

## Week 12

1. A hospital supervisor needs to create a weekly schedule for four nurses, subject to the following condition
  - Each day is divided into three 8-hour shifts.
  - On each day, all nurses are assigned to different shifts and one nurse has the day off.
  - Each nurse works five or six days a week.
  - No shift is staffed by more than two different nurses in a week.
  - If a nurse works shifts 2 or 3 on a given day, he must also work the same shift either the previous day or the following day.

Two ways to formulate the problem

- Assign nurses to shifts
- Assign shifts to nurses

2. Write an algorithm for the given problem:

Dhoni and Holidays: Dhoni has  $n$  days of vacations! So he decided to go either driving or do his cricket practice. Dhoni knows the following information about each of these  $n$  days: whether he can drive his car or not (due to odd-even rule) and whether the cricket academy is open for practice on that day. For the  $i$ -th day there are four options:

1. He cannot drive his car and the academy is closed.
2. He cannot drive his car and the academy is open.
3. He can drive his car and the academy is closed.
4. He can drive his car and the academy is open.

On each of these days Dhoni can either have rest or drive his car (if it is possible on this day), or go to academy (if the academy is open on this day).

Find the minimum number of days on which Dhoni will have rest (it means, he will not go driving and academy at the same time). The only limitation that Dhoni has — he does not want to do the same activity on two consecutive days: it means, he will not go for driving on two consecutive days, and academy for practice on two consecutive days.

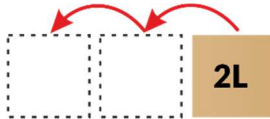
**Spot:**

1. There are 8 boxes on a shelf. The positions of the boxes are labelled from 1 to 8.

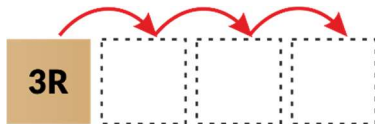
Each box contains an instruction for how a game piece should move.

An example of each instruction type is given below:

1. Movement to the Left  
e.g. 2L means move two boxes to the left.



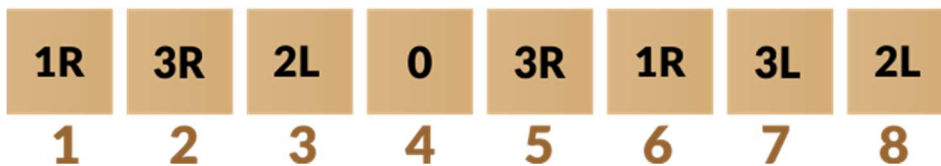
2. Movement to the Right  
e.g. 3R means move three boxes to the right.



3. Do not move  
If the rule says "0", do not move from this box at all.

**Question:**

Consider these instructions:



On which box should you start your game piece so that, by following the rules, it touches every box?

2. There are two ice-cream sellers. They use the same four flavours:



The first seller uses the following instructions to make ice-cream:

1. Start with an empty cone.
2. Pick a flavour at random, and add two scoops of that flavour.
3. Add one scoop of any different flavour.
4. If the requested height is reached, stop, otherwise go to Step 2.

The second ice-cream seller does not follow any instructions.

**Question:** You can only see the first few scoops of the ice-cream cones below. Which one is certainly from the second seller?

