Permutation and Combination Tutorial 2

1. [2011/VJC/Prelim/II/5]

   Given the word "SUCCESS", find the number of arrangements of these letter such that

   (a) there is no restriction, [1]

   (b) the three letters 'S' are separated from one another, [2]

   (c) the two letters 'C' are together and exactly two letters 'S' are together. [2]

   [(a) 420 (b) 120 (c) 72]

2. [2011/SRJC/Prelim/II/6]

   From the 6 letters of the word "SALOON", find the

   (a) number of possible arrangements if no two vowels are next to each other, [2]

   (b) number of possible arrangements if two 'O's are separated. [2]

   (c) number of 3-letter code-words that can be formed. [2]

   [(a) 72 (b) 240 (c) 72]

3. [2012/AJC/Prelim/II/6]

   Find the number of ways in which the letters of the word PERCEPTIVE can be arranged if

   (a) all the vowels are separated; [2]

   (b) there are two letters between the two Ps, at least one of which must be an E. [3]

   [(a) 50400 (b) 30240]

4. [2010/YJC/Prelim/II/10]

   Find the number of 8-letter code-words that can be formed using the letters A, B, C, D, E if

   i. there are no restrictions, [1]

   ii. each vowel (A, E) appears once and each consonant (B, C, D) appears twice, [1]

   iii. each letter occurs at least once and the letters appear in alphabetical order. [3]

   [(i) 390625 (ii) 5040 (iii) 35]

5. [2012/PJC/Prelim/II/7]

   Find the number of 6-digit codes that can be formed using the digits 1 to 9 if

   (a) there are no restrictions, [1]

   (b) there are three distinct pairs of identical digits, [2]

   (c) there is more than one odd digit and all odd digits are separated. [3]

   [(a) 531,441 (b) 7560 (c) 96,000]

6. [2010/PJC/Prelim/II/10]

   A six-digit number is to be formed from the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9. For each of the following cases, find how many different ways the six-digit number can be formed.

   (a) The even and odd digits of the number must alternate and any digit may appear more than once.

   (b) The number must be odd and is less than 600 000 and no digit may appear more than once.

   (c) The number is formed from four different digits, eg. 621313, 255567.

[(a) 16 000 (b) 18 480 (c) 196 560]

7. How many ways are there to split 12 friends into 3 groups of 4 each? [5775]

8. [2015/ACJC/Prelim/II/6]

   (a) A teacher wants to set a class test for her class of 25 students. She plans to give each student the same questions, but have each student's questions appear in a different order. Find the least number of questions she must set [2]

   (b) Sally has 12 bars of chocolates in four different flavours as summarised in the table below.

Flavour	white	milk	dark	hazelnut
Number	4	3	4	1

   Sally intends to give one bar of chocolate each to three of her best friends in school.

   i. Find the number of ways she can do it. [3]

   ii. Sally remembers that one particular friend amongst the three has a nut allergy, and should not be given the hazelnut chocolate bar. Find the number of ways she can now give her friends the chocolates. [2]

[(a) 5 (b)i) 54 ii) 45]

9. [2015/NJC/Prelim/II/Q7]

   A box contains 6 orange, 6 red, 6 green, 6 blue and 6 yellow balls. Balls of the same colour are considered to be indistinguishable.

   Find the number of ways to select

   i. 4 distinct balls, [1]

   ii. 4 balls, of which exactly 3 are identical, [2]

   iii. 4 balls without any restriction. [3]

[(i) 5 (ii) 20 (iii) 70]

10. [2010/MJC/Prelim/II/8b]

    Secret codes can be sent using 6 available letters X, Y, Y, Z, Z, Z.

    i. How many different 5-letter secret codes can be sent? [3]

    ii. How many different 5-letter secret codes will begin and end with Y? [1]

[(i) 60 b(ii) 4]

11. [2010/VJC/Prelim/II/10]

    Annabel has 7 tiles each lettered A, N, N, A, B, E, L respectively. A code-word is formed when some tiles are picked and arranged to form a "word".

    Find the number of different ways in which a 4-letter code-word can be formed

    i. if the first letter is N and the last letter is E, [3]

    ii. if there are no restrictions. [5]

[(i) 13 (ii) 270]