

HANDBOOK ON TEACHING LEARNING MATERIALS

**DPEP TRAINING ACTIVITY-3
'ADOPTION OF BRC/CRC FOR ACADEMIC SUPPORT'**

TASK LEADER

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P R E L U D E

Regional Institute of Education (RIE), Mysore adopted Block Resource Centre at Kanai, Villupuram district, Tamil Nadu for providing academic support. This was one of the training activities taken up by the Institution under DPEP for the year 1997-98. This programme was carried out for about six months. During the interaction with the BRC staff and the teachers at Kanai, it was felt that a training programme for the preparation and use of Teaching Learning Materials (TLMs) is essential to make the Teaching-Learning process 'activity-based'. Consequently a workshop was organised at RIE, Mysore from 09-03-1998 to 13-03-1998. The participants for this workshop were drawn from nine Block Resource Centres of Villupuram district. During the workshop about 30-35 TLMs in different subject areas like Mathematics, Environmental Science, Tamil, Work experience were actually prepared. This 'Hand Book on TLMs' contains a write up on the preparation and use of some selected TLMs. It is hoped that, this hand book will be useful for the teachers and the teacher-trainers at the BRCs and CRCs for their teacher-training programmes.

B. S. RAGHAVENDRA
TASK LEADER

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INTRODUCTION

Teaching-Learning Materials (TLM) are essential for effective classroom transaction. It is now clearly accepted that activity based, child centered teaching-learning practices should be promoted so that the children are actively involved in the learning processes and there is a clear shift from 'providing information' to 'learning through experiences'.

In order to encourage the teachers to use TLMs for classroom teaching, the DPEP provides Rs. 500/- per teacher every year. It is expected that the teacher utilises this money to procure locally available materials and to prepare TLMs relevant to the topics in various subjects. The teaching-learning process becomes more meaningful and joyful to the children only if the TLMs are effectively used in the classrooms. The teachers by and large are not very clear about what TLMs to be prepared for different subjects and how to use the TLMs to teach effectively the concepts to the children. In this context, it was thought that a training programme in the preparation and use of TLMs would serve the needs of the teachers and the teacher trainers.

As one of the DPEP projects for the year 1997-98, Regional Institute of Education, Mysore adopted the Block Resource Centre (BRC) at Kanai in Villupuram DPEP district,

Tamil Nadu for providing academic support. From the discussions, the project team had with the BRC personnel, it was evident that the area of TLM required academic inputs. The BRC staff at Kanai and the teachers who attended the training programmes organised by BRC Kanai expressed the need for some training in the preparation of TLMS. In addition, Villupuram District Primary Education Project had not organised any workshop for the teachers, BRC/CRC personnel so far. Against this background, it was felt that a training programme for the BRC personnel would be an appropriate academic intervention for the DPEP project undertaken.

Keeping this felt need in mind, a five day workshop on the 'Preparation and Use of TLM' was organised for the BRC supervisors and teacher educators at RIE, Mysore from 9-3-98 to 13-3-98. Twelve participants from nine BRCs of Villupuram district attended the training programme. During the workshop, the participants along with Resource Persons identified the topics and the competencies for which TLMS could be prepared in different curricular areas like Mathematics, Language (Tamil) and Environmental Science. Some sample TLMS were actually prepared using easily available materials in all the curricular areas. About 30 to 35 TLMS were prepared. In order to make use of these TLMS for Teaching-Learning process in the classrooms, a write up

of 'Preparation and Use of TLMs' was prepared. This writeup includes the topic, competencies, preparation of TLM, suggested activities for using TLMs, and the classes to which they can be used is brought out in the form of a Handbook on TLMs.

The present 'Handbook on the Preparation and Use of TLMs' also includes items in the area of work experience. The participants were given training in preparing models from materials like clay, plaster of paris and wax. The skills acquired in preparing the TLMs in the work experience area are expected to help the teachers and teacher trainers to use their talents to come out with better TLMs.

Thermocole is a very easily available material and also commonly used in the preparation of TLMs. An electrically operated 'Thermocole Cutter', designed and fabricated at RIE, Mysore was used in this workshop. The thermocole cutter can be used to cut thermocole sheets to any required shape. A short-write up for making the thermocole cutter is also included in this handbook. This was distributed to three Block Resource Centres of Villupuram district. It is hoped that this draft Hand Book on TLMs will be useful to the BRCs and CRCs in their teacher training programmes. A feedback on the usefulness of this Handbook from teacher trainers and teachers is welcome and the suggestions will be taken positively for further improvement in future.

TAMIL

WORD STRIPS

- TOPIC : Sentence Construction
- COMPETENCIES : To improve the competencies in Comprehension/Application of Language/ Functional Grammar.
- MATERIALS REQUIRED : Cardboard strips of 3 cm width, sketch pen.
- PREPARATION OF TLM :

1. Prepare required number of strips.
2. Write different word on each strip.
3. The pupil may be asked to form any number of suitable and meaningful sentences using the available word strips.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Let the child read the words written on the strips.	Identify the meaning of each word.
2. Help the child to construct meaningful sentences using the available words.	The child is able to use <ul style="list-style-type: none">- appropriate words/phrases to convey thought.- correct sentence structures.- proper tenses, forms of verbs, prepositions and other grammatical elements.

CLASSES TO WHICH TLM CAN BE USED:

This can be used for classes 4 and 5.

WORD STRIPS FOR SENTENCE CONSTRUCTION

புல்	பசித்தால்	புலி	தின்னும்மா?
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புலி	பசித்தால்	புல்	தின்னும்மா?
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WORD BUILDING CHART

- TOPIC : Vocabulary Development
- COMPETENCIES : To improve the competencies in reading/writing/comprehension/application of language.
- MATERIALS REQUIRED : White card boards, sketch pens
- PREPARATION OF TLM :

1. Write the given expression at left hand side of cardboard in bold letters.

2. Coin as many meaningful words as possible using the alphabets available in the expression and write them against it as shown in the chart.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Let the pupils read the given expression.	Pronounce words correctly Use proper stress and intonation. Recognise - sounds of consonants, vowels, etc. - phonetic analysis of words like syllables, accents, etc. - structure analysis of words like prefixes, suffixes, compounds, etc. - usage of words, idioms and structural items. Recall spelling of words and meaning of words.
2. Let the pupils write the meaningful words using the alphabets from given expression.	Form words correctly. Write legibly and distinctly Pickout beautiful expressions, thoughts, figures of speech, etc. Identify meanings of words in particular contexts and peculiar usage of words. Use appropriate words, phrases to convey thought.

CLASSES TO WHICH THE TLM CAN BE USED:

This can be used for class 3. However, by increasing the difficulty level of expressions the TLM may be used for IV and V classes too.

RABBIT MODEL

- TOPIC : Rabbit Rhyme
- COMPETENCIES : To improve the competencies in Listening/Speaking/Singing/Comprehension.
- MATERIALS REQUIRED : Cotton, paper, fevicol, scissors, sketch pens, thermocole, etc.
- PREPARATION OF TLM :

1. The picture of a rabbit is drawn in the paper using sketch pen.

2. The picture is cut into actual shape with the help of scissor.

3. The cotton is pasted on the paper in many layers using fevicol.

4. Finally the rabbit model is fixed in a thermocole stand.

SUGGESTED STRATEGIES FOR USING THE TLM

<u>Activity</u>	<u>Learning outcome</u>
1. Make children listen to poem, music and rhythms.	Interest is generated by creating proper environment.
2. Ensure children participate in singing group songs, rhyme and poems.	
3. Show children their names in written form.	Participation in group songs, action songs and
4. Show picture cards with names and labels written under them.	rhymes.
5. Let the children make judgements on the basis of their own experiences about poems, songs, etc. which they have listened to.	Children are able to make their own judgements.

CLASS TO WHICH TLM CAN BE USED:

This can be used for classes 1 and 2.

AUDITORY DISCRIMINATION

- TOPIC : Auditory Discrimination
- COMPETENCIES : To improve the competencies of Listening/Speaking/Reading/Comprehension.
- MATERIALS REQUIRED : Cardboard, sketch pens.
- PREPARATION OF TLM :

1. Use cards of minimum size 10x10 cm. Pictures drawn must be clear and if possible colourful too. Names of the pictures must be written boldly and clearly.

2. Draw the pictures of the following in each picture card.

- Names with similar initial sounds like ஆல்/ஆள் and வால்/வான்
- Names with similar middle sounds like குடம்/படம் வான்
- Names with similar ending sounds like மலை/தலை

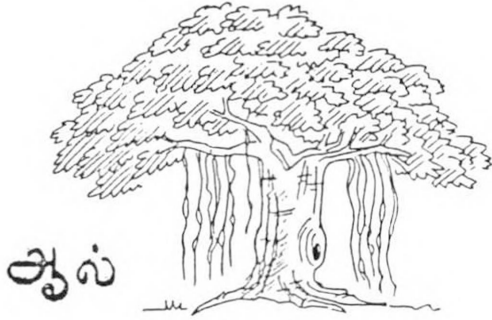
SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Ensure that children have concepts of initial, middle and ending sounds.	The children discriminate sounds.
2. Make children aware of initial sound in words by showing pictures.	Recognises the initial sound.
3. Make the children aware of middle sound in words by showing pictures.	Recognises the middle sound.
4. Make children aware of ending sound in words by showing pictures.	Recognises the ending sound.
5. Ensure that children's auditory ability is trained enough to discriminate between sounds of different letters.	Discriminates between initial phonemes (படம்/குடம்)
6. Help children to recognise the names and words that begin with the same sound and those which end with the same sound.	Discriminates between medial phonemes (படம்/பழம்) Discriminate between final phonemes (ஆல்/ஆள்) and வால்/வான்)

CLASS TO WHICH TLM CAN BE USED:

This can be used for class 2.

AUDITORY DISCRIMINATION CHART.



ஆல்



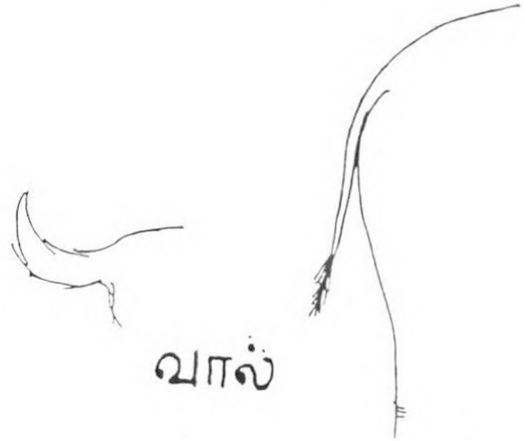
ஆள்



வாள்



மலை



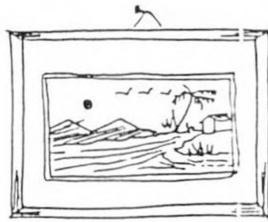
வால்



தலை



குடம்



படம்



பழம்

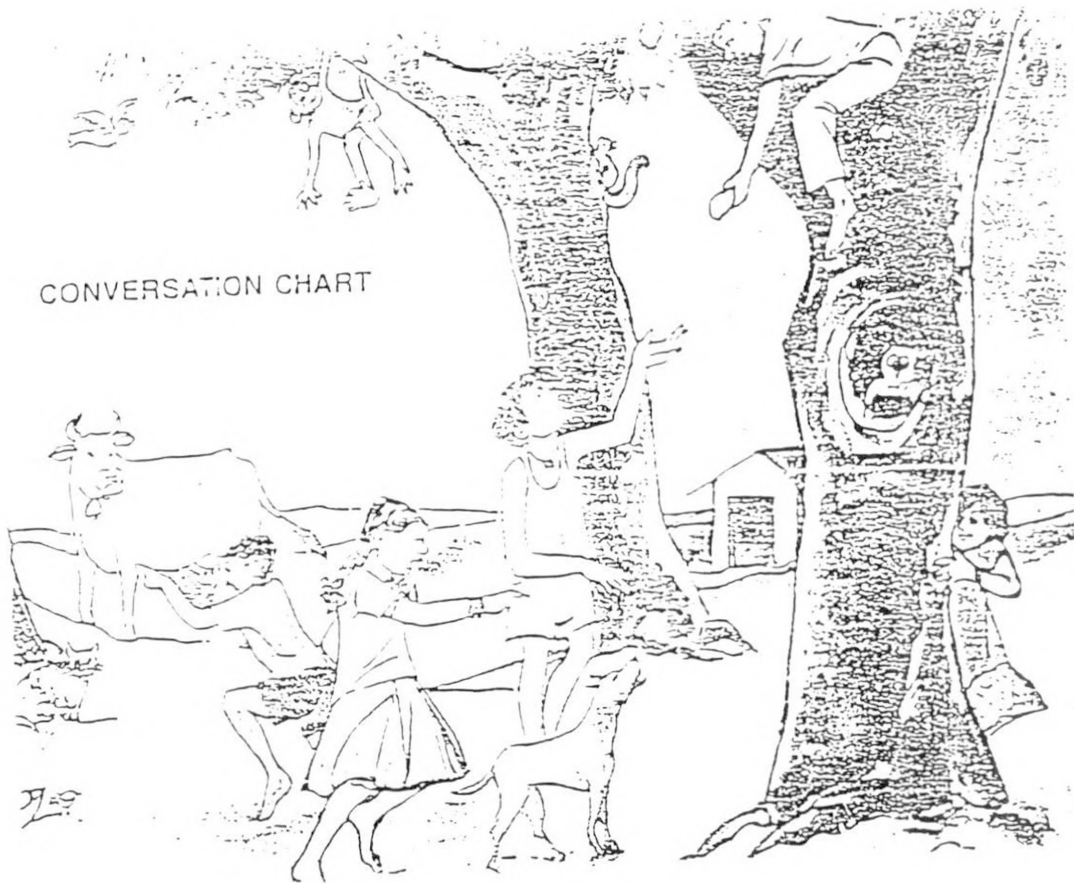
CONVERSATION CHART

- TOPIC : Visual Discrimination
- COMPETENCIES : To develop the competencies among the children in observation, speaking and comprehension.
- MATERIALS REQUIRED : Cardboard, sketch pens
- PREPARATION OF TLM :

Draw various figures in the chart which include boys, girls, animals, trees, house, etc. so as to enable both the teacher and pupils to converse among themselves about the objects drawn in the chart.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Let the pupils be asked to name the objects in the chart.	The pupils observe the chart, recognise the objects and recollect their names.
2. Ask the pupils to name the inanimate and animate objects.	The pupils are able to understand and discriminate between animate and in-animate/human and non-human/masculine and feminine, etc. on the basis of some criteria.
3. Ask the pupils to name human and non-human beings.	
4. Ask them how many boys and girls are there in the chart.	
5. Let the children be able to converse fluently and clearly.	Development of children's ability in spoken language.
6. Let the children speak a few sentences about any familiar objects drawn in the chart.	The children are able to say a few sentences comprehensively about any object from their immediate environment.



CONVERSATION CHART

CLASS TO WHICH TLM CAN BE USED:

The conversation chart may be used for different purposes, namely

- to write various forms like narration, report, essay, etc.
- to identify different parts of speech like nouns, verbs, etc.
- to express one's own ideas.
- to frame sentences in particular structure and so on.

As such, the TLM is suitable to the children of all primary classes.

MATHEMATICS

ROLLING DRUM

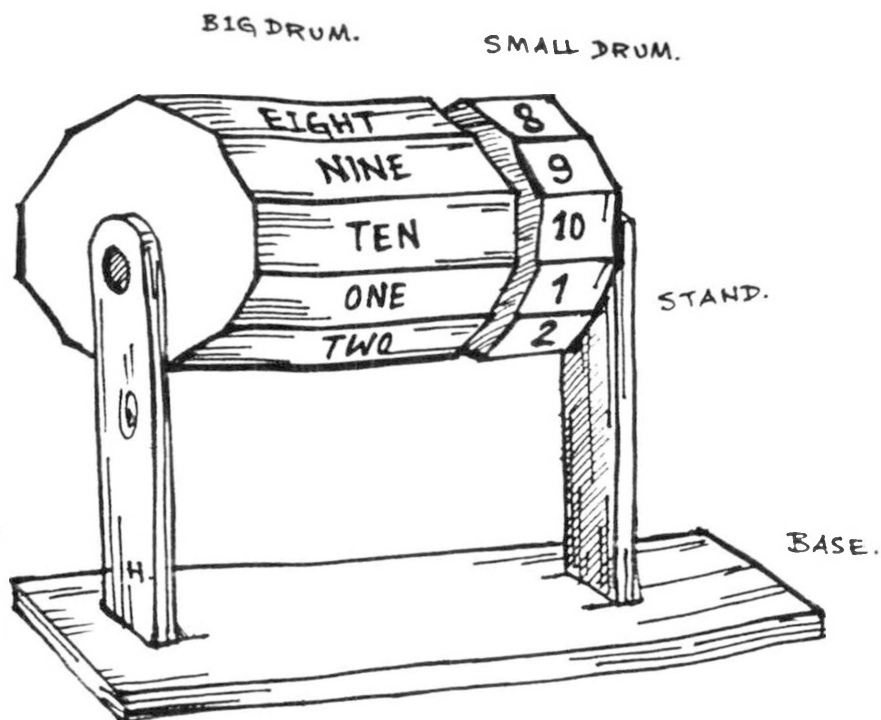
TOPIC : Numbers and number names

COMPETENCIES : Writing the numbers from 1 to 10 and their number names.

MATERIALS REQUIRED : Card board, colour paper, white paper, calender numbers, scissors, knife, fevicol, glass rod/metal rod, sketch pen, thermocole sheet.

PREPARATION OF TLM :

1. Take a cardboard of 50 cm length and 18 cm breadth.
2. Divide the cardboard into 10 equal parts of 5 cm each. On each division fold the cardboard.
3. Fold the cardboard in a polygon shape of 10 sides. Cover the top and the base of drum with the cardboard (cut to proper size).
4. Paste the surface of the ten sides with coloured paper.
5. Make a similar cardboard polygon drum of breadth 12 cm. Cover the base and the top of this as was done in step 3.
6. Paste the sides of the smaller drum with white paper.
7. Write/paste the numbers 1 to 10 on the sides of the smaller polygon drum.
8. On the bigger polygon drum, write the number names from one to ten.
9. Suspend the two polygon drums with a glass rod or a metal rod such that the rod passes through the centre of the base of the two polygon drums.
10. Support the two ends of the glass rod with the thermocole stands.



ROLLING DRUM.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Rotate the polygon drum containing the numbers. Ask the student to rotate the other one to get the matching name.	Recognise the correct number.
2. Tell the name of a number and ask the child to match its corresponding number using the rolling drum.	Matches the name with the correct number.

CLASSES TO WHICH THE TLM CAN BE USED:

This can be used for class 1. A similar model containing two digits or more can be used for classes 2, 3 and 4.

NUMBER RECOGNITION BOARD

- TOPIC : Recognition of numbers 1 to 9.
- COMPETENCIES : Recognition of numbers from 1 to 9.
Writing of numbers from 1 to 9.
Writing before and after a given number and middle numbers.
- MATERIALS REQUIRED : Thermocole, thread, scissors, fevicol, sketch pens, blade.

PREPARATION OF TLM :

1. Cut a rectangular or square piece of thermocole.
2. Write the numbers 1 to 9 on that piece with the help of sketch pens such that a groove can be made in the shape of the numerals.
3. Take the thread and fix it in the groove using fevicol such that the numeral can be seen.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Give a numeral and ask the child to recognise it from the board.	Recognising and writing the numbers from 1 to 9.
2. Show a numeral and asking them to tell the number.	
3. Except one numeral, other numerals are closed with a piece of paper. Ask the child to tell the before and after number.	Know before and after numbers.
4. Close some middle numbers and ask the children to tell the missing numbers.	Know the middle numbers when two numbers are given.

CLASSES IN WHICH THE TLM CAN BE USED:

This can be used in class 1.

NUMBER CUTTINGS

- TOPIC : Ascending and descending numbers.
- COMPETENCIES : Writing numbers from 1 to 9. Arranging the numbers in ascending and descending order. Finding out greater and smaller numbers.
- MATERIALS REQUIRED : Card board, fevicol, colour paper, thermocole sheet.

PREPARATION OF TLM :

1. Cut numbers 1 to 9 from the card board and paste colour paper over it.

2. Attach sand paper at the back of the number cards.

3. Fix the number cards on the thermocole board (These cards can be easily fixed and removed from the thermocole board).

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Fix any number between 1 and 9 on the board. Ask the children to recognise the number and write the number.	Recognise numbers from 1 to 9.
2. Fix two numbers on the board and ask the students to take out the smaller or greater number.	Identify the smaller and greater number.
3. Fix three or four numbers on the board and ask the children to arrange them in the ascending or descending order.	Knows to arrange numbers in ascending or descending order.

CLASSES TO WHICH THE TLM CAN BE USED:

This can be used for class 1. Using two or three digit numbers, this TLM can be used for classes 2, 3 and 4.

DISC CHART

TOPIC : Basic addition facts and multiplication facts

COMPETENCIES : Adding two numbers whose sum does not exceed 18.
Multiplying of two numbers whose product does not exceed 18.

MATERIALS REQUIRED : White drawing sheets, thermocole sheet, calender number cutouts, fevicol, used refil.

PREPARATION OF TLM :

1. Cut two card board circular discs each of dimensions 6 inches, 8 inches and 10 inches (these are discs A, B and C respectively).

2. Paste numbers 0 to 9 on one of the discs A.

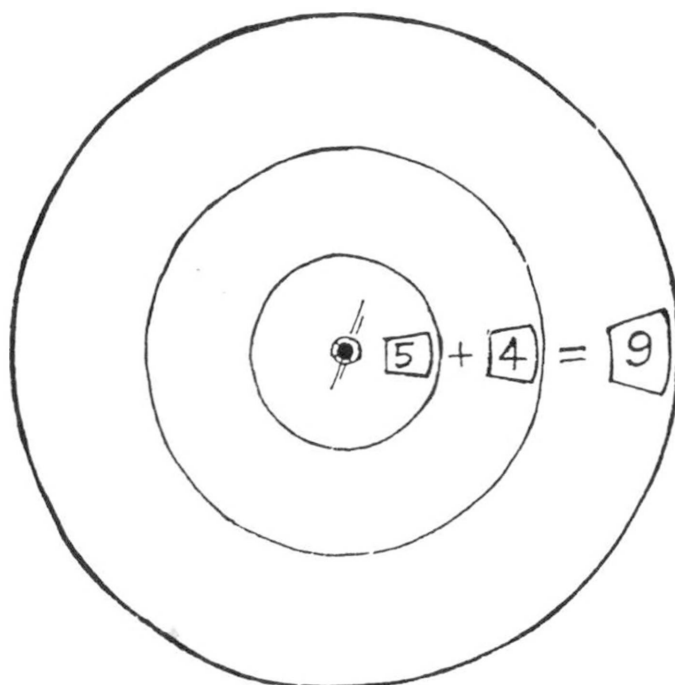
3. Cut a window on the other disc A in such a way that only one number can be seen at one time.

4. Similarly paste number 0 to 9 on the disc B and 0 to 18 on the disc C.

5. Cut out windows on the discs B and C as was done in the case of A.

6. Place the discs and their windows in the order C, B and A, one above the other.

7. Fix all the discs on a circular thermocole sheet using an used ball point pen refil as pivot.



SUGGESTED STRATEGIES FOR USING THE TLM:

Activity	Learning outcome
1. The teacher writes two numbers on the board, say 5+4. One child may be asked to find out the answer using the disc chart.	Performs single addition facts.
2. The class is divided into two groups. One group can give the numbers to be added (the sum should not exceed 18). The other group can give the answer using the disc (can be used as a game in the classroom).	
3. The same activity can be used to find out the product which does not exceed 18 and for finding out factors of a given number equal to or not exceeding 18.	Performs multiplication facts Finds out the factors of a given number not exceeding 18.

CLASSES IN WHICH THE TLM CAN BE USED:

The TLM can be used in classes 1, 2 and 4.

SELF LEARNING BOARD

TOPIC : Basic addition, subtraction, multiplication and division facts and use of symbols +, -, x, - and =.

COMPETENCIES :

Adds numbers 0-18 with sum not exceeding 18.

Adds two numbers mentally with sum not exceeding 9.

Subtracts numbers from 0-18 to separate smaller number from a larger number and to find the difference between two numbers.

Subtracts mentally one single digit number from another single digit number.

Interprets and writes the symbols +, - and =.

Interprets and writes the symbol x for multiplication.

Knows mentally and in writing multiplication tables of 2, 3, 4, 5 and 10.

Demonstrates understanding of the concept of division as repeated subtraction.

MATERIALS REQUIRED : Thermocole sheet, sketch pens, cutting blade.

PREPARATION OF TLM :

1. Cut a square piece of thermocole sheet.

2. On that fix 5 sockets to insert the number cutouts and symbol cutouts.

3. Write two sets of number cards with digits 0 to 9 such that one digit on each piece of thermocole and also write the different symbols +, -, x, - and = on each piece using sketch pens.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Ask the child to insert the given number and the given symbol.	Recognises the numbers, writes the basic addition facts, subtraction facts, multiplication facts and division facts using the symbols.
2. Ask the children to display the basic addition facts subtraction facts, multiplication facts and division facts.	
3. Give three numbers and ask the children to find out the basic operations which connects the given three numbers.	Using the correct symbol +, -, x and -.

CLASSES TO WHICH THE TLM CAN BE USED:

This can be used for classes 1 to 3 and this can also be used for remedial instruction.

PLACE VALUE MODEL

- TOPIC : Place and Place Value
- COMPETENCIES : Writing the place value of the digits. Expanding numbers and writing the corresponding numbers for the expanded form of the number.
- MATERIALS REQUIRED : Thermocole, thermocole cutter, calender number cutouts, sketch pens and fevicol.
- PREPARATION OF TLM :

1. Cut the numbers 0 to 9 from an old calender and paste them on a small square piece of thermocole.







2. Write the places on a big rectangle thermocole board as shown in the figure. For each place make a holder with thermocole pieces so that the numbers pasted on small thermocole piece (step 1) can be inserted.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Insert different digits in the place holders. Ask the children to read numbers.	Recognises the numbers and their place value.
2. Ask the students to write the number in the expanded form.	Recognises the place value of the digits.
3. Ask the students to read the number in the expanded form and ask them to show the corresponding place values using the place value model.	Recognises the number using the place values of the digits.
4. Give some numbers in the expanded form and ask them to write the numbers and vice-versa using the TLM.	Recognises different numbers with their place values.

CLASSES IN WHICH THE TLM CAN BE USED:

It can be used for classes 1 to 5.

LAKHS	TEN THOUSANDS	THOUSANDS	HUNDREDS	TENS	ONES
					

PLACE VALUE

GEOMETRICAL SHAPES

- TOPIC : Geometrical shapes
- COMPETENCIES : Recognises different geometrical shapes like, square, rectangle, triangle and circle.
- MATERIALS REQUIRED : Thermocole sheet, knife/cutter, water colours.

PREPARATION OF TLM :

1. Take a thermocole sheet of 50 cms length and 15 cms breadth.

2. Mark a square (8x8 cms), a rectangle (10x8 cms) an equilateral triangle (sides with 8 cms) and a circle with 8 cm diameter.

3. Cut the squares and rectangle with a knife. Cut the triangle and circle using a thermocole cutter.

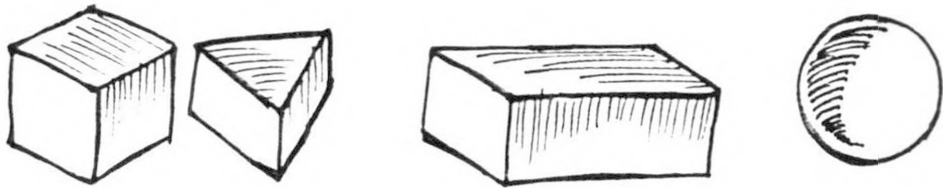
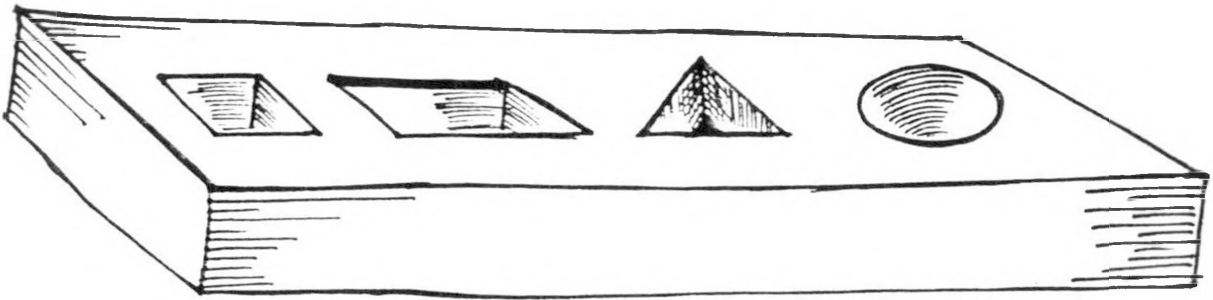
4. Colour the geometrical figures (use different colours for different geometrical shapes).

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Shows different geometrical shapes and tells their names.	Recognise the shapes of geometrical figures like square, triangle, etc.
2. Takes each geometrical shape and ask the children to observe the number of sides in square, rectangle, and triangle.	Understand that - square and rectangle has four sides. - triangle has three sides.
3. Ask the children to note the differences between square and rectangle.	Infer that - all the sides of a square are equal. - two sides are equal in rectangle.
4. Give familiar examples like table, postcard, bricks, carrom board, tennicoit, etc. ask then to identify their shapes.	Relates common items with geometrical shapes.

CLASSES TO WHICH THE TLM CAN BE USED:

This can be used for classes 2 to 5.



GEOMETRICAL SHAPES

ENVIRONMENTAL SCIENCE

PARTS OF THE BODY

TOPIC : Parts of the Body

COMPETENCIES : To know about the parts of a body and their functions.

MATERIALS REQUIRED : Chart containing pictures of parts of a body, thermocole sheet, cutter, fevicol, sketch pens, scissors and pictures of functions/uses of different parts of the body.

PREPARATION OF TLM :

1. Cut the pictures of the different parts of the body.
2. Paste these pictures on a thermocole sheet.
3. Cut the thermocole sheet to get different parts of the body.
4. Fix these pictures on another thermocole board.
5. Similarly cut and paste the pictures showing uses of parts of the body on the other side of the thermocole board.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Present the chart.	Recognises the names of the parts of the body.
2. Perform some activities to show how each part of our body works. Eg: Lifting things with hand, walking, etc.	Understands the role played by different parts of the body.
3. Show the chart containing the pictures of the parts of a body and their functions and uses.	Matches the different parts with their functions.

CLASSES TO WHICH THIS TLM CAN BE USED:

This can be used for classes 1 and 2.

BIRDS AND ANIMALS

TOPIC : Features of Birds and Animals

COMPETENCIES : To know about different types of birds and animals and their feeding habits.

MATERIALS REQUIRED : Pictures of some familiar birds and animals, thermocole, knife, fevicol.

PREPARATION OF TLM :

1. Cut the pictures of birds and animals.
2. Paste them on a thermocole sheet.
3. Cut the thermocole sheet with pictures individually.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Display the chart and explain the different modifications of parts of body of birds and animals.	Recognises different types of birds. Understands their food and feeding habits. Identifies different modifications of various parts of the body.
2. Asks students to observe birds in nature.	Create interest in children about birds and bird watching.
3. Asks to classify the birds and animals based on their food and feeding habits.	Classifies into herbivores, carnivores, insectivores, omnivores, etc.

CLASS TO WHICH THIS TLM CAN BE USED:

To all classes of primary level.

PARTS OF PLANTS

- TOPIC : Parts of the Plants.
- COMPETENCIES : To know about different parts of the plants.
- MATERIALS REQUIRED : Chart paper, colour pens, pictures of different plants, gum, specimens of complete plants, roots, stems, leaves, flowers.

PREPARATION OF TLM :

1. Draw neat and proportionate diagrams of different parts of plants.
2. Colour each part of plants with appropriate colours.
3. Draw diagrams of root, stem, leaves, flowers separately and mount them on a chart paper.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Presentation of the chart showing plants.	Recognise different plants. Recognise different parts of each plant. Compare various parts of a plant. Identify their structure and functions.
2. Showing actual plant specimens.	Recognise various parts of a plant. Identify their roles.
3. Asks to collect and store different types of plants.	Develops skill of collection, identification of parts, mounting and storing of plants and their parts.

CLASSES TO WHICH THIS TLM CAN BE USED:

This can be used for classes 3, 4 and 5.

GERMINATION OF SEEDS

TOPIC : Germination of Seeds.

COMPETENCIES : To know the essential requirements for germination and different stages of germination.

MATERIALS REQUIRED : Thermocole sheets, cutter, water paints, brush, cardboard, fevicol.

PREPARATION OF TLM :

1. Outlines of various stages of germination of seeds are drawn on thermocole sheets.

2. Thermocole is cut into different stages of germination of seeds.

3. The stages are pasted on a sheet sequentially with fevicol.

4. The stages are painted with appropriate colours with paints.

5. Parts are labelled.

SUGGESTED STRATEGIES FOR USING THE TLM

<u>Activity</u>	<u>Learning outcome</u>
1. Display the model of germination of seed.	Recognises various stages. Recognises the sequence. Compares one stage with the other. Discriminates between any two stages.
2. Explains the process of germination Factors essential like light, water and temperature	Understands the process of germination. Identifies role played by each factor. Applies the knowledge in new situations.
3. Manipulation of factors	Reasons out for the success or failure of germination.
4. Random distribution of stages to students asks them to arrange them in proper sequence.	Recognises stages and arranges them sequentially.

CLASSES TO WHICH THIS TLM CAN BE USED:

This can be used for class 5.

REPRODUCTION IN BUTTERFLY

TOPIC : Living Things

COMPETENCIES : To learn about different stages of reproduction in some animals.

MATERIALS REQUIRED : Pictures of life cycle of butterfly, frog, chick, card board, thermocole sheet, gum, knife.

PREPARATION OF TLM :

1. Cut various stages of development (reproduction) of butterfly neatly.

2. Paste them on thick cardboard pieces or thermocole pieces.

3. Arrange them in a proper sequence on a sheet of paper or thermocole sheet.

4. Similarly prepare cutouts for other animals also.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Display of cards on a thermocole stand.	Recognises different stages of reproduction of a butterfly.
2. Remove the cards and give to children in small groups and ask them to arrange on sheet.	Learns the sequence of stages and organises all stages on a sheet of paper.
3. Similar activities on fish, frog, chick be done.	Understands the life cycle and sequential stages in different animals.

CLASSES TO WHICH THIS TLM CAN BE USED:

This can be used for classes 4 and 5.

UNPROTECTED FOOD

- TOPIC : Unprotected Food
- COMPETENCIES : To understand the need for protection of food.
- MATERIALS REQUIRED : Chart paper, pencil, sketch pens, poster colours, brush, fevicol.
- PREPARATION OF TLM :

1. Collect pictures or draw diagrams of unprotected food, diseases, etc.

2. Cut and paste the pictures on a chart paper and label them.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Show the chart to students	Recognises the way the unprotected food gets contaminated. Recognises need for protection of food. Understands and avoids eating unprotected food. knows various ways of preventing diseases. Develops good habits like washing hands, vegetables, covering food items, water, etc. Develops healthy habits.

CLASSES TO WHICH TLM CAN BE USED:

This can be used for all classes of primary level.

NUTRITIOUS DISC

TOPIC : Nutritious Food and Health Education.

COMPETENCIES : To know the sources of vitamins and the importance of balanced diet.

MATERIALS REQUIRED : Cardboard, scissors/blade, sketch pens.

PREPARATION OF TLM :

1. Cut two cardboard discs, one of 12" diameter and the other of 9" diameter.

2. Write the names of different vitamins and balanced diet on bigger disc.

3. Write the sources of vitamins, diseases caused because of deficiency of vitamins on smaller disc.

4. Fix small disc on larger disc in such way that they can be rotated.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Give disc to students and ask them to rotate upper disc and find out sources, diseases of vitamin 'A'.	Learns about vitamin 'A', its sources, deficiency, diseases.
2. Similarly ask the students to identify about other vitamins.	Learns about other vitamins also. Understands the need of balanced diet.

CLASSES TO WHICH THIS TLM CAN BE USED:

This can be used for classes 4 and 5.

POLLUTION

- TOPIC : Pollution
- COMPETENCIES : To know about the causes and prevention of pollution.
- MATERIALS REQUIRED : Pictures, chart paper, poster colours, brush, pencil, scissors.
- PREPARATION OF TLM :

1. Collect pictures showing pollution of water, air and immediate surroundings.

2. Paste the pictures on chart papers and label them.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Display the chart	Understands different types of pollution. Understands how pollutions take place. Suggests some means for prevention of pollution.
2. Field trip	Bringing awareness of hazards of pollution. Understands different types of pollutants added. Gains first hand information about need for prevention. Follow good habits to prevent using polluted water, air, etc.

CLASSES TO WHICH TLM CAN BE USED:

This can be used for classes 3, 4 and 5.

RESPIROMETER

- TOPIC : Respiration in Plants.
- COMPETENCIES : To understand that seeds, flowers, birds, etc. breath out carbon dioxide.
- MATERIALS REQUIRED : Bottle, two holed rubber cork, thistle funnel, delivery tube, pinch cock, lime water, test tube.
- PREPARATION OF TLM :

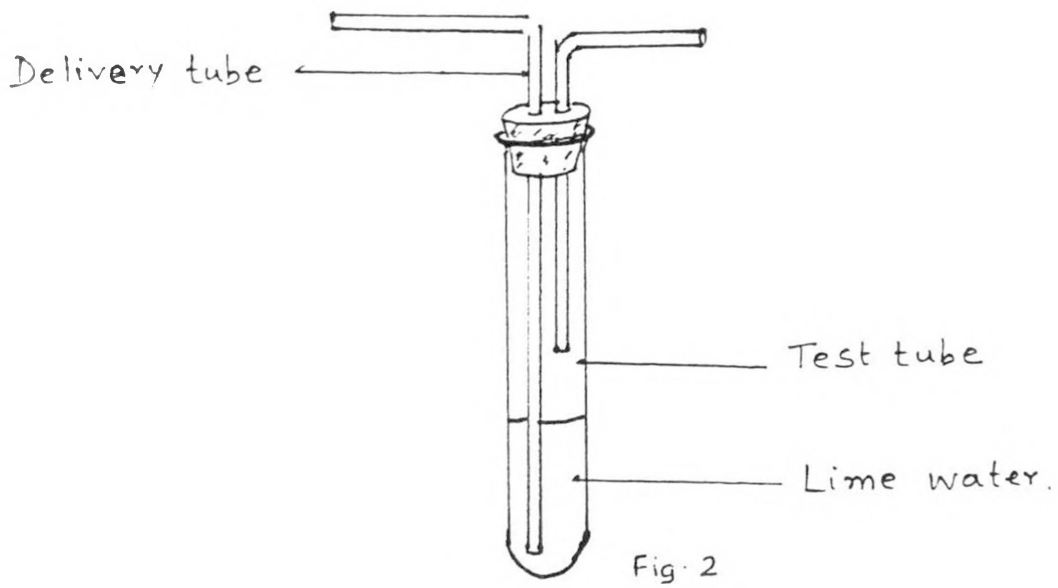
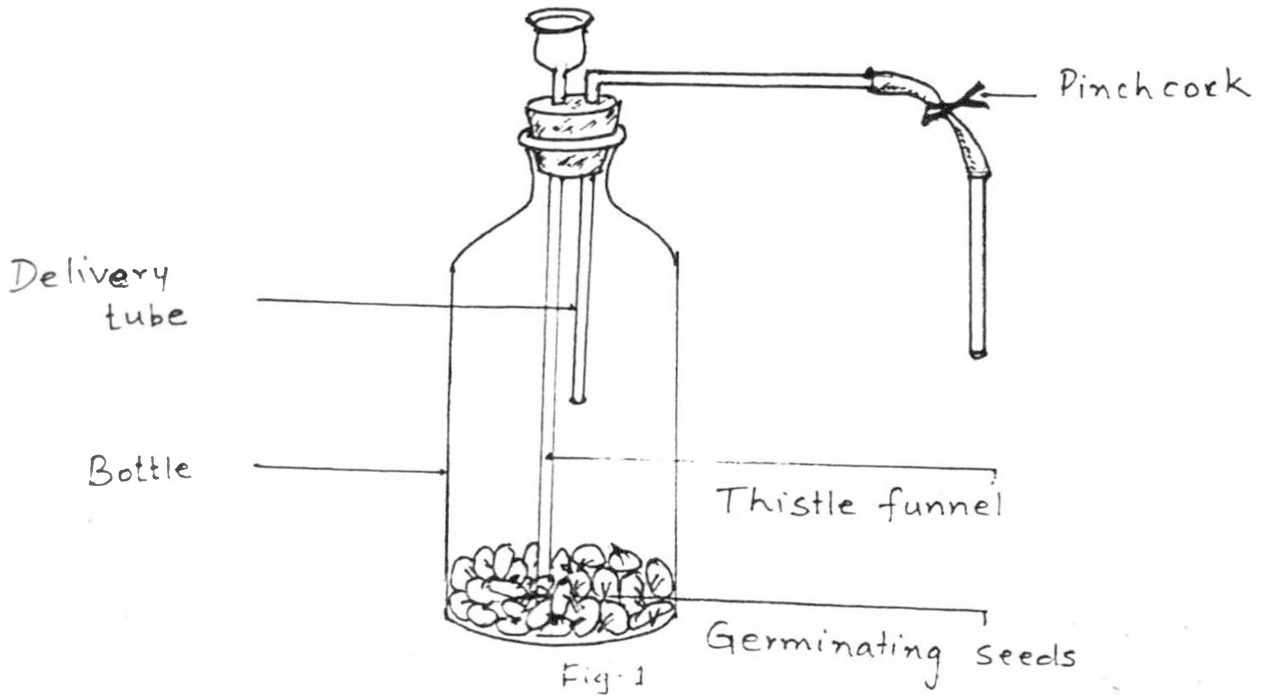
1. Take a bottle and put germinating seeds in it.
2. Fix a two holed rubber cork to the mouth of the bottle.
3. Insert thistle funnel through one of the holes and a delivery tube through another.
4. Put a rubber tube to the free end of delivery tube and close with pinch cock.
5. Blow air through delivery tube in the set up shown in Figure 2 and note the changes in lime water.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Set up the experiment as show in figure and keep it for 2-3 hours	Learns to handle apparatus carefully.
2. Release pinch cock. Displace the evolved gas from the bottle into a testtube containing lime water by pouring water into bottle through thistle funnel.	Observes that lime water turns milky. Reasons out that carbon dioxide is evolved during respiration.
3. Use some other living material like flowers and conduct experiment as described.	Infers that all living things produce carbon dioxide during breathing.

CLASSES TO WHICH TLM CAN BE USED:

This can be used for class 5.



BALL AND SOCKET JOINT

- TOPIC : Bones and Joints in Human Body.
- COMPETENCIES : To understand structure and movements of ball and socket joint.
- MATERIALS REQUIRED : A slightly larger rubber ball, a plastic ball, plastic/wooden strap or scale, nut bolt, thermocole cutter.
- PREPARATION OF TLM :

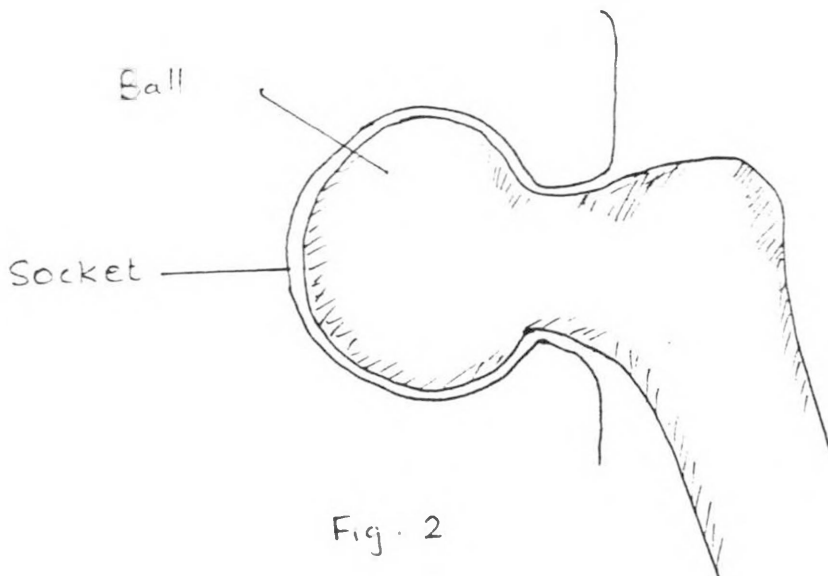
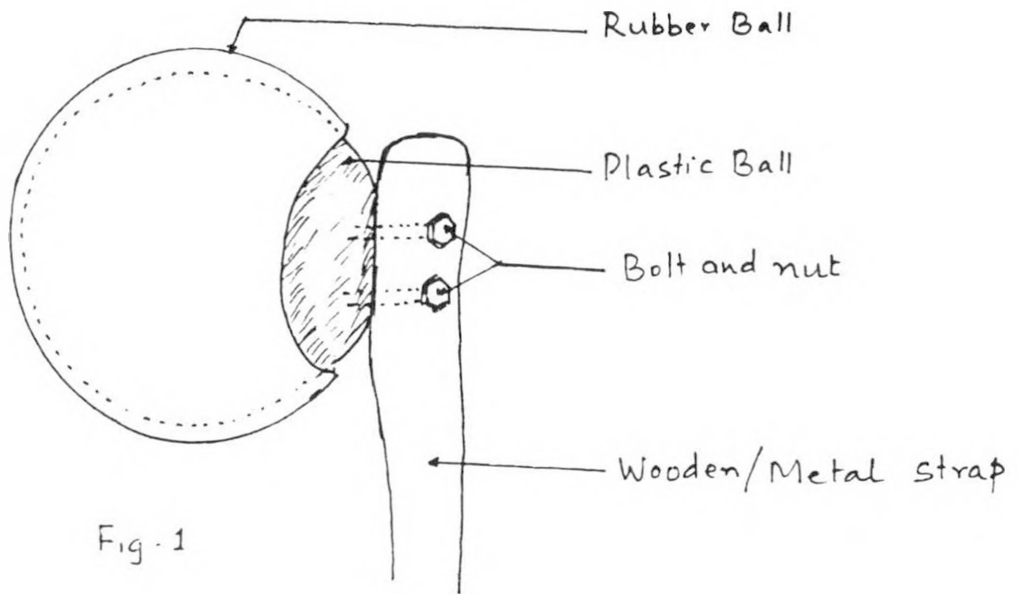
1. Collect a rubber ball and a plastic ball (size of rubber ball should be slightly bigger than the plastic ball).
2. Slice one-fourth portion of the rubber ball.
3. Push the plastic ball into rubber ball through cut portion tightly.
4. Fix a plastic/wooden strap/scale to the plastic ball with nut and bolts as shown in the Figure 1.
5. Draw the diagram of ball and socket joint as shown in Figure 2 on thermocole sheet.
6. Cut the thermocole sheet along the diagram drawn as shown in figure.

SUGGESTED STRATEGIES FOR USING THE TLM

Activity	Learning outcome
1. Present the models (3-D and 2-D)	Recognises parts of joint.
2. Demonstrate the possible movements with 3-D model.	Understands how the bones of joint work. Understands need for joints.
3. Demonstrates the movement of shoulder bones and compares with the model.	Sees relationship between movements in model and shoulder bones. Understands that joints are required for smooth movement of bones, fold of parts of body, etc.

CLASSES TO WHICH TLM CAN BE USED:

This can be used for class 5.



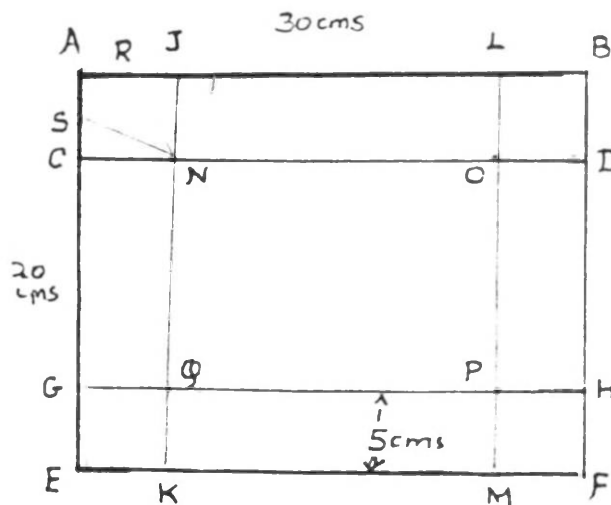
WORK EXPERIENCE

CARDBOARD RECTANGULAR TRAY

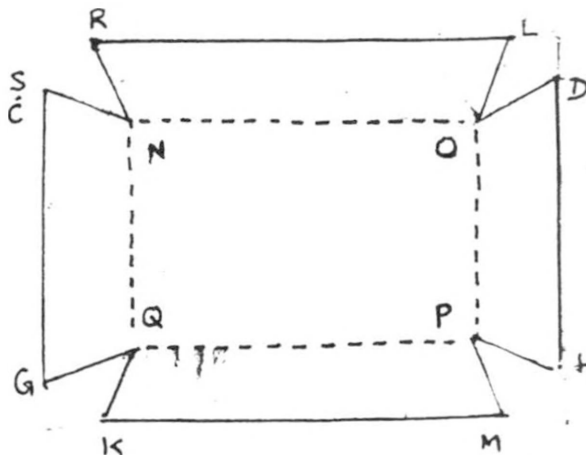
MATERIALS REQUIRED: Cardboard, gum tape, maida paste, printed marble sheet, pencil, scale, a pair of scissors.

PROCEDURE:

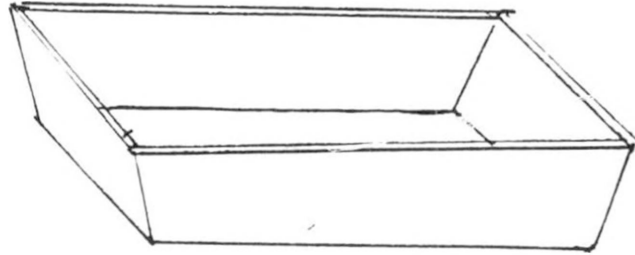
1. Take a rectangular sheet of card-board of size 30x24 cms.
2. Draw CD parallel to AB at a distance of 5 cms. Similarly, draw GH parallel to EF, 5 cm from EF, JK and LM are parallel to AE and BF, respectively, at a distance of 5 cm each.



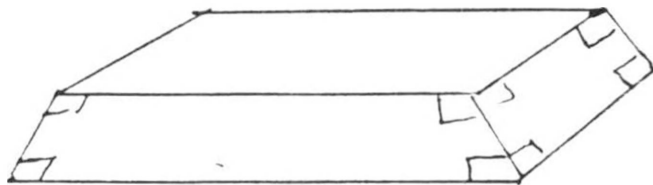
3. Mark R and S as the centres of AJ and AC respectively. Join RN and SN.
4. Remove ARNS with a pair of scissors. Repeat this in the remaining three corners as shown in the figure.



5. Using the edge of a sharp knife, make scratches NO, OP, PQ and QN so that the depth of the scratches is about half of the thickness of the cardboard.



6. Turn the cardboard and gently bend the edges RLON and KQPM along NO, and QP. Now bend the remaining edges so that the corners come close to each other and join them with gum tape from both inside and outside.



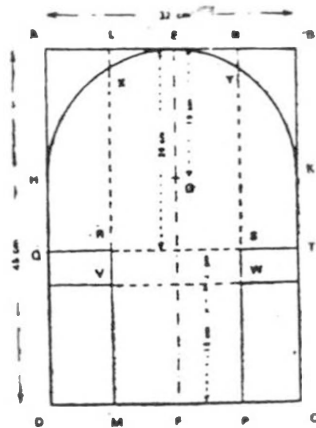
7. Decorate it with marble paper. The tray is ready for regular use. Its strength depends upon the thickness of the cardboard.

LETTER HOLDER

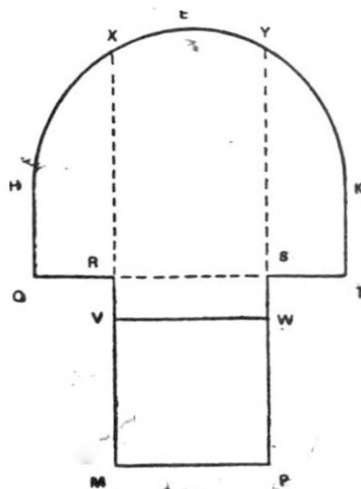
MATERIALS REQUIRED: Card board, scissors, gum tape, colour papers, pencil, scale.

PROCEDURE:

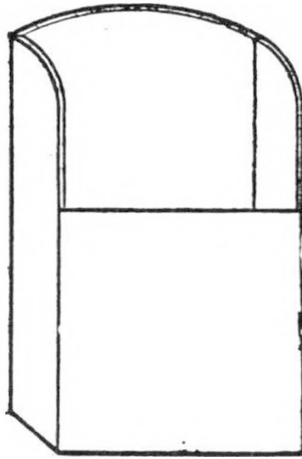
1. Take a rectangular piece of cardboard, ABCD, of size 45x32 cm.
2. Mark E and F so that $AE = EB$ and $DF = FC$. Join EF.



3. Mark G on EF at a distance of 16 cm from E. With G as center, draw an arc HEK.
4. With a pair of scissors remove AHE, KBE, QRMD and TSPC carefully.
5. Use a sharp edge to make scratches, as before, along VW, QT, MX and PY. Turn the sheet and bend RSPM along RS to form a right angle.



6. Now bend VMPW along VW so that it makes a right angle with RVWS.
7. Bend HXRQ along XR and YSTK along YS to close the box. Fix the edges with gum tape and decorate with colour papers.

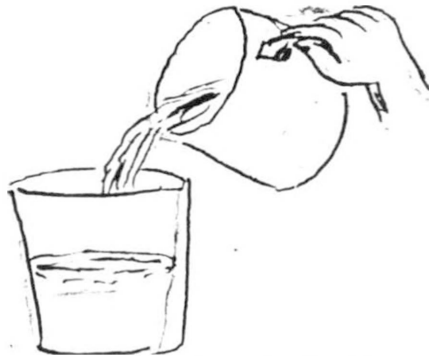


WAX MODEL MAKING

MATERIALS REQUIRED: Plaster of paris, plastic bowl, big size plastic mug, paraffin wax, waxalin colours, aluminium vessel, heater, bucket.

PROCEDURE:

1. Take plaster of paris in a container, prepare a thick mixture in water and pour it in the plastic mug.



2. Take a vegetable or fruit, place it in the centre of the poured mixture and press half portion in it.



3. After 20 minutes mix plaster of paris again as mentioned above and pour the mixture to cover the upper portion of the vegetable or fruit.

4. After 20 minutes plaster of paris mixture will become hard. Separate it from the mug.



5. With the help of a knife separate the two portions carefully. You will find the impression in one half and remove the fruit from the other half. Keep the moulds for three hours when it gets dried.

6. Place an aluminium vessel on the heater. Put some paraffin wax in it along with some waxaline colour powder and melt it. Wax mixture will turn to a liquid form. (Take care to see that the smoke should stop). Pour the liquid wax in one of the half mould and keep the other half mould over it. Hold it firmly and shake it several times for the wax mixture to become hard.



7. Cool it in a large quantity of water taken in a bucket for 10 minutes. Take out the wax model carefully. (If the wax model is sticking to the mould, cool it for some more time).



MARBLE DESIGNS

Materials required: Plate or tray for keeping water, enamel paints (any three colours), kerosene oil, cleaning cloth and white paper.

Procedure: Fill water in a plate or tray. Take some enamel paint at the end of a small stick and spread a few drops on the water surface. Similarly add other enamel colours and spread the paint by blowing.



Hold the paper horizontally to the surface of the water, dip it slowly, hold it for a few seconds till the paper absorbs the paint from water surface.



Take care to see that the paper does not reach the bottom of the plate or tray. Then take it out and keep it for drying. Now you will get marble designs on the paper.



This method of decoration is easy and effective. Clean the plate and hand with kerosene oil immediately.

Marble designs can be done on metal sheets and wood planks. The paint will not be wasted, looks beautiful and will protect the materials from catching rust. Marble designs can be done on greeting cards and presentation wrappers.

CLAY MOULD AND PLASTER OF PARIS MODEL MAKING

Materials required: Cleaned clay (available with potters), plastic or metallic original model, plaster of paris, thread, bowl or vessel, old newspaper, cardboard piece, coconut oil and artist's brush, kerosene and enamel paints.

Procedure: Take an original metallic or plastic model, place it on a cardboard piece. Then take some cleaned clay and press it on the model which is kept on a cardboard piece. Now you will get the impression of the original model.



(Take care to see the original model does not get cracks or damaged at the time of pressing the clay on it.) Carefully separate the original model from clay. You will get an impression of the model. This is called a mould.

Take some plaster of paris in a bowl or vessel, add water, mix it well and pour this in a clay mould and place a piece of twine in the poured plaster of paris (to hang it on the wall).



After ten minutes, the plaster of paris mixture will become hard. Separate it from clay mould. Now you will get plaster of paris model in the shape of original model. Decorate it with paints using brushes.

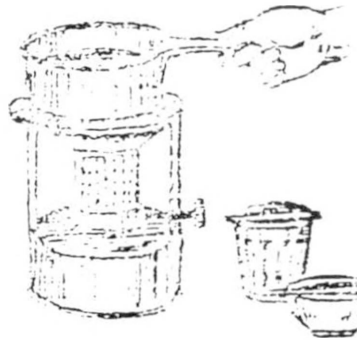


Note: Once you mix water with plaster of paris and when it becomes hard, the mixture cannot be used again. Nature of plaster of paris is like cement. Cement will take 8 hours to get hard and plaster of paris will take ten minutes (very quickly) so that the mixing work should be done quickly. Plaster of paris is available at hardware shops and medical shops.

CANDLE MAKING

Materials required: Paraffin wax, waxaline powder colours, kerosene stove, vessel or bowl, steel cups, thick cotton thread and bucket of water.

Procedure: Take a vessel or bowl with some paraffin wax in it. Keep it on the heater for melting. Add the desired waxalin colour powder. After melting, keep it down for cooling for a few minutes (the smoke should stop).



Take a thick cotton thread and tie one end to the centre of a small stick. Place that in a cup such that the other end of the thread should reach the bottom of the cup. Keep 4/6 cups ready to make the candles. Pour the melted paraffin wax liquid in the cups without disturbing the thread position.



Keep them for 20 minutes for cooling. Then the paraffin will come out from the cups in a hard form having the shape of a cup.

To prepare candles easily you can use paper cups and ice cream cups as mould. Candles of any colour and shape can be made by this way.

Sometimes paraffin wax will not come out from the cups. To avoid this, melted wax free from smoke should be used. That means you should not pour boiling wax mixture in the cup. Do not try to separate the hard wax from the cup before cooling properly. It will damage the cup and the candle.



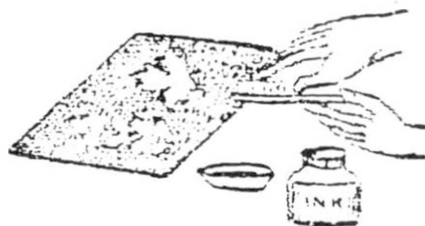
SPRAY PRINTS

Materials required: Plant leaves of different shapes, piece of stick, old tooth brush, ink of different colours and paper.

Procedure: Select plant leaves with good shape or some magazine pictures and place them on a sheet of white paper as shown in the figure.



Take an old tooth brush, dip it in the ink and rub it with small stick or finger. You will find the spray on the setting. Pull the finger on the brush towards you, take two more colours and spray on the setting. After a few minutes, take out all plant leaves or paper cuttings.



Now, you will find the shadow portion of the leaves looking nice and the remaining portion with coloured spots. You can also cut some letter, place it on paper and spray on it. You will get letter prints. Using this technique you can make some banners and posters.



THERMOCOLE CUTTER

Thermocole is a basic raw material used for preparing teaching aids of wide varieties. It is bright in colour, light in weight and can be cut in different shapes.

However, cutting the thermocole with a sharp knife or blade is possible only when it is cut along straight line. To cut the thermocole piece into curved shapes like elliptical, cylindrical, it is a difficult exercise.

To enable smooth and accurate cutting, a thermocole cutter can be used. This cutter works on the heating effect of electricity. The hot wire melts the thermocole along the line of cutting and thus enables cutting of intricate designs.

Thermocole cutter can be assembled by using the following materials.

- | | |
|--|--------------|
| 1. Transformer 210/16V 2 Amps | - 1 No. |
| 2. Nichrome wire 28-30 G | - 50 cm |
| 3. Base board (wooden 2'x2') | - 1 No. |
| 4. Bracket - Flat inn pieces of 12" and 9" | - 1 No. each |
| 5. PVC wires | - 50 cm |
| 6. Plug top (2 pin) | - 1 No. |

Assembling the cutter

1. The metal bracket is fitted on the base board at 90° to the surface.

2. The transformer is fitted at one corner of the base board.

3. The nichrome wire is fixed to the bracket end with screws. The other end is fixed at the bottom of the base board keeping the nichrome wire straight.

4. The primary terminals of the transformer is connected to a 2 pin plug using PVC wire.

5. The secondary terminals are connected to the two ends of the nichrome wire as shown in the figure.

Working with the Cutter

1. Connect the plug to mains and switch on the power supply.

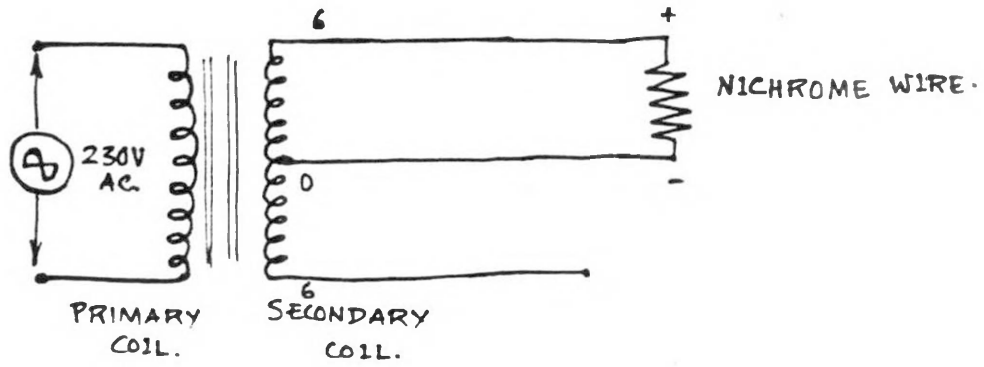
2. The nichrome wire gets heated and is ready for cutting.

3. Keep the thermocole piece on the base board and move it across the nichrome wire. The hot wire slices the thermocole along the line.

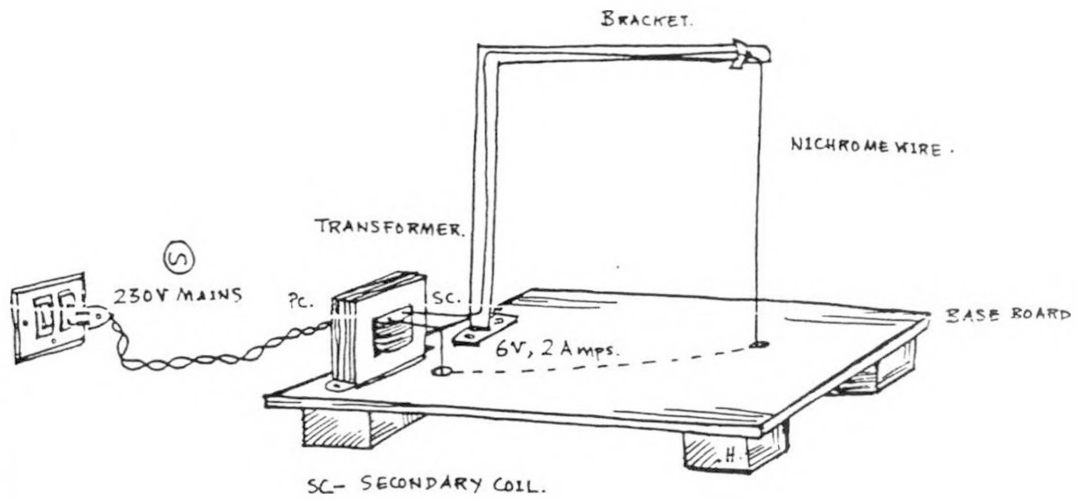
Precautions

1. Insulate the joints with insulation tape leaving no open ends.

2. If the wire becomes red hot use a longer piece of nichrome wire.



THERMOCOILE CUTTER
(a) Circuit diagram.



THERMOCOILE CUTTER
(b) figure

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