extend simple patterns in numbers and shapes classify concrete materials or models from their surroundings.

In class II students are able to use observation and sense of touch to describe the various shapes, estimate and measure length/distances, identifies the values of currency from their daily life experiences and perform addition and subtraction operation in different situation related to day to day life, identifies various 2D shapes such as rectangle, square, circle and 3D objects such as box, ball etc. Students can describe time schedule such as name of the day, week, month, year etc.

In class III, students will know the counting of large number of object from their daily life experiences by making groups of 10, 100 etc, construct and use of multiplication table up to 10 in daily life situation, arrange various concrete objects and draw different multiplication facts, use and develop multiplication facts of 2, 3, 4, 5 and 10 using different ways, observe and discuss various 3D shapes in their surroundings, measure capacities of different containers and discuss their experiences of doing.

In class IV, students will explore, discuss in pairs / group / individually and able to write multiplication facts through various ways like skip counting, extending patterns etc and applies different techniques for solving (e.g $23 \times 6 = (20 + 3) \times 6 = 20 \times 6 + 3 \times 6 = 120 + 18 = 138$), discuss and evolve standard algorithm for multiplication.

In class V, Students will work with numbers up to 1,00,000, and perform fundamental operations, represent data by various types of graph, convert decimal to fraction and vice versa, relate different units of length, area, volume, describe properties of quadrilaterals, 3D objects.

5. Pedagogies for achieving the Learning Outcomes:

- Concrete objects such as marbles, seeds, abacus etc. will be used for number sense, operation of numbers etc.

- Daily life situations will be connected with various ideas such as far – near, heavy – light, more – less etc, data handling, measurement of length, weight, volume etc.
- Improvised materials will be used for measurement of length, area, volume, weight etc.
- Paper folding, shading area or any other similar activities will be used for giving idea of fraction and fractional operation.
- Concrete models will be used for developing idea of various 3D objects and their properties.
- ICT can be used for developing concept of number, number patterns, shapes, fractions, measurement etc.
- Discussions will be done for habituating students for observation of patterns related to number system and fundamental operations, 2D / 3D objects and their properties etc.

6. Exemplars

Chapter 4: Part and Wholes, Class V.

(a) Introduction:

Students have the concept about numbers. To get concept about numbers they have taken whole things but while we work on part of a whole, the concept of fraction arises. When a whole thing in our real life is to be divided into parts concept of fraction is very important. In this chapter we will get idea about fraction, finding fractional part of a collection, equivalent fractions.

To give idea about fraction we can use following three models:

1. Area Model
2. Set Model
3. Line Model

Area Model: In Area Model a rectangular / circular / square or any symmetric piece of paper or any other material can be taken and by folding and shading different fractions can be shown. As models are considering area , this kinds of models is called Area Model.

Set Model: In Set Model objects of same shape, size and colour are used. The objectives are classified into different groups and groups are represented by fraction of all groups.

Line Model: In Line Model a line segment is taken on which length are measured. Marking the line $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ etc. can be identified.

(b) Learning Outcomes

- Students will describe $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ etc by paper folding or by any other concrete method.
- Students will determine the number corresponding to a part of collection and vice versa.
- Students will identify and form equivalent fractions of a given fraction.

Pedagogies preferred for achieving learning outcomes:

- $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ etc. will be discussed by paper folding shading etc.
- Fractions will be presented in number and vice versa by concrete activities.
- Equivalence fraction will be discussed by paper folding and shading on Black board or copies.

After few activities students will be able to understand the law for finding equivalent fractions.

(c) Conduct of in-build activities using learner centred approach:

Activity 1: Identification of shaded part of a given shape.

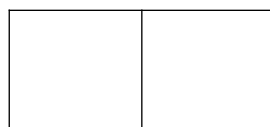
Objectives: Students will describe $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ etc. by paper folding or any other concrete method.

Material required:- Rectangular /circular/ square paper sheets, colours, crayons.

Steps of Activity:

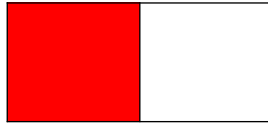
Teacher will give every child a paper sheet and ask to fold it into equal parts.

Student:



Teacher: Colour one part.

Student:



Teacher: Out of two equal parts one part is shaded. What do we call the shaded portion?

Student: $\frac{1}{2}$

Teacher: Can you draw it in your copy?

Student: Yes,

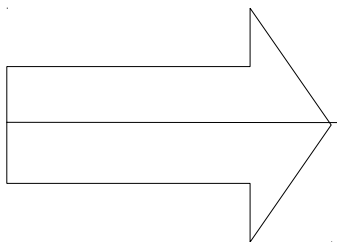


Teacher: Can you do it in any other way?

Student: -----

Teacher: For example if we divide any symmetric shape or object such as triangle, strip, ball etc in two equal parts and take one part then also we will get $\frac{1}{2}$. Now can you shade half in any other way?

Student:



Teacher: Now take another paper and make $\frac{1}{3}$

Student:



Teacher: (Drawing a figure on black board)

What fraction is represented by the coloured part?



Student: $\frac{3}{6}$

Few examples of this type will be continued.

These examples are suggestive only. Teachers may have their own examples.

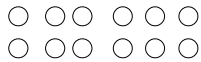
Activity 2: Determination of number corresponding to a part of a collection.

Objectives:

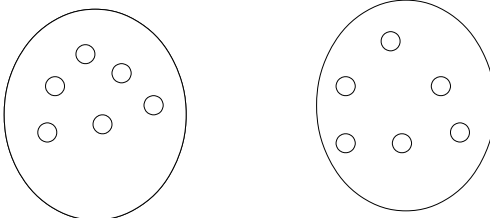
Students will determine the number corresponding to a part of a collection and vice versa.

Material required: Marbles, seeds etc

Teacher: (After distributing marbles in group/ individual) Take one dozen marbles.

Student: 

Teacher: Divide the marbles in two equal groups.

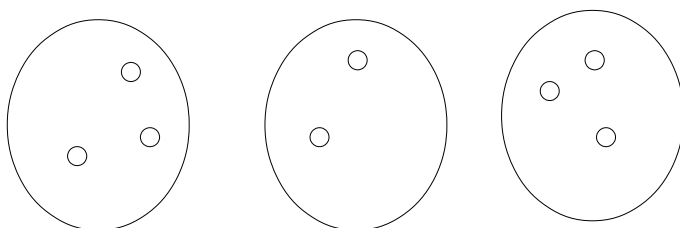
Student: 

Teacher: In one group how many marbles are there?

Student: Six, half dozen.

Teacher: So if we divide 1 dozen in two equal parts then each part will be half dozen. Now take 9 seeds and divide it in three equal groups. How many seeds are in one group? What does one group represent?

Student:



One group consists of three seeds, one group out of three groups is $\frac{1}{3}$

Teacher: Now take 5 marbles and give me two marbles, what portions of marbles are you giving me?

Student: Two out of five

Teacher: How do you will express it in fractional form?

Student: $\frac{2}{5}$

Teacher: (Continuing in this way) Show me $\frac{3}{7}$ by seeds or marbles.

Student:



Process will be continued for two or three more examples.

Activity 3: Identification and framing of equivalent fraction.

Objectives:

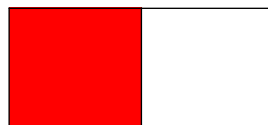
Students will identify and form equivalent fraction of a given fraction.

Materials required: Rectangular /circular/ square paper sheets, colours, crayons.

Steps of Activity:

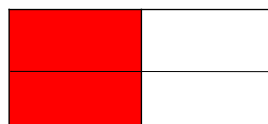
Teacher: (After giving every child a paper sheet he will ask to fold it into equal parts and colour one part) What is the fractional expression of the coloured portion

Student:



$\frac{1}{2}$

Teacher: Now fold the paper again (teacher will also do)



What is the fractional expression of the shaded portion?

Student: $\frac{2}{4}$

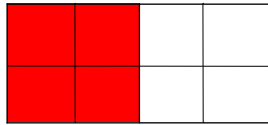
Teacher: Area of coloured portion is increased or decreased?

Student: It remains same as previous i.e equal.

Teacher: So what is the relation between $\frac{1}{2}$ and $\frac{1}{4}$?

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

Teacher: Now fold the paper again (teacher will show how to fold).



What is the fractional expression of coloured portion?

Student: $\frac{4}{8}$

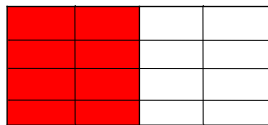
Teacher: Area of coloured portion is increased or decreased?

Student: Same

Teacher: So what is the relation between $\frac{1}{2}$, $\frac{2}{4}$, $\frac{4}{8}$

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

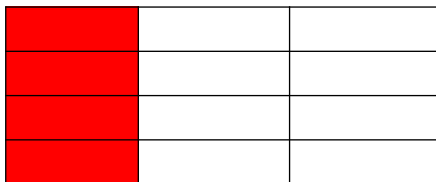
Teacher: What will you get if you fold the paper again (Showing the folding)



Student: $\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{8}{16}$

Teacher: $\frac{1}{2}$, $\frac{2}{4}$, $\frac{4}{8}$, $\frac{8}{16}$ are called equivalent fraction. Now find two equivalent fraction of $\frac{1}{3}$.

Student:



$\frac{1}{3} = \frac{2}{6} = \frac{4}{12}$

$\frac{2}{6}$ and $\frac{4}{12}$ are two equivalent fraction of $\frac{1}{3}$.

Process may be continued for two or three more examples.

Teacher: 1×2
----- = ?

2×2

Student: $\frac{2}{4}$

Teacher: 1×4

$$\frac{2 \times 4}{4 \times 4} = ?$$

2 X 4

Student: $\frac{4}{8}$

Teacher: $\frac{1}{2}$, $\frac{2}{4}$, $\frac{4}{8}$ are what kind of fraction?

Student: Equivalent fraction

Teacher: So how can you get equivalent fraction of a given fraction?

Student: We can get equivalent fraction of a given by multiplying the numerator and denominator by same number.

Teacher: $\frac{8}{2}$

$$\frac{16}{2} = ?$$

$\frac{16}{2}$

$\frac{4}{4}$

$$\frac{8}{4} = ?$$

$\frac{8}{4}$

Student: $\frac{4}{8}$, $\frac{1}{2}$

Teacher: Again $\frac{1}{2}$, $\frac{4}{8}$, $\frac{8}{16}$ are equivalent fraction. So what is the another rule for finding equivalent fraction?

Student: If we divide any fraction's denominator and numerator by same number then equivalent fraction can be obtained.

Teacher: So if the denominator and numerator of a fraction is multiplied or divided by same number then we will get equivalent fraction of that fraction.

(d) Perspective of in built evaluation

- (i) Observing the activity of the child.
- (ii) Listening the answers given by the child
- (iii) Asking them to perform some activity
- (iv) If some students are unable to perform the activity or to give answer, helping them.

(e) Diversity (How to deal with)

To deal with the diversified need of students differentiated instruction along with activities will be used. So many apps are available which can be used through smart phone of teacher (if computer is unavailable) for learning purpose of diversified group.

More examples will be given from Tripura context e.g., Three girls are performing Hojagiri dance, one girl is dancing on a pot, What is the fractional expression of the dancer performing on pot in this dance etc.

(f) Exercises:

Different types of questions (related to real life situation, local (context) may be asked, Some of the questions may be open ended and divergent. This will help in making clear concept of student about fraction. Examples are as follows.

- By drawing and shading show $\frac{1}{6}$.
- Find two equivalent fractions of $\frac{2}{5}$ where the denominator is even number.
- This week your school is closed on Wednesday and Sunday. What is the fraction of closed days this week?
- There are 15 mango trees in Sabita's garden and 7 are giving fruits. What is the fractional expression of fruit giving plants?

(g) How to deal with children with special needs while transacting "Fraction"

- (i) **Children with visual impairment:** For these children paper folding can be used. Counting the number of fold they can identify the fraction.
- (ii) **Children with hearing Impairment:** For these children marbles of equal shape and size can be used. By counting marbles they can identify fraction of collection. These children may be benefited by lip reading of teacher.

(h) How to address issue of multilingualism if arise during the session / class?

In case of multilingualism classroom, teacher should try to understand students' language. Teachers may show relative object to the children and ask them its name in their language(s). After clarifying the name of the object, teacher may use that term while interacting with the child. Teacher may express his/her opinion by physical activity and movement.

Textbooks in Mathematics developed by the NCERT

Mathematics textbooks for the primary stage provide ample opportunity to reflect and discuss. Simple activities are included relating to child's own life.

Module Development Team

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