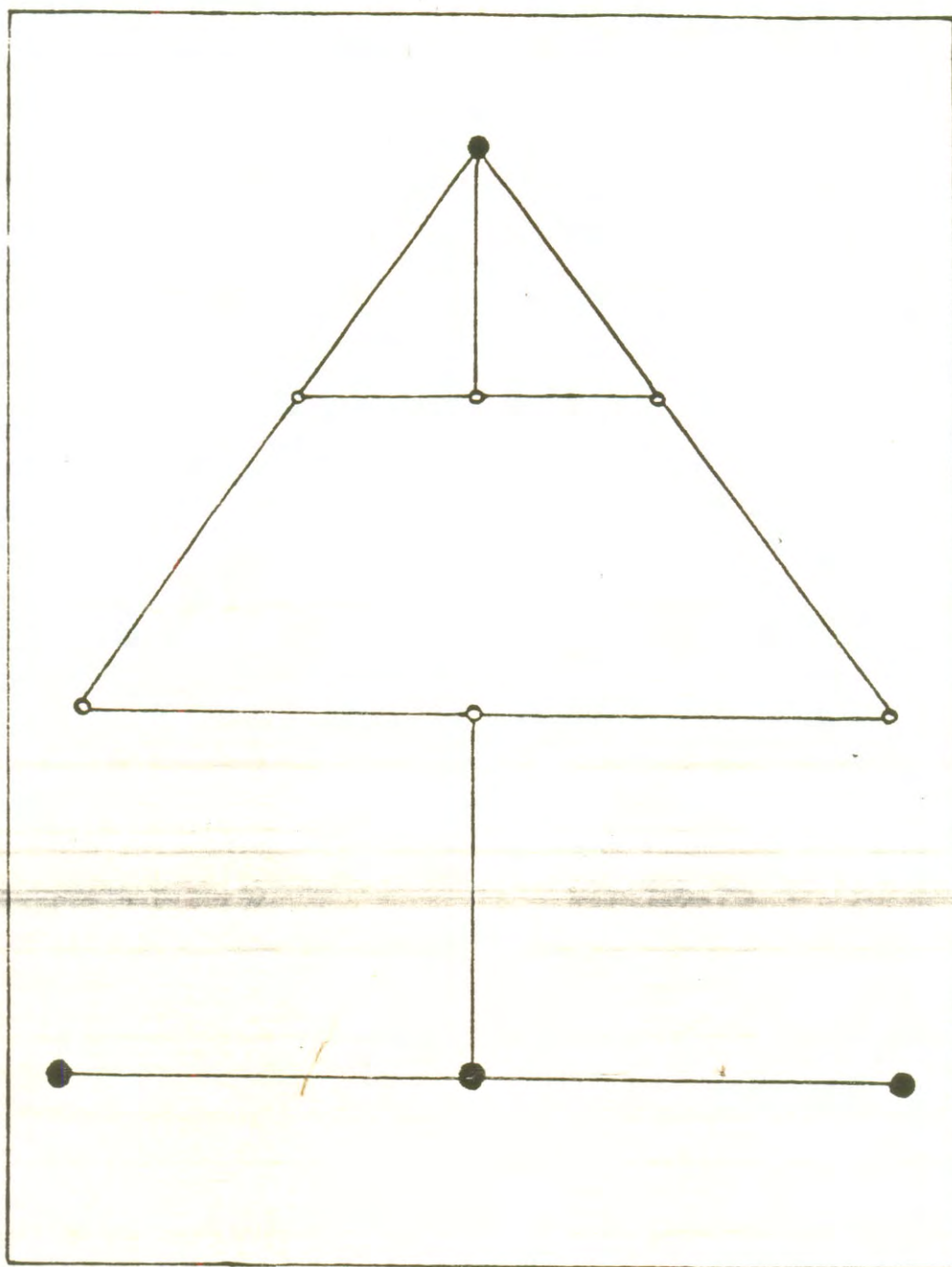




NATIONAL
COUNCIL OF
SCIENCE
MUSEUMS



CHECKMATE GAME



It is a game for two persons. One has to play with goats (yellow beads) and other with tiger (pink beads).

Arrange the beads on the board as per above.

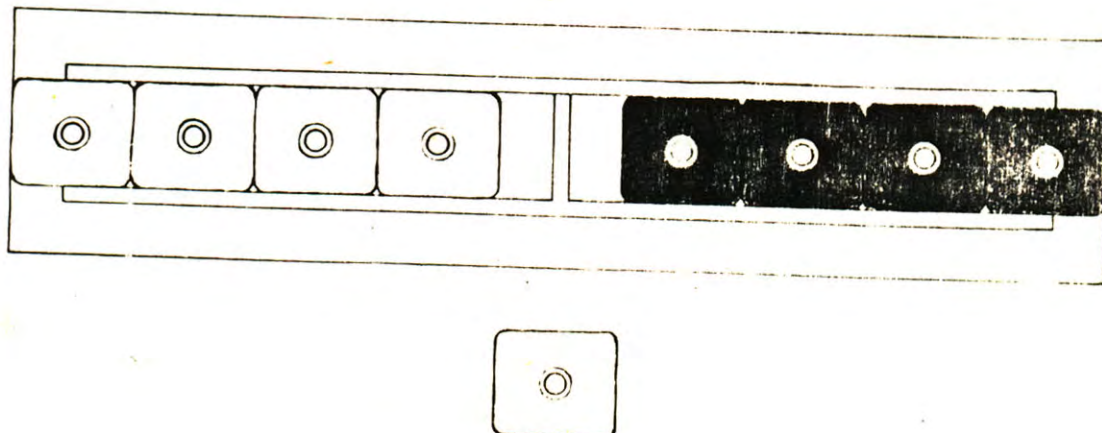
Rules: Goat can move only one step in either direction.
The tiger can move only one step in either direction normally.
But can jump to third position. Position is free. In that case the goat at the 2nd position will be eliminated from the game.

PTO

If the tiger eliminates all the goats or only one goat is left, the player playing with tiger wins the game or if the goats trap the tiger i.e. the tiger has no place to move, the player playing with goats wins.

Match is drawn, if none wins within 15 minutes.

SWAP THE COLOURS



It is an interesting puzzle to play with.

On the board you have four red squares on one side and four green on the other.

HOW TO PLAY?

Arrange the squares as per the sketch on the reverse. Now swap the red squares with green ones following the rules given below:

1. Each square can normally move only one step in one direction.
2. Any square can jump forward to third place, if there is a vacant position.
3. It is not necessary that red and green squares should move alternately.

NOTE

Complete swapping should be completed in minimum number of 24 moves.

To find out the minimum number of moves required to complete the swapping, the mathematical formula $n(n+2)$ can be applied; where 'n' is the number of squares on either side.

PERFORMANCE SCALE

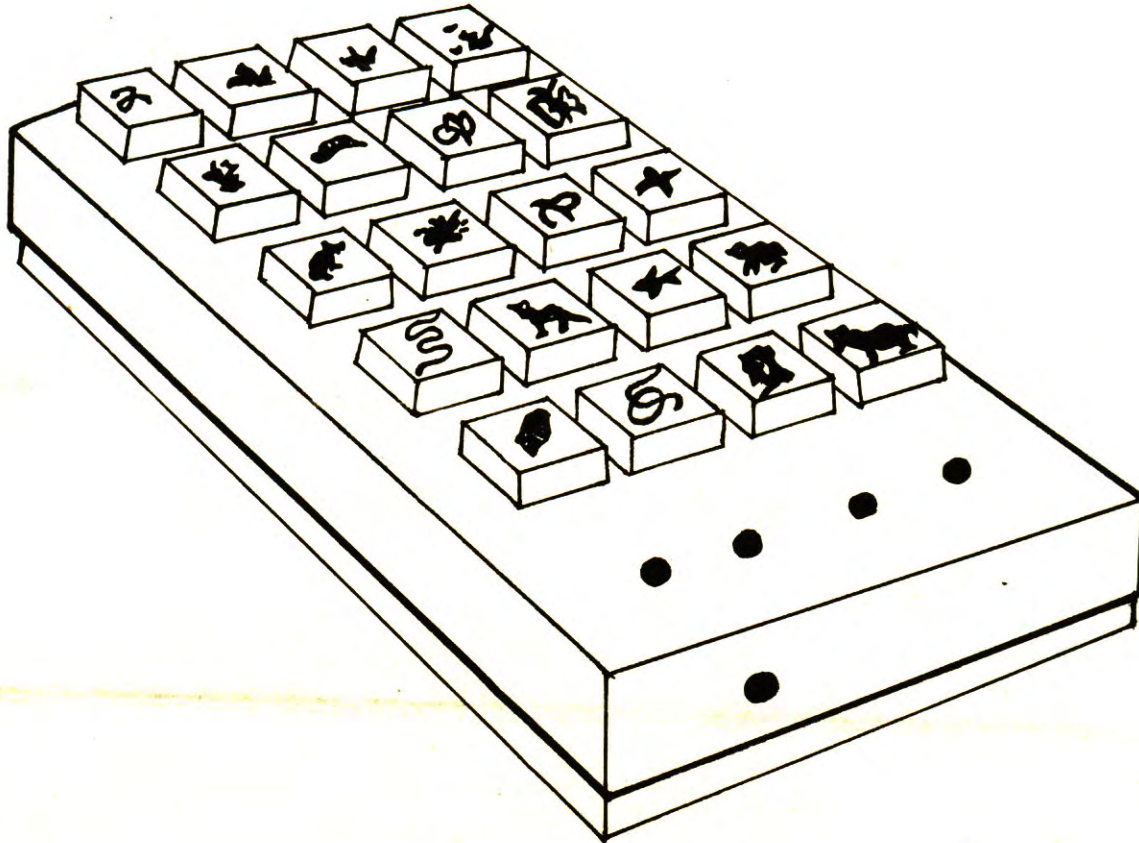
Number of moves to complete
the exercise with 4 squares
on both sides.

Standard

24	Excellent
28	Very good
30	Good
32	Fair
36 or above	Poor, try again.

If it is too difficult to complete the swapping with 4 squares on either side, try with 2 or 3 squares.

FOOD CHAIN GAME



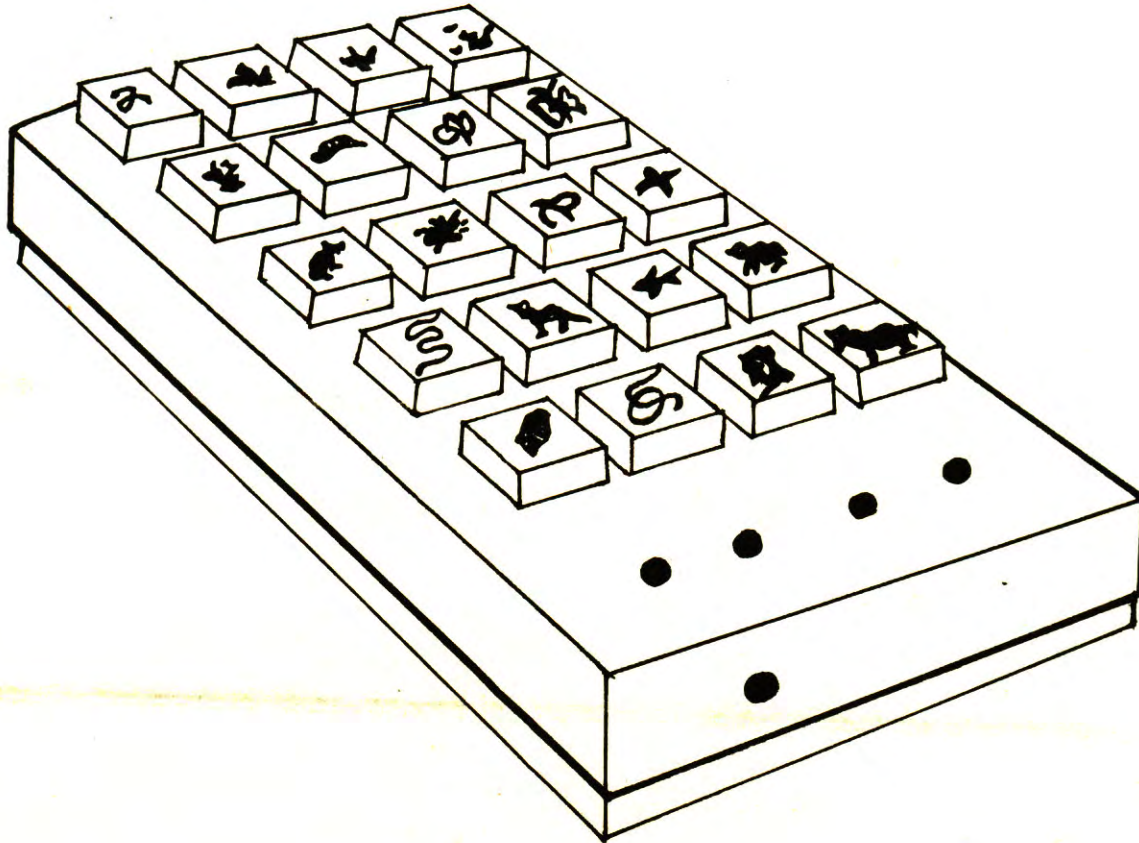
All living organisms in nature are inter-dependent for their survival. Like a cat eats bird, bird eats insects and insects eat green leaves. This cycle is known as food chain.

There are various food chains for different groups of organisms. On the board, 4 columns are provided representing different food chains, identified by different colours.

Fit in the blocks in the gaps in the order you feel the food chain exists from top to bottom. If the corresponding light glows the arrangement of food chain is correct. Otherwise, try again.

Similarly arrange other food chains on the board.

FOOD CHAIN GAME



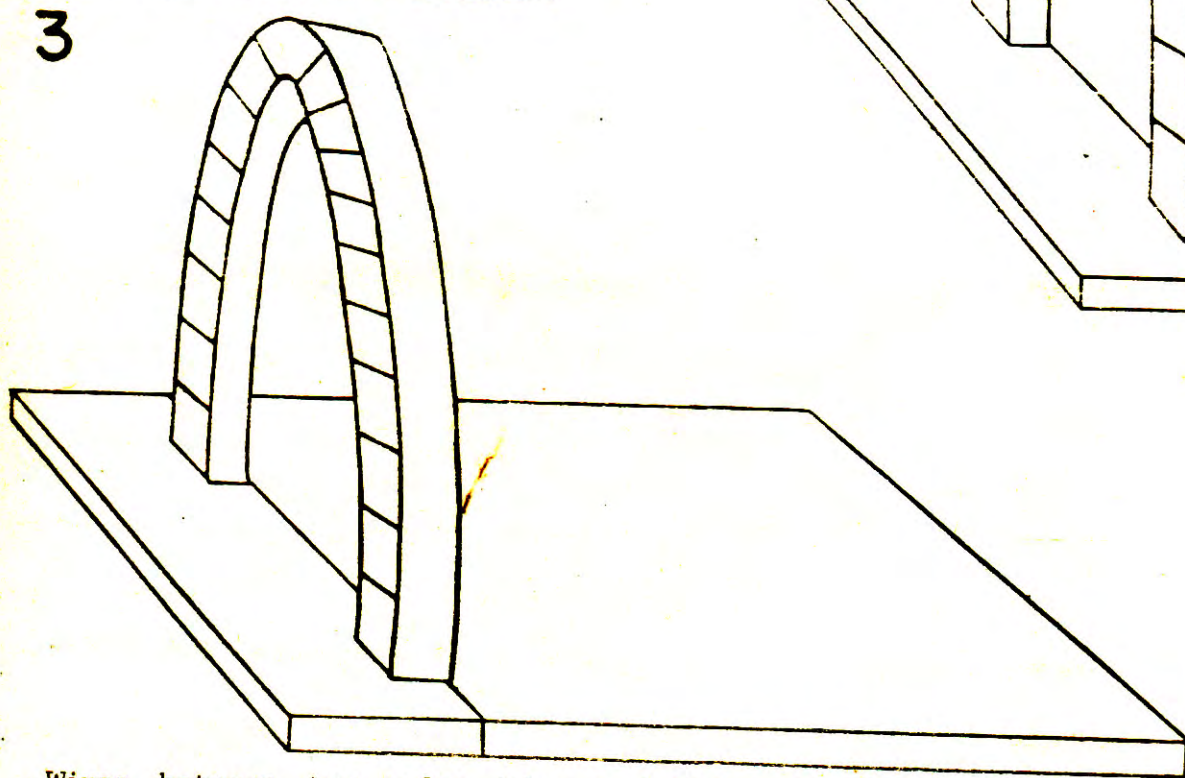
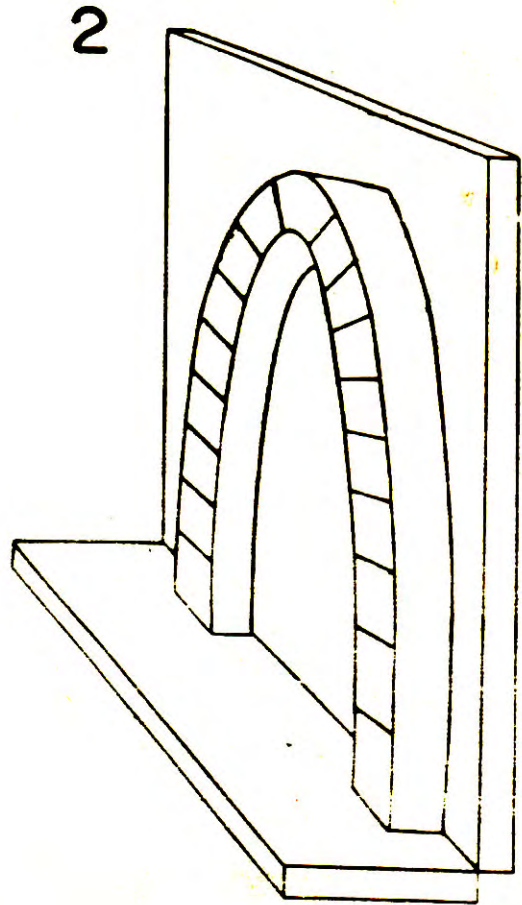
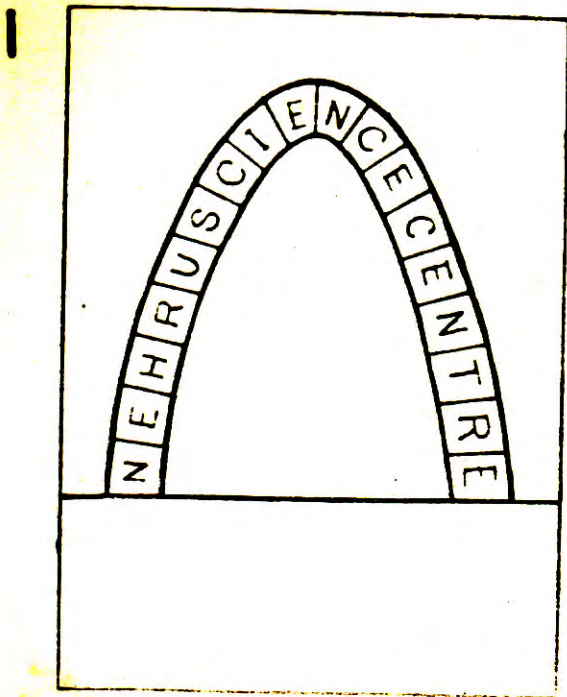
All living organisms in nature are inter-dependent for their survival. Like a cat eats bird, bird eats insects and insects eat green leaves. This cycle is known as food chain.

There are various food chains for different groups of organisms. On the board, 4 columns are provided representing different food chains, identified by different colours.

Fit in the blocks in the gaps in the order you feel the food chain exists from top to bottom. If the corresponding light glows the arrangement of food chain is correct. Otherwise, try again.

Similarly arrange other food chains on the board.

CATENARY KIT



Wires between two poles take a definite shape. Similarly some bridges are also constructed of the same shape. But why? This was a great invention which led to various construction designs and solved the problems of architecture.

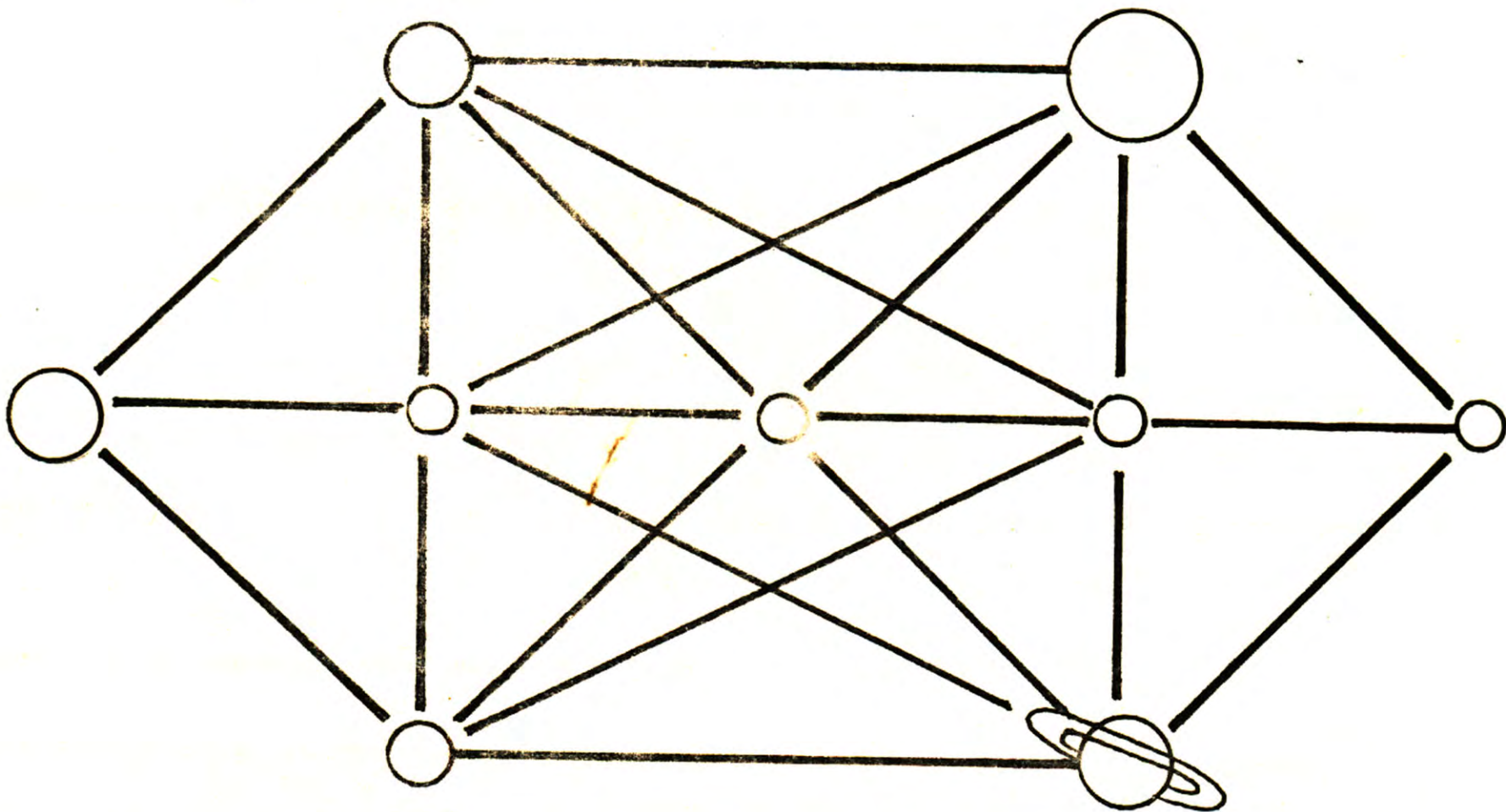
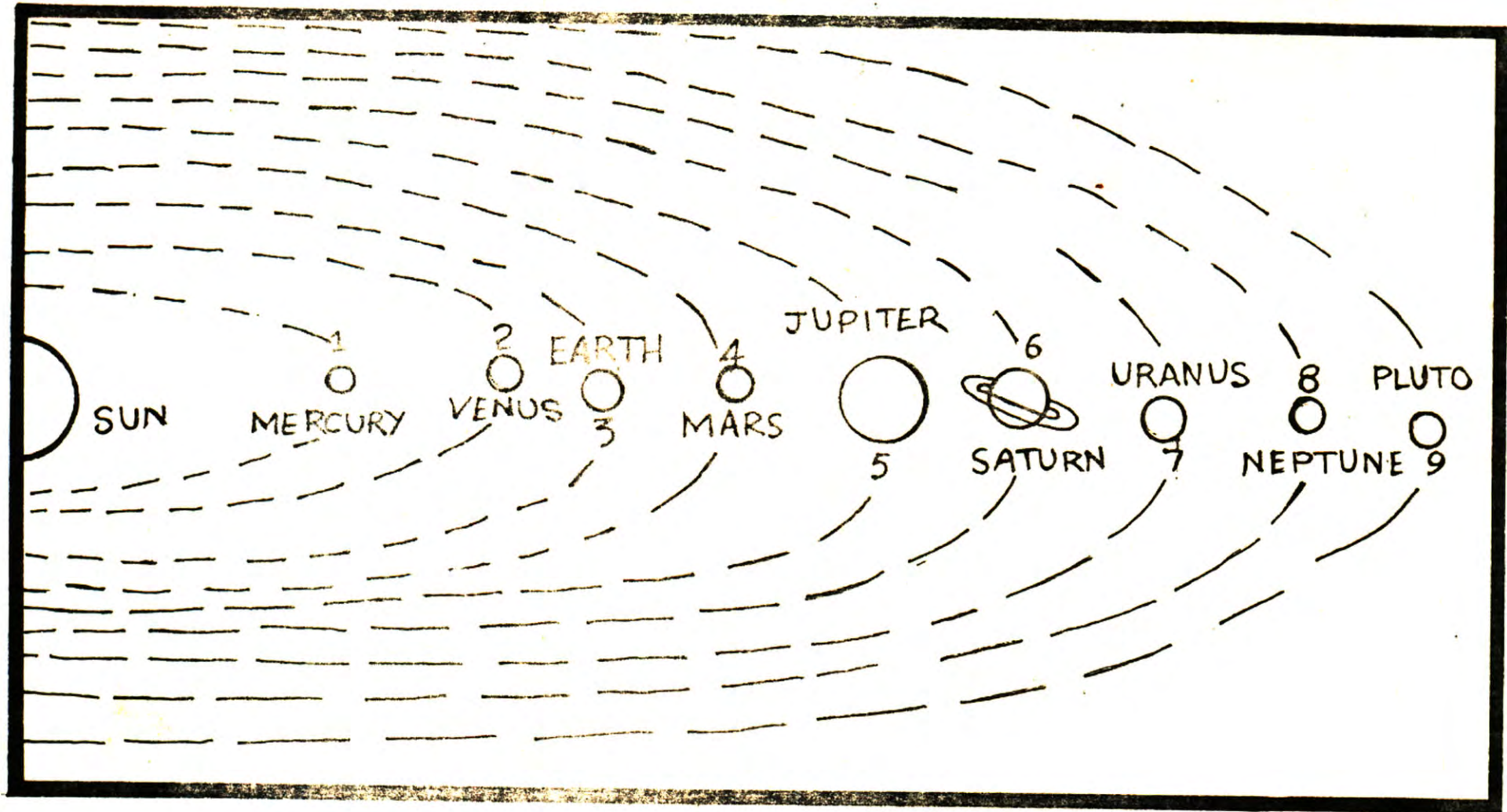
This particular shape formed by hanging wire between two poles is known as common catenary. The special property of this curve is that the total load gets disturbed along the curve.

PTO

HOW TO START?

Place the wooden pieces on the bigger half of the board to read NEHRU SCIENCE CENTRE, as shown in the fig.1. Now lift the smaller half to make a right angle and make the last and first block touch the vertical arm. Slowly lift the bigger arm and lower the smaller arm to get the position 2 as shown on the reverse. Now slowly detach the bigger arm to get the position 3. The structure, in the form of an arch, stands on its own.

PLANETARY LOGIC



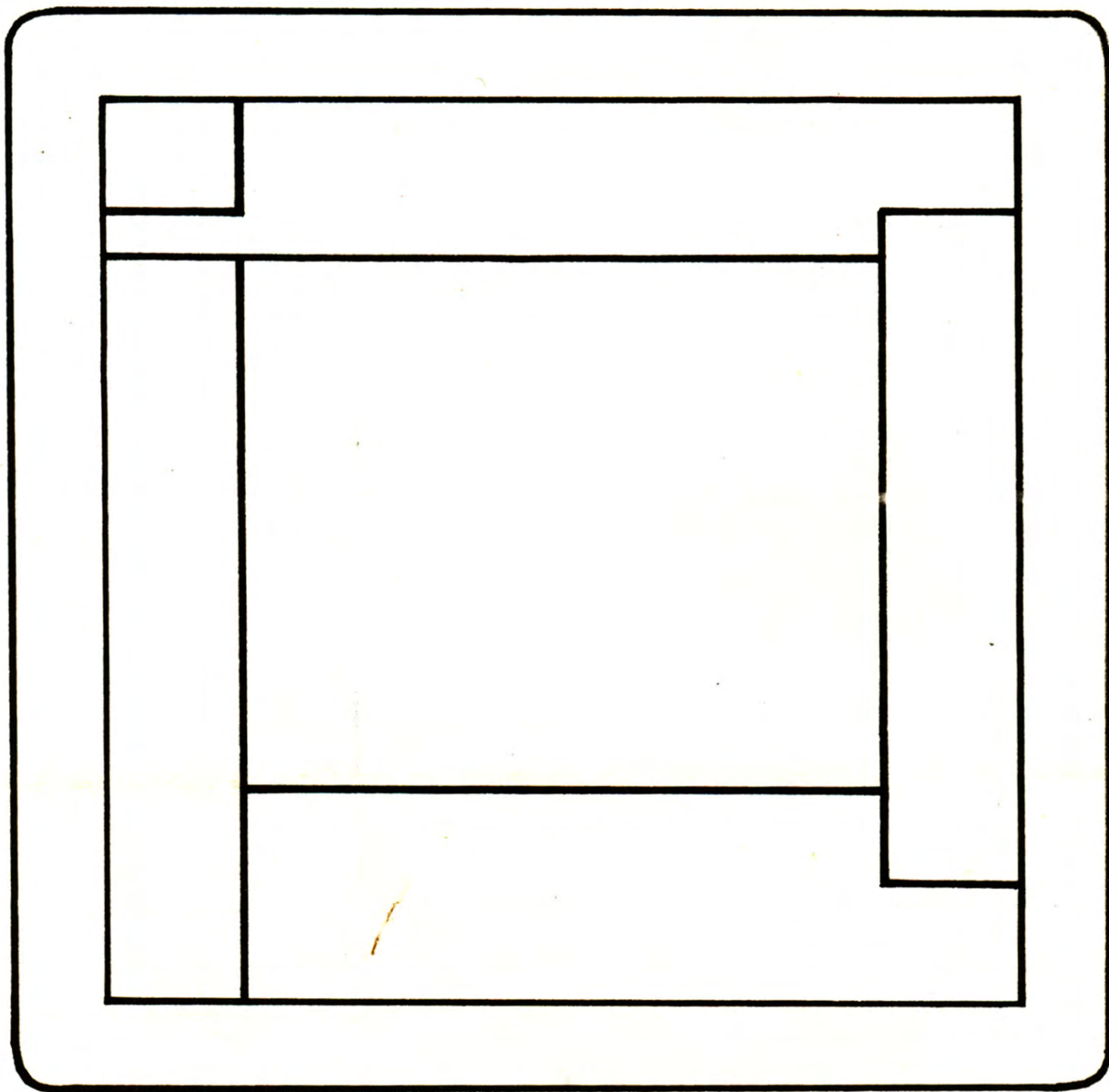
Solar system has 9 planets revolving around sun. Each planet is at a certain distance from the sun in a definite numbered orbit.

On the board, place the 9 planets in such a way that nowhere neighbouring planets meet by lines.

CLUE: Mercury is the nearest planet to the sun and Pluto is the farthest. Therefore both have only one neighbour.

Maximum time allowed to complete the right configuration is 30 minutes.

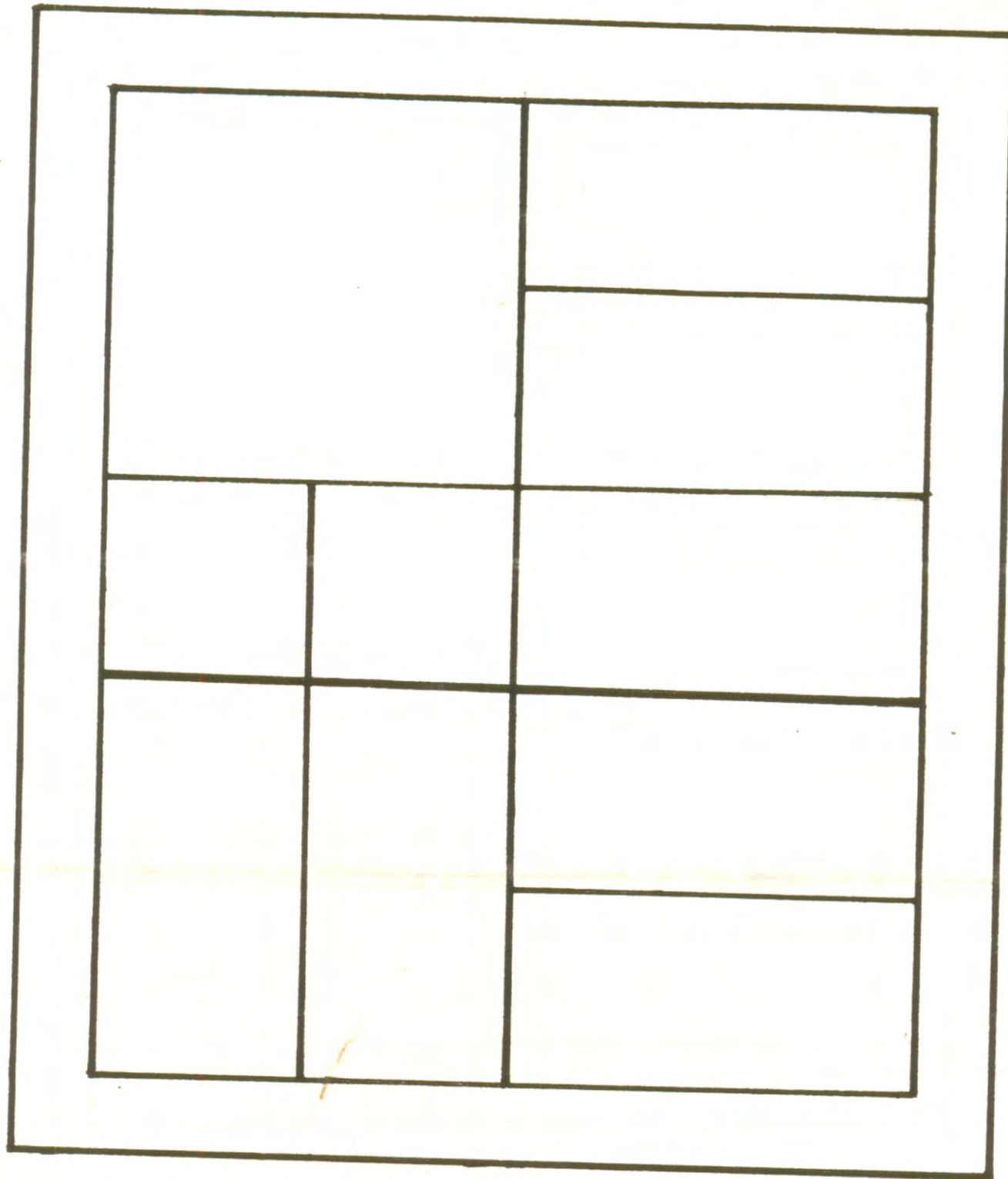
SIX COLOUR SQUARE



This is a passtime of logic. A square has to be constructed out of the given rectangular pieces of different colours.

NOTE: While making the squares, no two same colour strips should join each other.

PUZZLE - 31



This is a game of logic and patience. A test piece is to be rescued through the opening window just by sliding pieces on the way.

It is possible to solve the puzzle but the minimum number of moves to complete the exercise is a credit.

HOW TO PLAY?

Arrange all the pieces as per the figure . Now slide the pieces to make room for the test piece to come out.

PTO

NOTE

In no case, any piece should be lifted.

PERFORMANCE

No. of moves

Standard

31 and less

Excellent

32 to 40

Very Good

41 to 45

Good

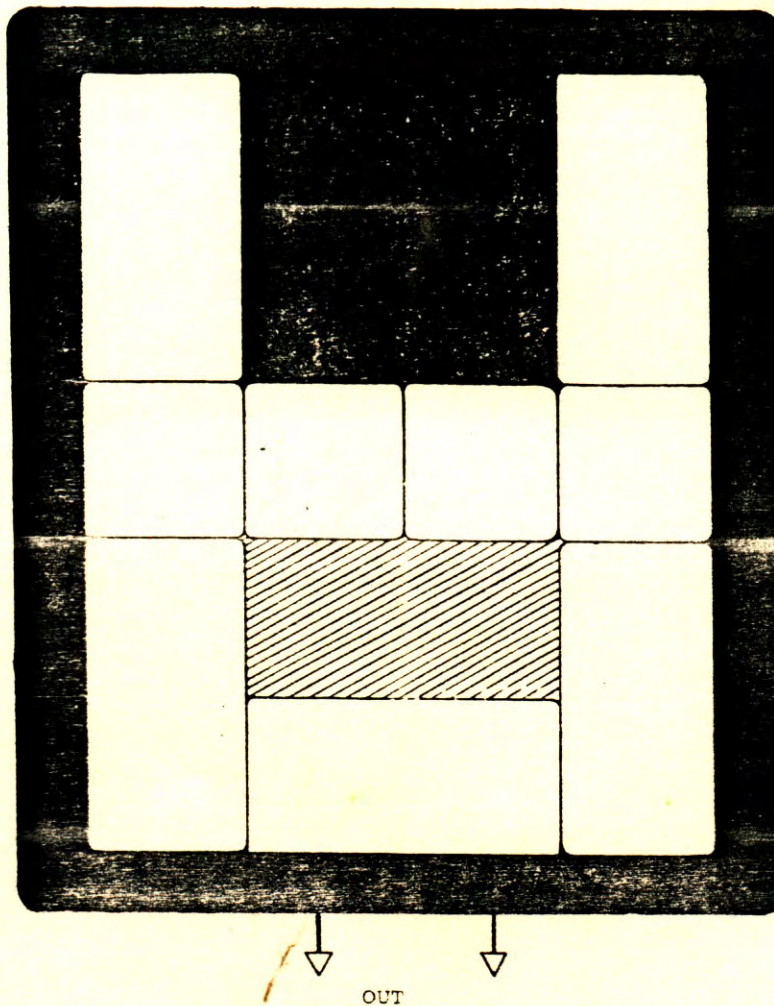
46 to 50

Fair

51 and above

Poor, try again.

RESCUE MOVE 59



This is a game of logic and patience. The test piece has to be rescued through the opening window just by sliding the pieces and making the passage for the test piece.

It is not impossible to achieve but minimum number of moves to complete the exercise is the credit.

HOW TO START?

Arrange all the pieces as per the sketch

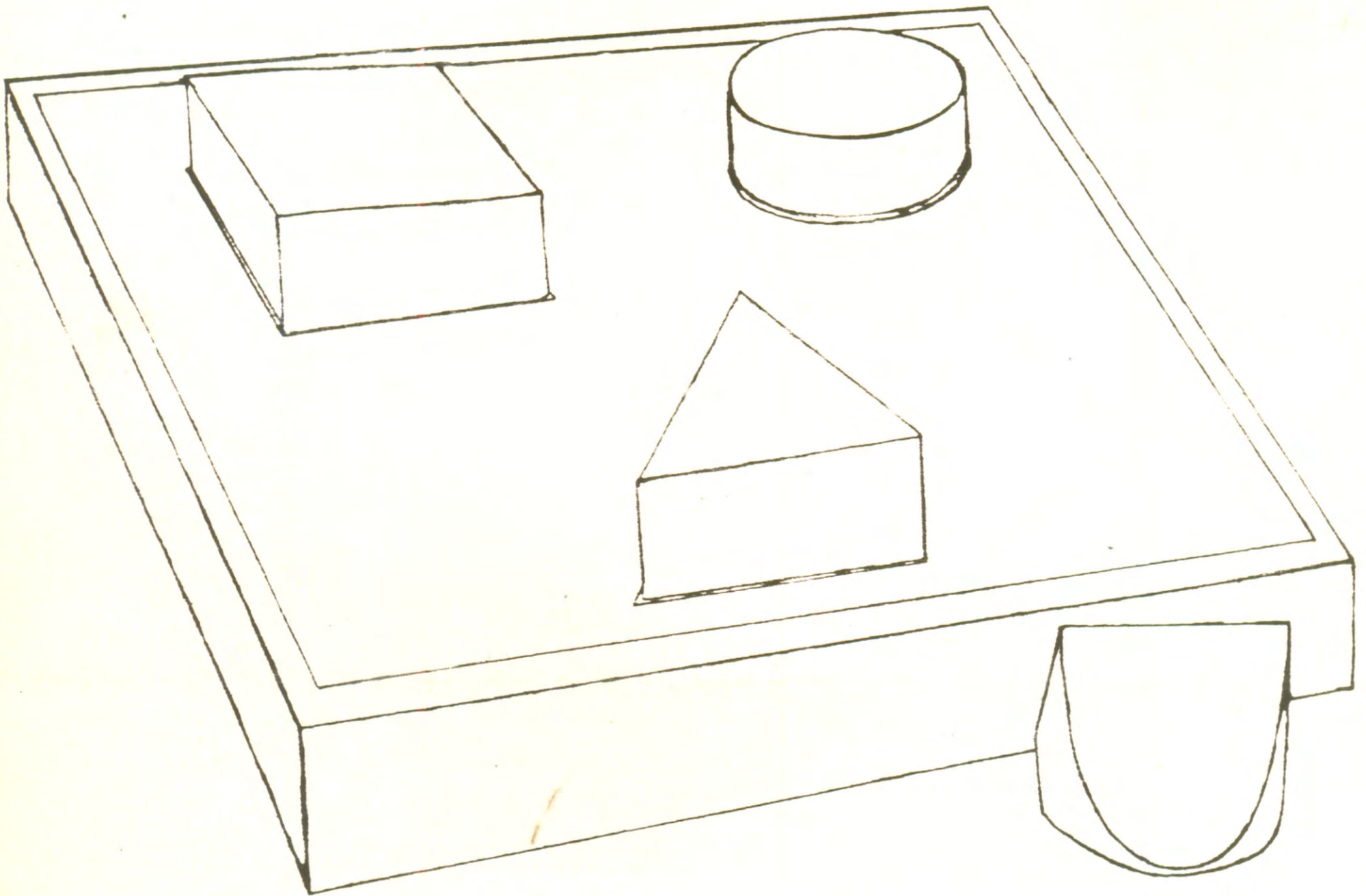
Slide the pieces to make room for the test piece and rescue it through the exit shown as 'out',

NOTE:

In no case any piece shall be lifted to change the position.

- 1) Minimum time required to
complete the exercise .. 15 minutes
- 2) Minimum number of moves .. 59

FITWELL BLOCKS



It is an interesting passtime and puzzle of imagination. Out of the four blocks, identify and test the blocks which can fit in all the holes provided on the board.

Also find out which block can fit in two holes and one hole only.

PRIME NUMBER KIT

	2	3		5		7			
11		13				17		19	
		23						29	
31						37			
41		43				47			
		53						59	
61						67			
71		73						79	
		83						89	
						97			
1 2 3 4									

Numbers which are indivisible by another number than the number itself are called prime numbers. For example, 13, 17, 19 etc.

This kit is to find out the prime numbers between 0 and 100

HOW TO START?

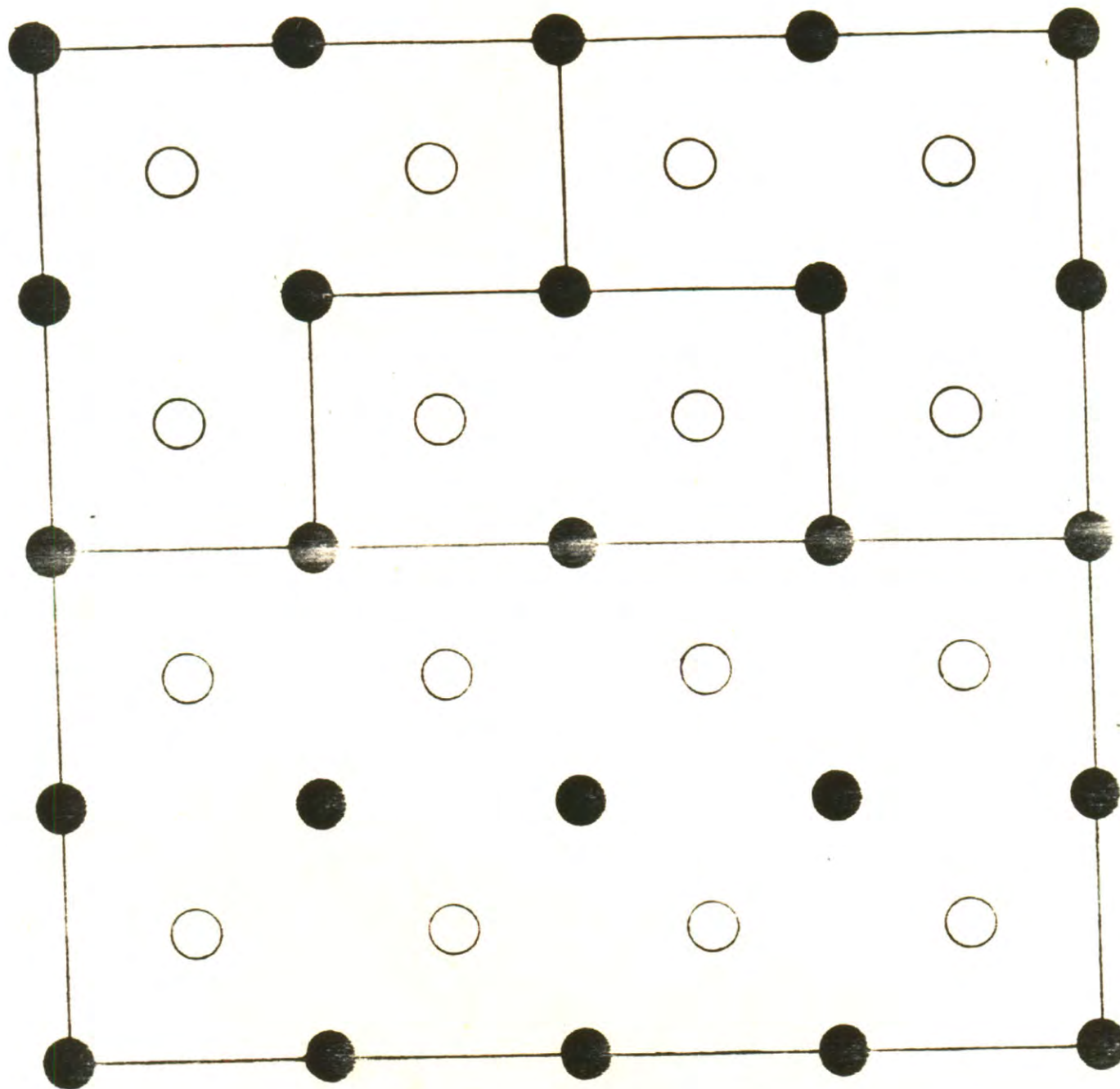
1. Put the plate number 1 on the board and see that all even numbers multiples of 2 & 4 except 2 itself, are eliminated.
2. Put the plate number 2 on the board and see that all multiples of 3 except 3 itself, are eliminated from the remaining numbers in the board.

3. Put the plate number 3 on the board and see that the multiples of 5 except 5 itself, are eliminated.
4. Put the plate number 4 on the board and see that the multiples of 7 except 7 itself, are eliminated.

The remaining numbers visible on the board are the prime numbers between 0 and 100.

There are 25 prime numbers from 0 to 100 which can be verified on this board.

STICK-O-PATTERN



It is a logic game with elements of imagination and full of puzzle .

HOW TO PLAY

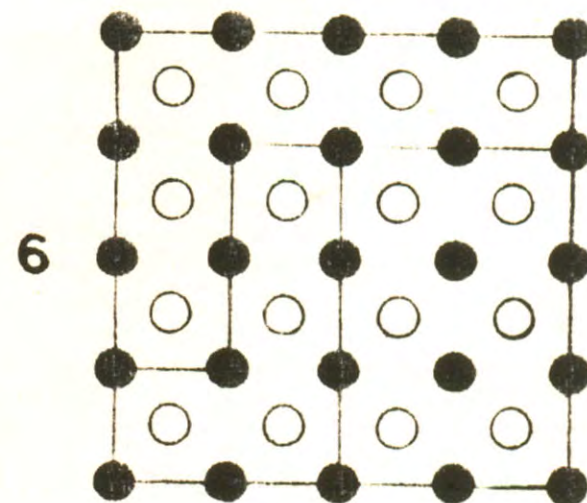
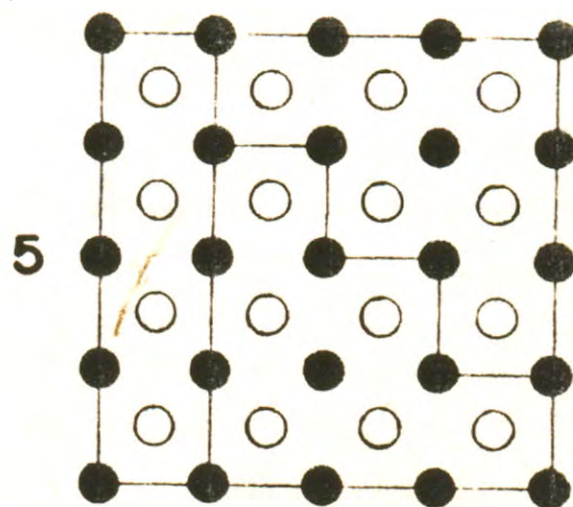
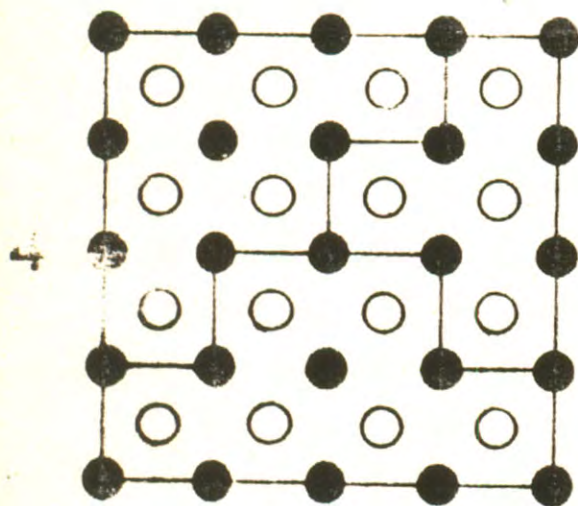
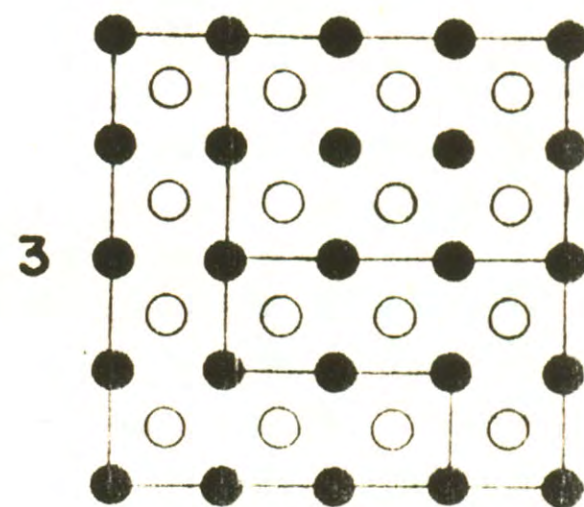
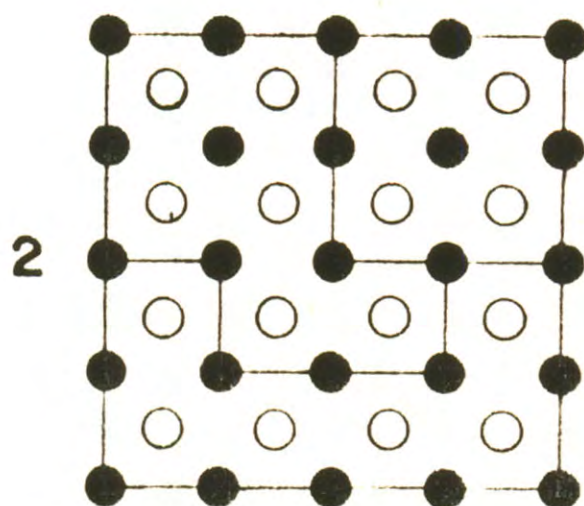
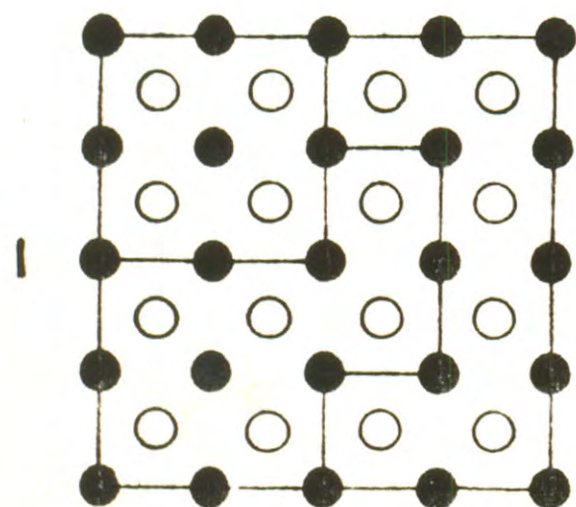
Arrange the strips as per the drawing with distribution of button as 8, 3, 3 and 2.

EXERCISE

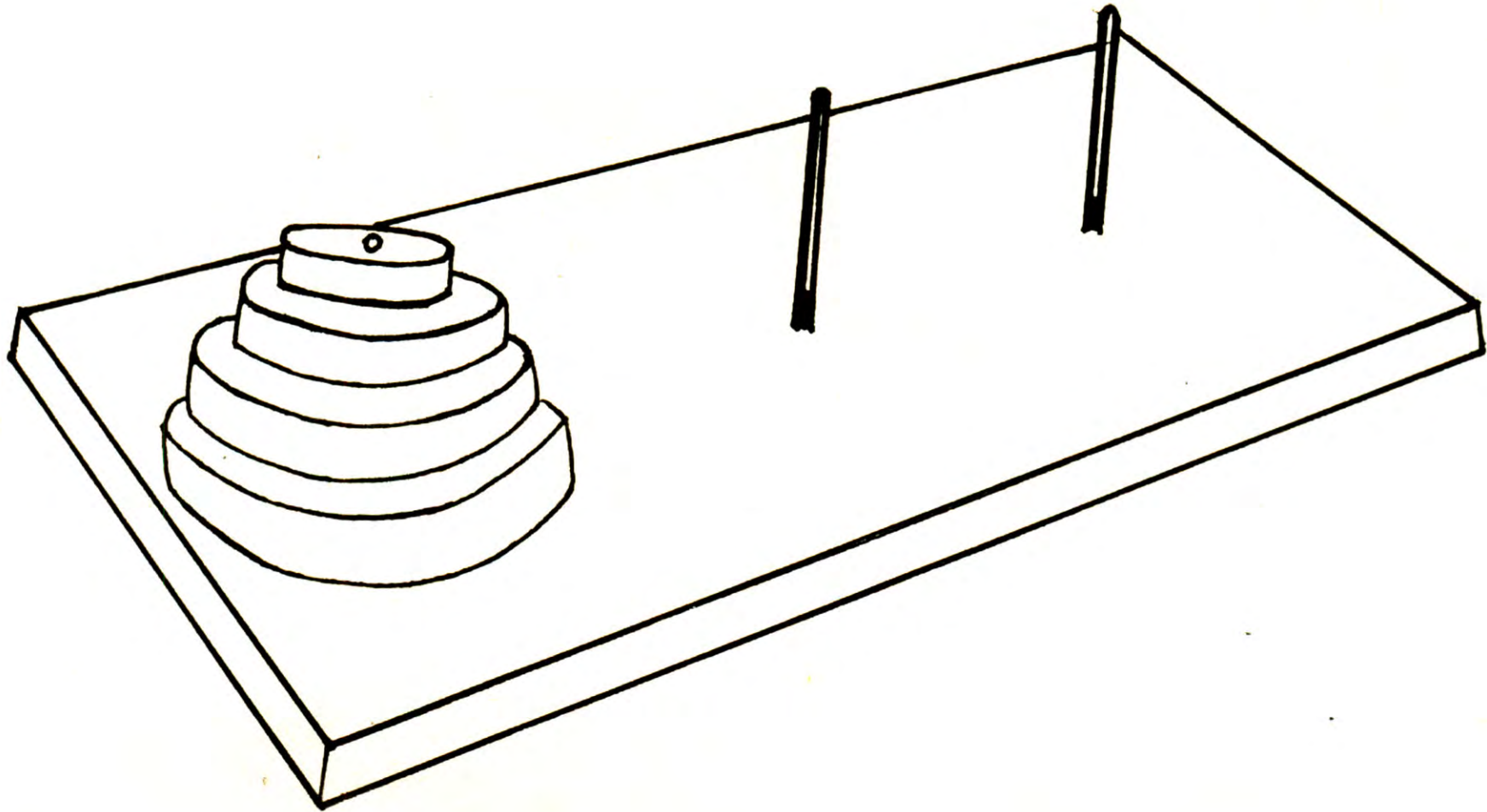
1. Shift any two strips to get a distribution of 6, 6 & 4 without disturbing the boundary.

2. In the original pattern again, shift any three strips to get 6, 6, 4 distribution again. Repeat the exercise by shifting 4,5,6,7 strips to get the distribution 6,6,4 from the original distribution.

In case of difficulty, consult the sketches.



BRAHMA'S TOWER



It is an interesting puzzle. It is said that Narada also took time in solving this. Minimum number of operations to transfer all the discs from one pile to other is important. If you can do the whole operation in $2^n - 1$ moves (where n is the number of discs in the pile) it is the best solution.

To begin, put the discs on the pile in the order of decreasing diameters. Now start transferring the discs to other place, keeping in mind that in no case a bigger disc will rest on the top of a smaller disc.

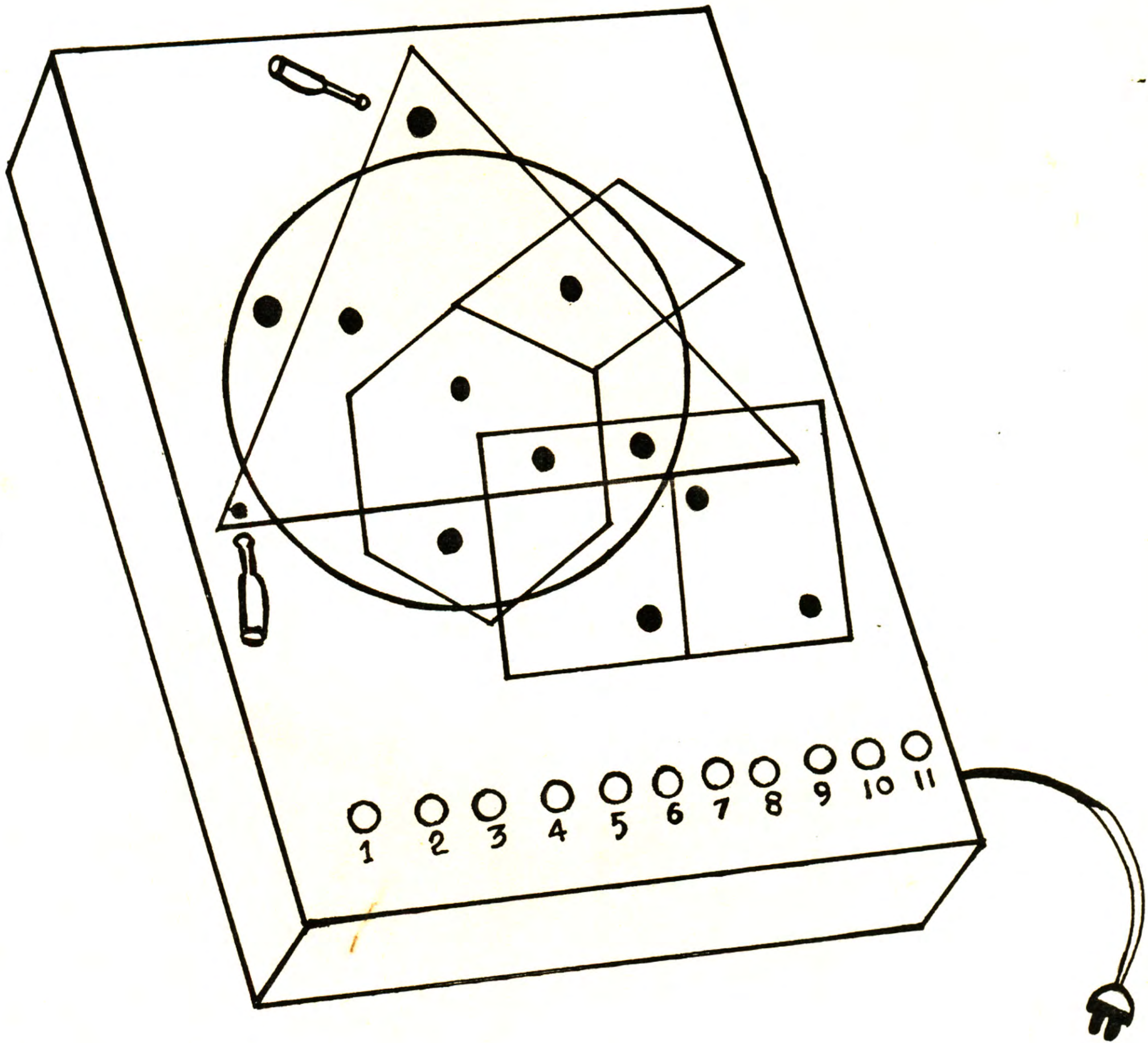
PTO

If you can solve the puzzle with three discs, try with four or five.

PERFORMANCE CHART FOR 5 DISCS

<u>No. of moves</u>	<u>Standard</u>
31	Excellent
36	Very Good
40	Good
44	Fair
48	Poor, try again

SET ELEMENT KIT



A collection of elements is called a set. When two sets are together, the set of common elements is called intersection and the set of all elements in both the sets is called union.

In this game, elements of intersections of various sets (triangle, rectangle, circle, hexagon, square, parallelogram) are to be identified.

HOW TO PLAY?

1. Read the instructions from I-II below and plug in the jack in serial order.
2. Watch the corresponding light. If the light glows, identification is correct.

NOTE: You may be required to plug in one or more than one jack to get correct identification.

INSTRUCTIONS:

1. Identify the points:

1. Only in triangle
2. Only in circle
3. Only in rectangle
4. Common in square and rectangle
5. Common in triangle and circle
6. Common in triangle, rectangle and circle
7. Common in circle and rectangle
8. Common in hexagon and circle
9. Common in circle, triangle and hexagon
10. Common in circle, triangle, rectangle and hexagon
11. Common in circle, triangle and parallelogram.

PERFORMANCE

No. of correct
identifications

Standard

11

Excellent

8-10

Very good

5-7

Good

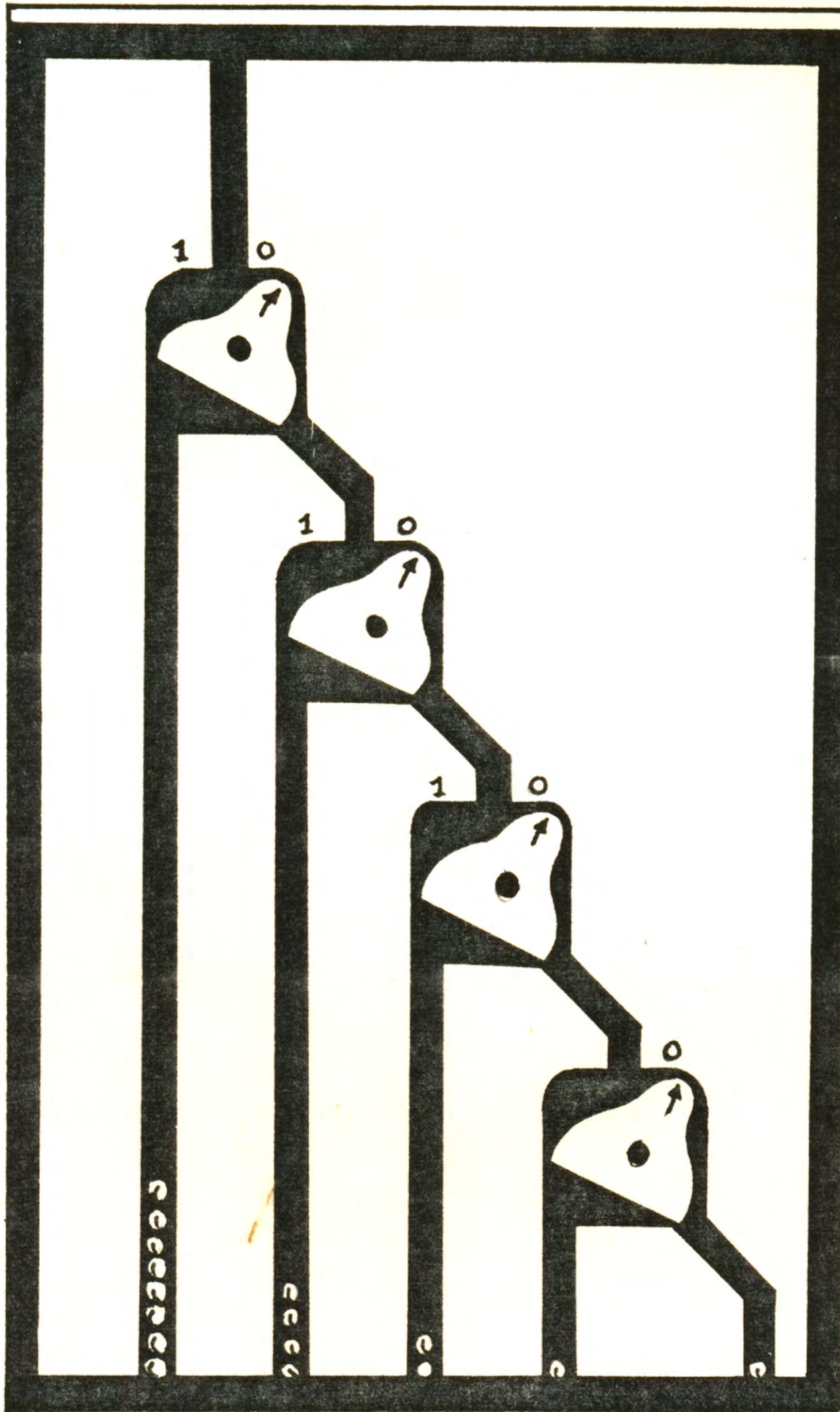
2-4

Fair

Below 2

Poor, try again

PIN BALL MACHINE
(Binary-Decimal Game)



In decimal system, any number can be represented with the help of numbers from 0 to 9, whereas in binary system any number can be represented with the help of 0 and 1 only.

This kit gives the binary equivalent of numbers from 0 to 16.

HOW TO FIND THE BINARY EQUIVALENT

Set the gates in 0 position. Now drop a ball and note the position of the gates from bottom to top. This gives the binary equivalent of number 1.

Drop another ball and note the position of the gates. This gives the binary conversion of number 2.

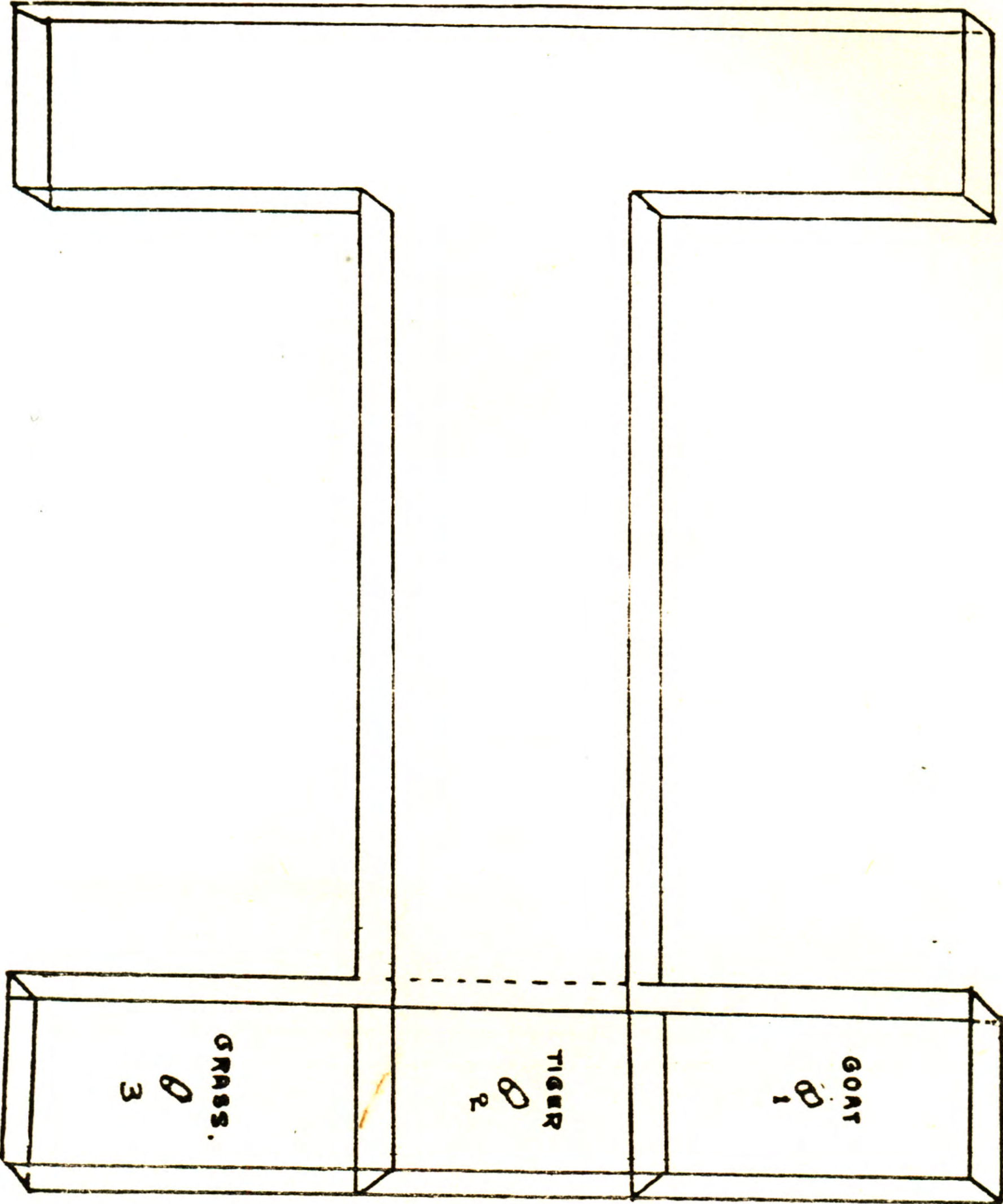
Similarly, the binary conversion of other numbers viz. 3 to 16, can also be obtained by dropping the balls in sequence.

EXAMPLE

Binary code of number 2 is 0010. Therefore, the gate positions from bottom to top will be 0, 0, 1, 0 for the second ball.

This kit can also be utilised for finding the probability of number of balls falling in a particular channel. For example, 16 balls are dropped one by one, and 8 balls are collected in channel 1, 4 in channel 2, 2 in channel 3, 1 in channel 4 and the last one in channel 5. Finally, the gates indicate 0-0 position.

GGT LOGIC



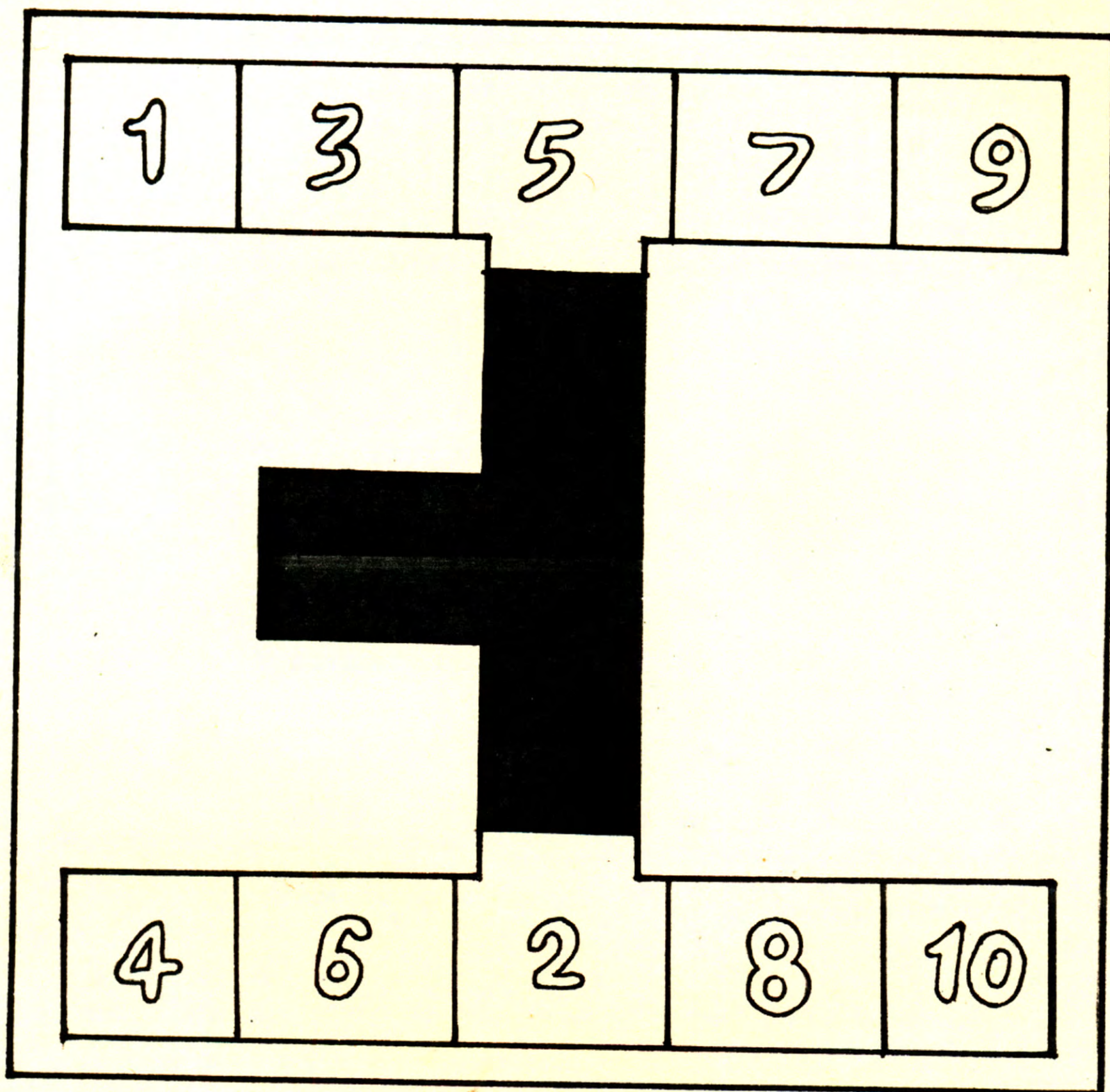
The famous farmer's problem of transferring a goat, grass bundle and a tiger from one end of the river to other end by a boat where he can take only one item at a time.

Find out solution to this problem by playing this kit.

PERFORMANCE

2 minutes	Excellent
5 minutes	Very good
6 minutes	Good
8 minutes	Fair
10 minutes and above	Poor, try again

EVEN - ODD NUMBER - LOGIC KIT



Numbers divisible by two are called even numbers and numbers indivisible by two are called odd numbers.

This kit enhances logical power and understanding of numbers.

HOW TO PLAY?

1. Arrange the squares, numbered even on one side of the board and the squares, numbered odd on the other. Now, by moving the squares, without lifting, try to get 2, 4, 8, 10 and 1, 3, 5, 7, 9 arrangement.
2. Exchange the even and odd numbered squares again to get the arrangement 1,2,3,4,5 & 6,7,8,9,10.

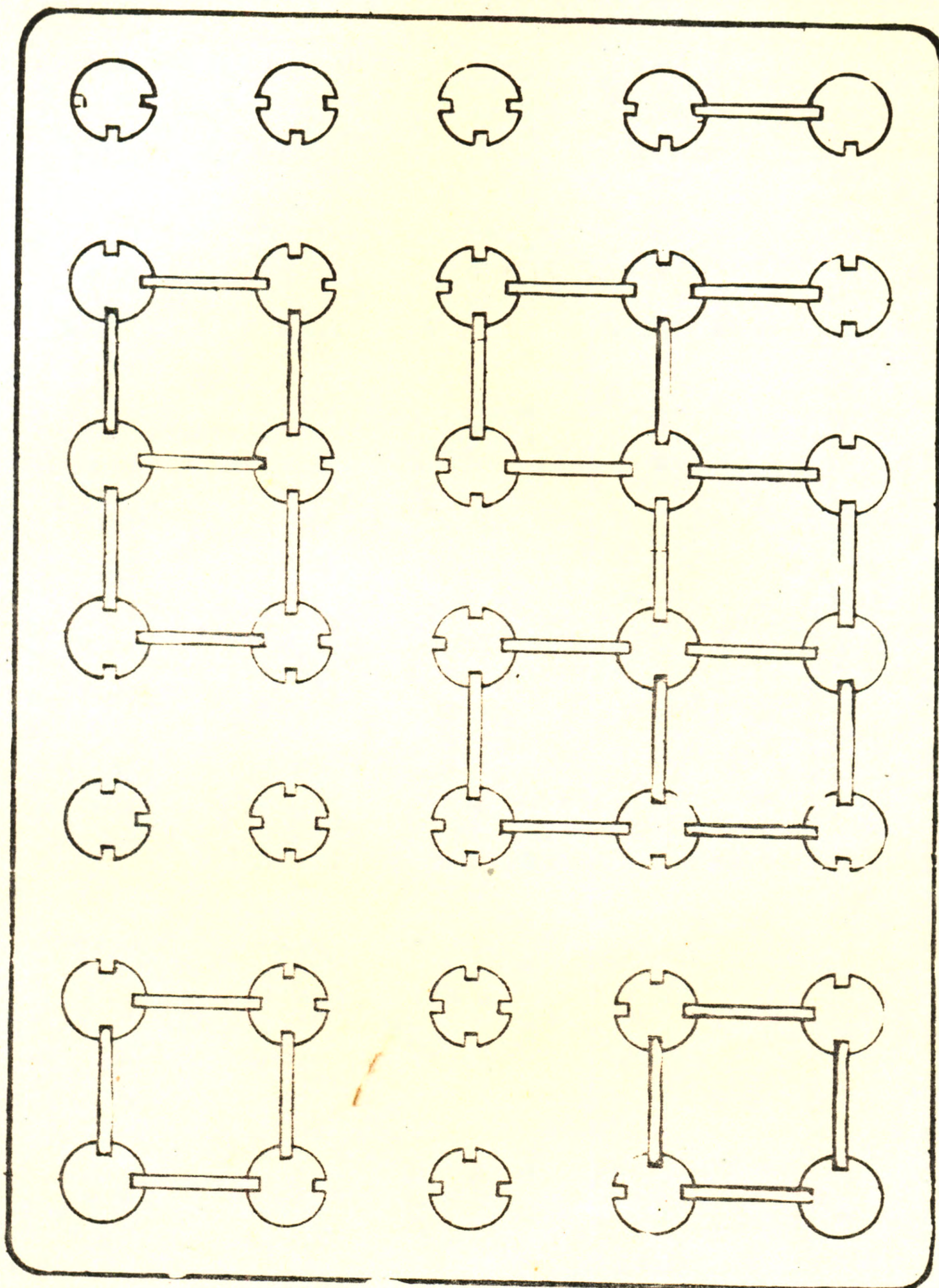
PERFORMANCE

Time taken to complete
the whole exercise

Standard

10 minutes	Excellent
12 minutes	Very good
15 minutes	Good
20 minutes	Fair
25 minutes	Poor, try again

6 BY 5 GAME



Are you interested to spend some time and do some mental exercise?

Call your friend to play too. Distribute the rectangular pieces among yourself equally. Remember, the white pieces should be with one and the green with other.

Now get ready to start. Toss the small disc to decide who will play first. Now go on placing the rectangular pieces one by one on the pegs and try to make as many squares as you can. Completion of every square provides an additional chance to play. To identify the completed squares keep coloured coins. When all the squares are over, count

PTO

the number of coins that you have placed. Who gets more squares is the winner.

CLUE:

Always try not to give chance to your opponent player to complete the square.

PERFORMANCE

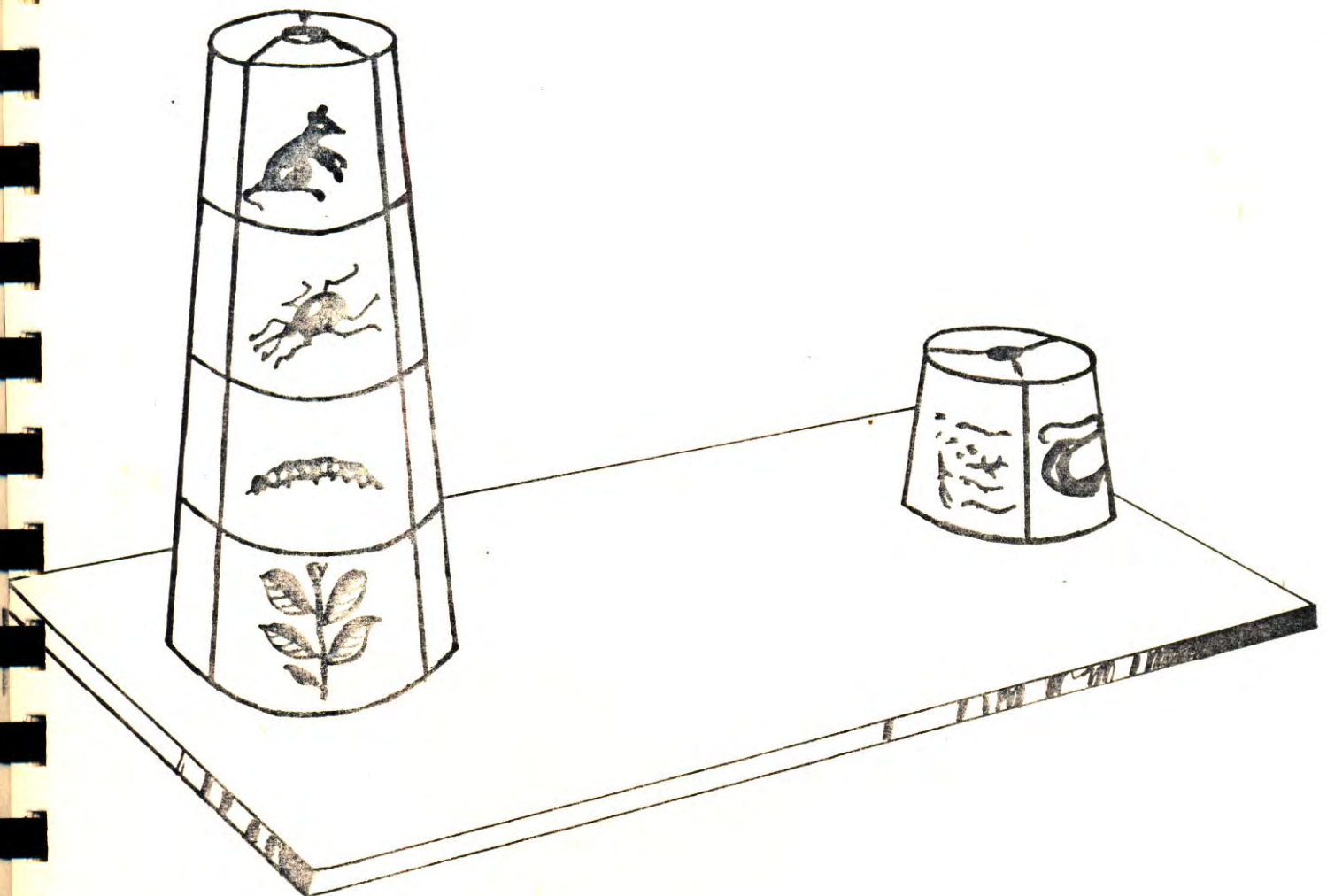
Number of squares

20
15
10
8
5

Standard

Excellent
Very good
Good
Fair
Poor, play again

FOOD TOWER PUZZLE



All living creatures are inter-dependent for their survival. This inter-dependence of living organisms makes a chain known as food-chain or food-web. The position of any element of food-chain is known as order. The higher order animal in any food-chain such as tiger always feeds on the lower order animals such as deer. Naturally, the population of lower order animal is higher than the higher order animal. For a perfect balance, the population of higher to lower order should be in the ratio of 1:10.

PTO

HOW TO PLAY?

Arrange the food block in a pile in such a way that higher order animal occupies the position above the lower order animal. Remember, while arranging the pile, the colour in the vertical column should match to distinguish three separate food-chains.

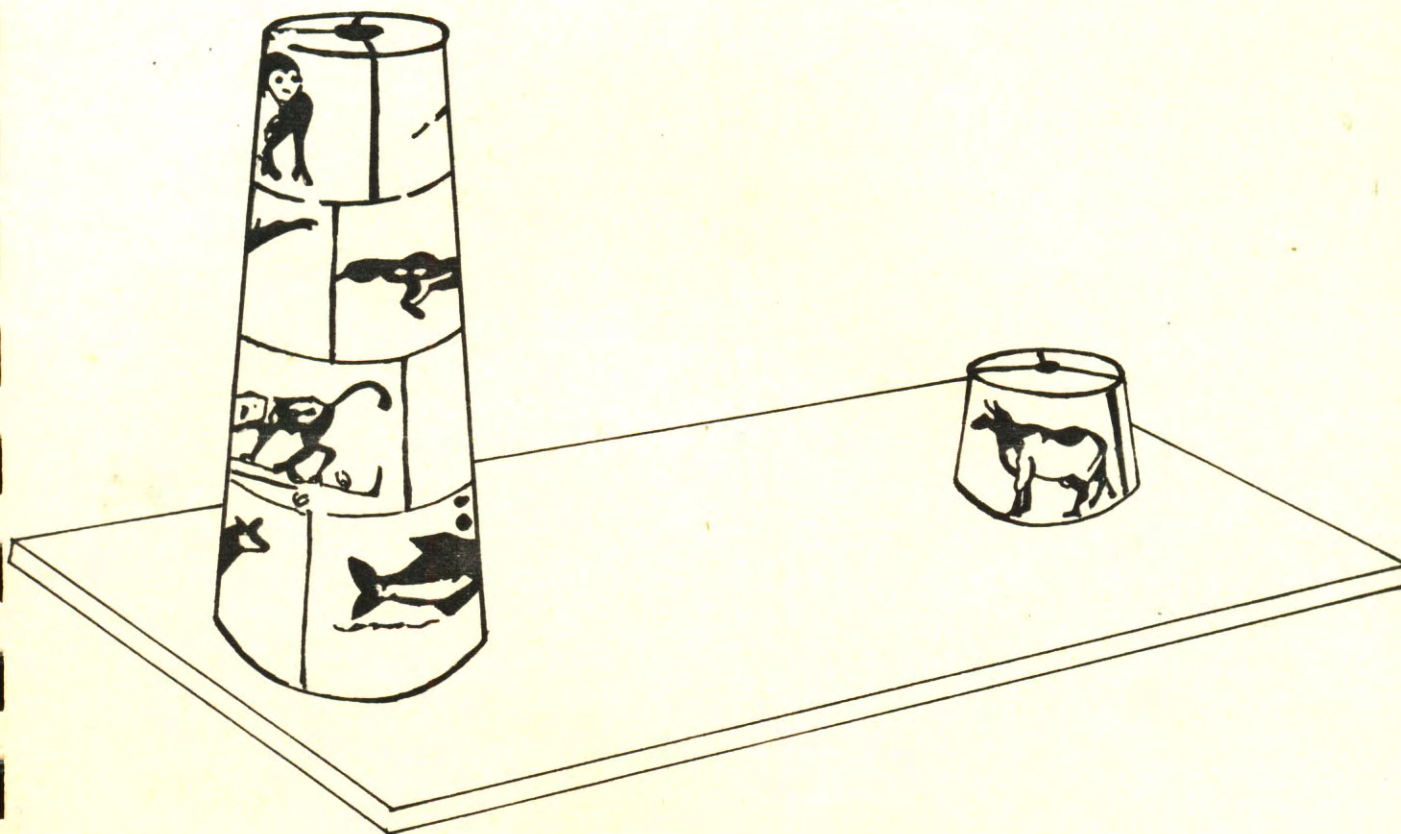
Transfer the food block from the pile to another position one by one. But nowhere lower order animal will occupy the position on the top of the higher order animal.

Lesser the number of moves to transfer the pile completely, better is the reasoning power.

PERFORMANCE

<u>No. of moves</u>	<u>Standard</u>
31	Excellent
36	Very good
40	Good
42	Fair
44	Poor, try again

EVOLUTION TOWER



Our earth is about 4500 million years old. The micro-organisms, which appeared on earth about 350 million years ago, were the first to have life. Man is about 10,000 years old. The order of evolution on earth is as follows:

Micro-organisms-animals (with spinal chord) - plants - amphibians - reptiles - mammals - man

If the total evolution period is taken as 24 hours, man was born just 20 seconds before.

PTO

HOW TO PLAY

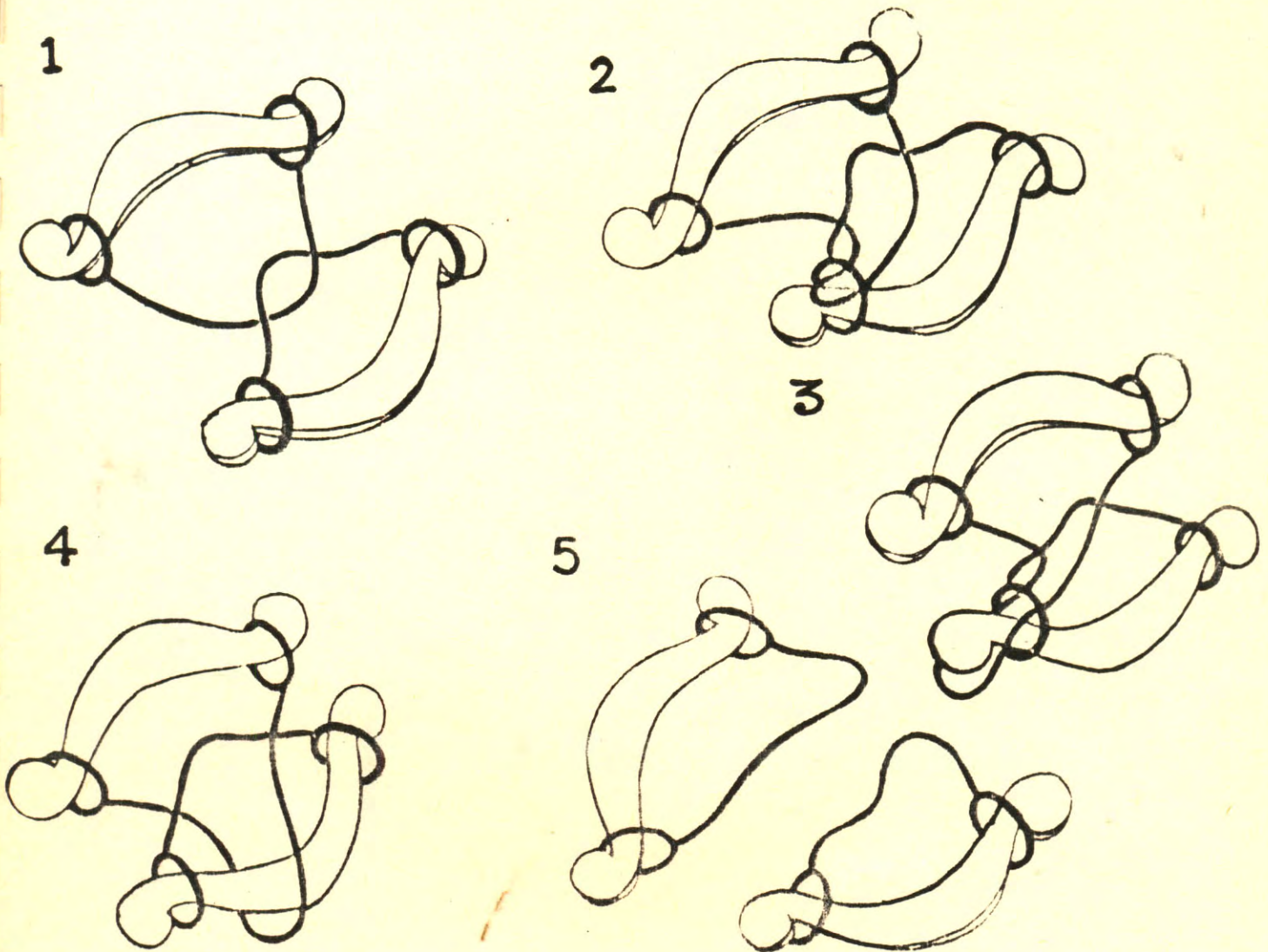
Arrange the blocks to form a pile. Remember, while arranging the blocks, the colour of each block should match.

Transfer the blocks to any of the two positions to form the pile again. In no case, lower order species will occupy the position on the top of the higher order species i.e. the order of evolution is to be maintained.

PERFORMANCE

<u>No. of moves</u>	<u>Standard</u>
31	Excellent
32-36	Very Good
37-40	Good
41-42	Fair
43 & above	Poor, try again.

TOPO - TUSSLE



Topology is a study of transformation of surfaces. If a lump of clay is transformed into different shapes, it does not really change at all as some of the original properties are unaltered.

In this game you have to separate two pieces entangled by a thread without opening any knots or breaking the thread.

Although it looks impossible, the solution is too simple.

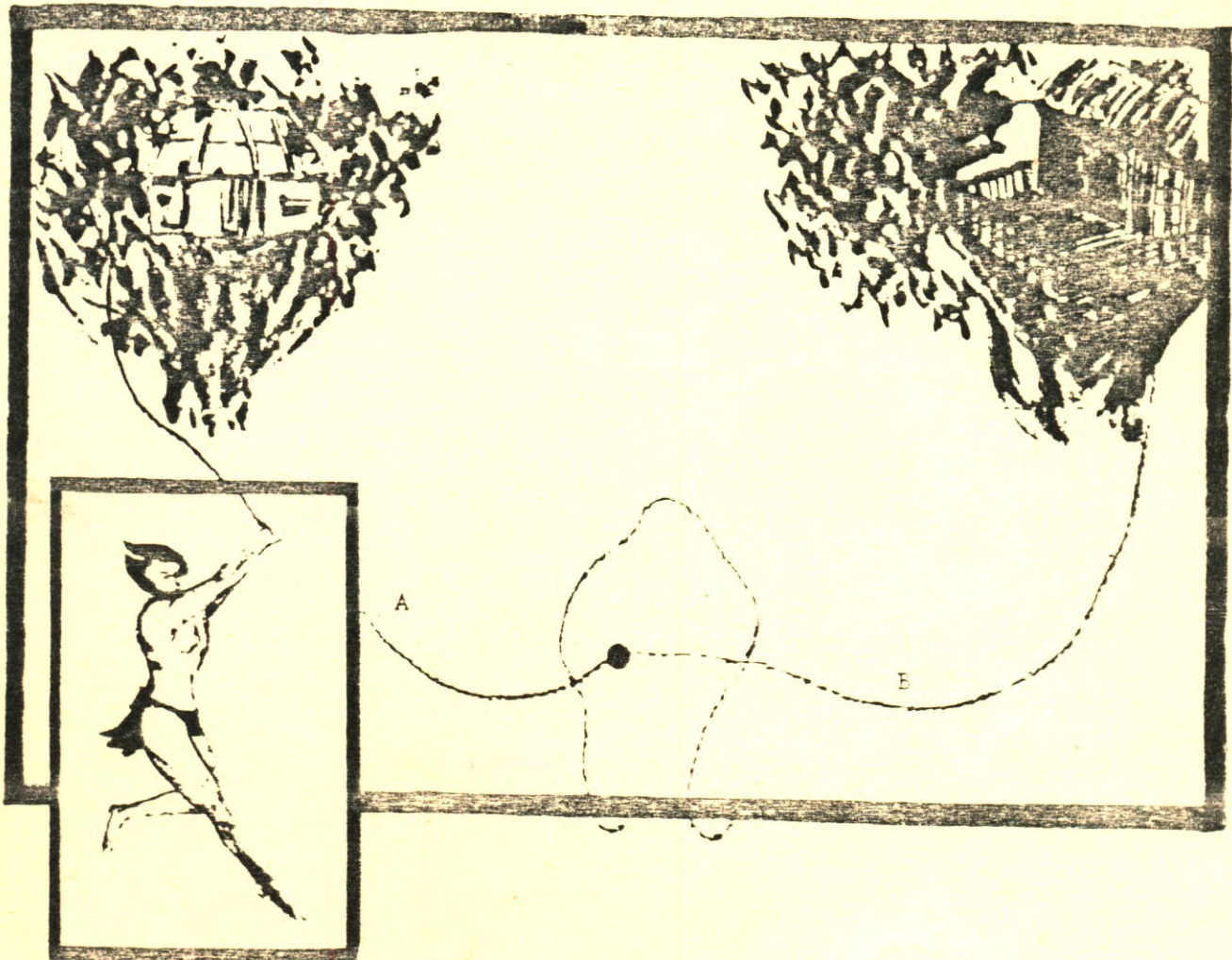
CLUE

Trace the hurdles and try to cross one by one.

NOTE

In case of difficulty, see sketches for solution.

TOPO-TREPIZ



It is interesting and speculative topological puzzle.

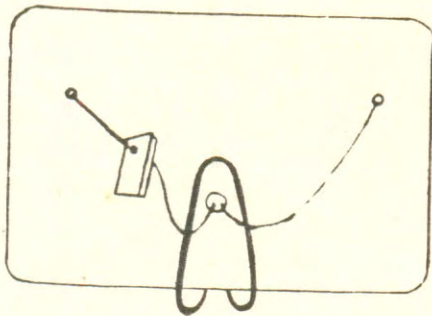
There are two loops on both sides of the central hole through which the loops can pass; but not the hanging Tarzan.

The problem is to take Tarzan from side 'A' loop to side 'B' loop without opening the thread or cutting it.

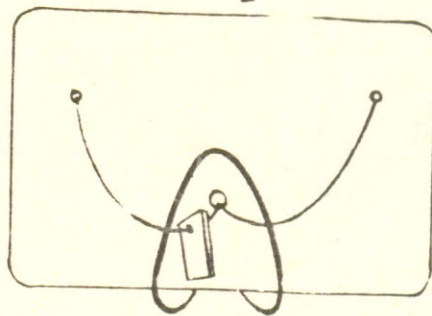
CLUE: - The Tarzan has to cross without passing through the hole.
- There are few hurdles which are to be overcome one by one.
- The whole loop can be pushed in and out of the hole.

In case of difficulty consult the solution on the reverse.

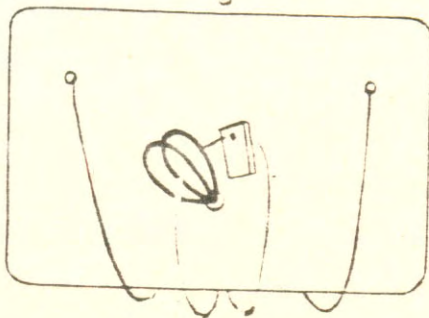
1



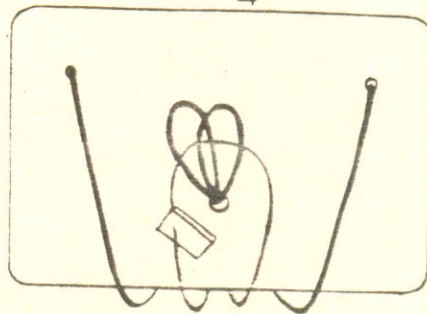
2



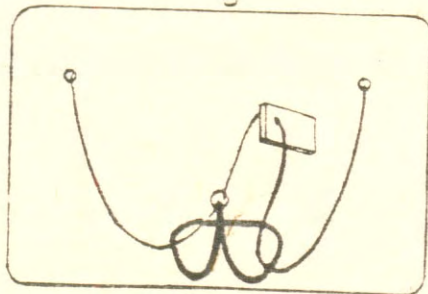
3



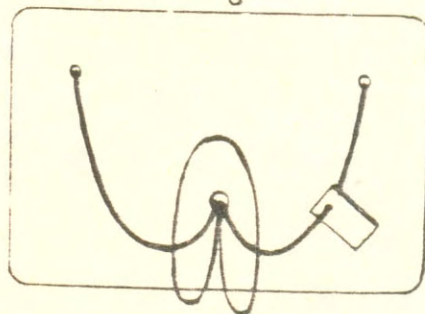
4



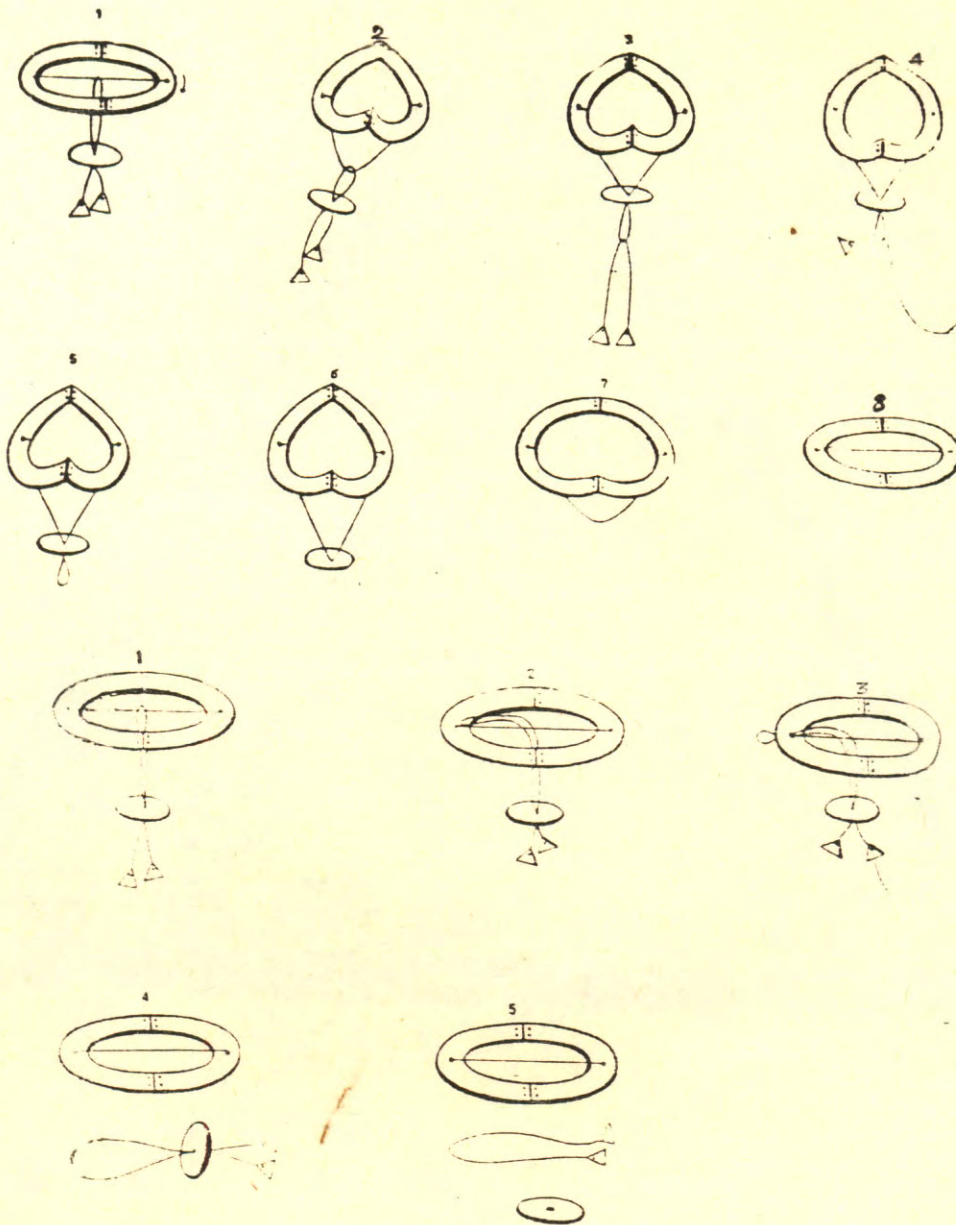
5



6



TOPO RING

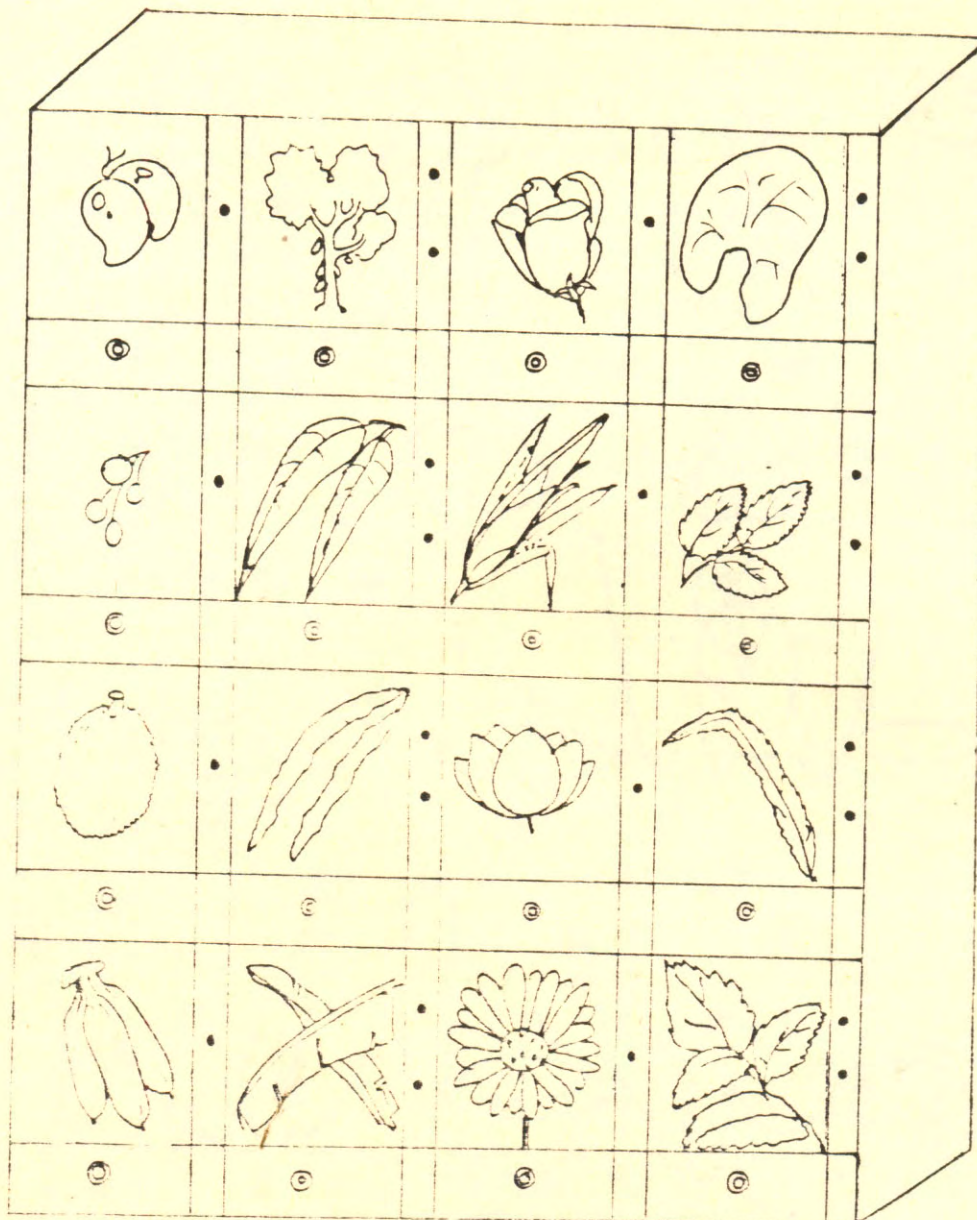


Topology is a branch of mathematics which deals with the transformation of surfaces.

In the oval ring, two triangular pieces tied with a thread and a circular ring are entangled together. The challenge is to separate them out without opening any knot of the thread.

In case you are unable to do so, see the figure for solution.

MATCH THE COLUMNS



On the board there are two columns of questions and answers.

Press a switch for which you want to guess the answer in order to check your identifying power. The question object will be indicated by a red light.

Now press the switch of the correlated picture. If green indicator glows, your answer is correct. If red, your answer is wrong.