

**Islington College****Module Code: MA4001NI Logic and Problem Solving**

1. Evaluate  $15C_2 + 15C_9 - 15C_6 - 15C_7$     **Ans: - 6330**
2. If  $nPr = 840$ ,  $nCr = 35$ , then *find*  $r!$   
**Ans: 24**
3. In a class, there are 27 boys and 14 girls. The teacher wants to select 1 boy and 1 girl to represent the class for a function. In how many ways can the teacher make this?  
**Ans :  $27C1 \times 14C1$**
4. In how many ways 3 mathematics books, 4 history books, 3 chemistry books and 2 biology books can be arranged on a shelf so that all books of the same subjects are together?  
**Ans :  $4! \times 3! \times 4! \times 3! \times 2! = 41472$**
5. A student has to answer 10 questions, choosing at least 4 from each of Parts A and B. If there are 6 questions in Part A and 7 in Part B, in how many ways can the student choose 10 questions?  
**Ans :  $6C4 \times 7C6 + 6C5 \times 7C5 + 6C6 \times 7C4$**
6. Three married couples are to be seated in a row having six seats in a cinema hall. If spouses are to be seated next to each other, in how many ways can they be seated? Find also the number of ways of their seating if all the ladies sit together.  
**Ans :  $3! \times 2! \times 2! \times 2! = 48$ .**  
**Ans :  $3! \times 3! \times 2! = 144$ .**
7. There are four bus routes between A and B; and three bus routes between B and C. A man can travel round-trip in number of ways by bus from A to C via B. If he does not want to use a bus route more than once, in how many ways can he make round trip?  
**Ans :  $12 \times 6 = 72$**
8. In how many ways a committee consisting of 3 men and 2 women, can be chosen from 7 men and 5 women?  
**Ans :  $7C3 \times 5C2$**
9. In how many ways can 5 children be arranged in a line such that
  - a) Two particular children of them are always together
  - b) Two particular children of them are never together.**(a) Ans:  $4! \times 2!$  (b) Ans :  $5! - (4! \times 2!)$**
10. All the letters of the word 'EAMCOT' are arranged in different possible ways. What is the number of such arrangements in which no two vowels are adjacent to each other?  
**Ans : We note that there are 3 consonants and 3 vowels E, A and O. Since no two vowels have to be together, the possible choice for vowels are the places marked as**

'X'. X M X C X T X, these vowels can be arranged in  $4P3$  ways 3 consonants can be arranged in 3 ways. Hence, the required number of ways =  $3! \times 4P3 = 144$ .

11. In an examination there are three multiple choice questions and each question has 4 choices. Find the number of ways in which a student can fail to get all answer correct.

Ans :  $(4 \times 4 \times 4) - 1$

12. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has

- a) no girls  
b) at least three girls.

(a) Ans:  $7C5$  (b) Ans :  $4C3 \times 7C2 + 4C4 \times 7C1$

13. Using the digits 1, 2, 3, 4, 5, 6, 7, 'a number' of 4 different digits are formed. Find

- (a) How many numbers are formed?  
(b) How many numbers are exactly divisible by 2?  
(c) How many numbers are exactly divisible by 25?

(a) Ans :  $7P4$  , (b) Ans :  $6 \times 5 \times 4 \times 3 = 360$  , (c) Ans :  $5 \times 4 \times 2 \times 1$  (last pos. 5, 2<sup>nd</sup> last can be 2&7)

14. How many words (with or without dictionary meaning) can be made from the letters of the word MONDAY, assuming that no letter is repeated, if

- a) 4 letters are used at a time  
b) All letters are used at a time  
c) All letters are used but the first is a vowel

(a) Ans :  $6P4$ , (b) Ans :  $6P6$  , (c) Ans :  $2 \times 5 \times 4 \times 3 \times 2 \times 1$

15. Find the number of ways in which a team of eleven players can be selected from 22 players always including 2 of them and excluding 4 of them.

Ans:  $16C9$

16. How many numbers are there between 99 and 1000 having 7 in the unit's place?

Ans :  $9 \times 10$

17. How many numbers are there between 99 and 1000 having at least one of their digits 7?

Ans :  $(9 \times 10 \times 10) - (8 \times 9 \times 9)$

**-END OF TUTORIAL-**