

# RAM Maths Circle

January 05, 2025

Nagpur

In this session we discussed some more interesting puzzles and then building upon the concepts of combinations and induction to solve mathematical problems.

## Questions

1. During a day, the hour hand and the minute hand of a clock form a right angle, at multiple times. For example, the two hand forms a right angle at 9 am, HOw many times during a day (24 hours) will two hands form a right angle?
2. There are 3 pots of capacities 8,5 and 3 litres. The largest is filled with milk and the other two are empty. How will you divide the mil into 2 equal parts using the three pots.
3. **Look at the following table:**

			8
1			

Two cells are filled with 1 and 8. The natural numbers from 2 to 7 must be filled in the remaining 6 cells satisfying each of the following conditions:

- In each row, the numbers in the right cells must be bigger than the numbers in the left cells.
- In each column, the number in the bottom cell must be smaller than the number in the upper cell.
- Number 5 must occupy a cell in the top row.

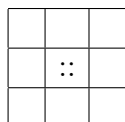
In how many ways can we fill the table?

4. The unit square in **Figure 1** is surrounded by 8 unit squares to form **Figure 2**. These 9 unit squares are then surrounded again to form **Figure 3**. The pattern of square(s) surrounded by unit squares along the boundaries (walls) and corners continues.

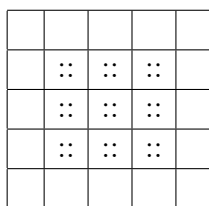
**Figure 1:**



**Figure 2:**



**Figure 3:**



How many unit squares should be surrounded in **Figure 9** to get **Figure 10**?

