

## Additional Permutation And Combination Questions

1. A particular monkey at a zoo is extremely intelligent. He is able to recognise shapes. In order to keep him from getting bored, his keeper gives him 5 circles, 5 squares and 3 triangles to play with. All the shapes have different sizes.
  - (i) If the monkey tries to arrange the 5 circles and 5 squares in a circular fashion and that the circles and squares have to be alternated, find the number of different possible arrangements.
  - (ii) The monkey finds that he does not like circles so he takes all the squares and triangles and tries to arrange them in a row such that no two triangles are placed to each other. Find the number of different possible arrangements.
  
2. A panel of judges in a Centurion superstar competition has to select and place in order of merit, three winning contestants from a total of 30.
  - (i) Find the number of ways this can be done.
  - (ii) All 30 contestants are subsequently put into voting by the student population for 2 special titles in which this can be done, assuming that a contestant may win more than one title.
  
- 3 (i) A particular social gathering consists of 40 people. Each person makes a handshake with every other person in the gathering. Find the total number of handshakes made.
  - (ii) Another gathering consists of 5 pairs of married couples. The entire group stands in a line, with each man standing next to his wife. Find the number of different possible arrangements in which this can be done.
  
4. In White's College, the Principal leads a team of 2 Deans and 10 Heads of departments. They are categorised in the junior and senior schools as shown below:

	Junior School	Senior School
Deans	1	1
Heads of Department	4	6

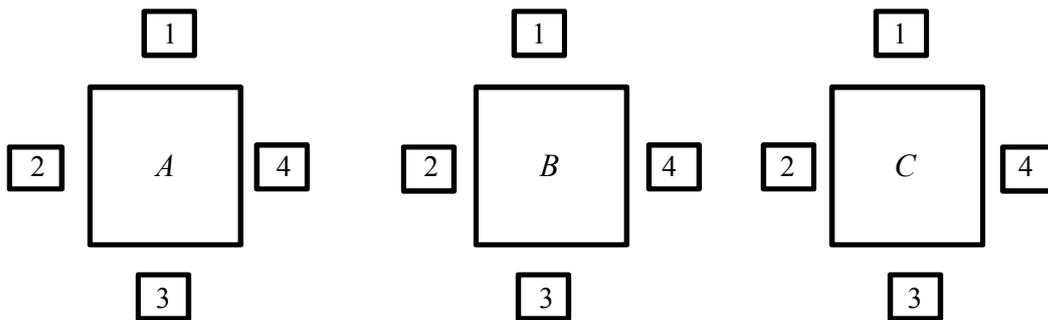
During a photo taking session, find the number of ways the photographer can arrange all of them if

- (i) a single row is to be formed such that the Principal stands in the middle of the row.
- (ii) two rows are to be formed such that each consists of all the staff from the same school, with each Dean standing at the leftmost position of the respective rows and the Principal standing at the rightmost position in the first row.

After the photo taking session, all staff proceeded to the conference room for a meeting. Find the number of ways they can be seated at the round table if

- (iii) the Principal and the 2 Deans sit together, in addition all staff from the same school sit together as well.

5. A group of 12 students consisting of 6 boys and 6 girls are to be seated at tables  $A$ ,  $B$  and  $C$ , each with chairs numbered 1, 2, 3 and 4 as shown below.



Find the number of ways this can be done if

- (i) there is no restriction.
- (ii) there are two girls and two boys at each table
- (iii) there are two girls and two boys at each table and students of the same gender are seated opposite each other.

6. The 10 letters from the word BARBAPAPPA are printed on 10 different cards. Three cards are chosen at random to form a 3-letter code word. Find the number of such code words.