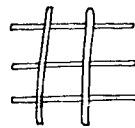


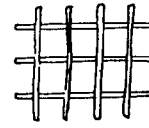
## BROOMSTICK TABLES

This article is inspired by the work of Sri P.K.Srinivasan of Chennai. Tables are often learnt by rote. This repetitive drill might help quick recall but it kills the whole joy of learning. With only 18 broomsticks children could discover the whole world of tables.

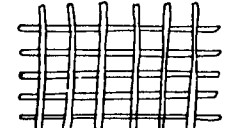
1. Lay one broomstick and place one across it. At how many points do they meet? Obviously one. So,  $1 \times 1 = 1$ . If two vertical broomsticks are placed criss-cross over three horizontal broomsticks then they have six junctions. A criss-cross of 4 and 3 sticks will have 12 junctions. So,  $4 \times 3 = 12$ . Six vertical sticks over five horizontal sticks will have 30 intersections.



$$2 \times 3 = 6$$



$$4 \times 3 = 12$$

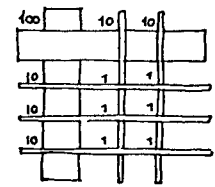
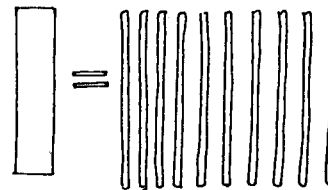


$$6 \times 5 = 30$$

2. Children can make a 0 to 9 matrix on a square ruled copy and make their own table sheet by placing broomsticks criss-cross and counting the number of junctions. Children who know how to count should be encouraged to make their own multiplication table chart.

0	1	2	3	4	5	6	7	8	9
1									
2			6						
3									
4			12						
5									
6						30			
7									
8									
9									

### Multiplication of two-digit numbers

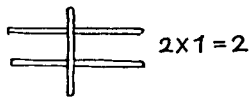


$$12 \times 13 = 156$$

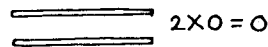
Multiplication of two-digit numbers would mean counting too many junctions. So, ten broomsticks can be represented by one card strip. Criss-cross of two strips will be  $10 \times 10 = 100$ , while that of a strip and a broomstick will be  $10 \times 1 = 10$ . Add up the sums of all the junctions to get the multiplication value. For instance,  $12 \times 13 = 156$ .

### Multiplication by Zero

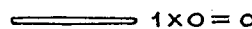
The abstract concept of multiplication by a zero can be concretised by the use of broomsticks.



1.  $2 \times 1 = 2$ . Now remove the vertical stick.



2. As there are no junctions now so  $2 \times 0 = 0$ . Now remove one horizontal stick.



3. What remains is  $1 \times 0 = 0$ . Now remove the last horizontal stick.



4. Now there are no junctions, so  $0 \times 0 = 0$ .