PERMUTATION & COMBINATION

(Ref: FM-QAH2022008)

I) Basics

1. (a) The value of $^{8}P_{2}$ is
   a) 28 b) 56 c) 48 d) 36

   (b) The value of $^{10}C_{8}$ is
   a) 90 b) 20 c) 45 d) 50

   (c) The value of $^{45}C_{44}$ is
   a) $^{45}C_{1}$ b) $^{45}C_{41}$ c) $^{45}C_{2}$ d) $^{45}C_{3}$

   (d) The value of $^{2008}C_{0}$ is
   a) 0 b) 1 c) 2009 d) 2008

   e) The value of $^{10}C_{1}$ is
   a) 0 b) 1 c) 10 d) 9

   (f) The value of $^{10}C_{2}$ is
   a) 90 b) 45 c) 60 d) 30

2. If $^{n}C_{2} = {}^{n}C_{15}$, then the value of n is

3. If $^{10}C_{3} + {}^{10}C_{4} = {}^{n}C_{4}$, then n =

4. The relation between $^{n}P_{r}$ and $^{n}C_{r}$ is
   a) $^{n}P_{r} = {}^{n}C_{r}$ b) $r.{}^{n}P_{r} = {}^{n}C_{r}$
   c) $^{n}P_{r} = {}^{r}r!{}^{n}C_{r}$ d) $^{n}P_{r} \times r! = {}^{n}C_{r}$

5. If $^{n}P_{4} = 11880$, then find $^{n}C_{4}$.
   a) 165 b) 330 c) 495 d) 660

6. In a restaurant there are four varieties of soft drinks and 6 varieties of snacks items.
   In how many ways can one place an order for
   I) a soft drink AND a snacks?
   II) a soft drink OR a snacks but not both?

7. There are three places, A, B and C in a city. A is connected to B through 6 routes and B is connected to C through 4 routes. In how many ways can one travel from A to C, via B?

Directions for questions 8 to 11: These questions are based on the following data.
In how many ways can the letters of the word `WINDOWS be arranged so that the words

8. Always start with letter S?
   a) 120 b) 720 c) 5040
   d) 24 e) 360

9. Always start with D and do not end with S?
   a) 480 b) 120 c) 240
   d) 600 e) 720

10. Contain all the vowels together?
    a) 240 b) 720 c) 480
    d) 360 e) None

11. Has no two vowels together?
    a) 240 b) 720 c) 1440
    d) 120 e) None

12. How many words can be formed using all the letters of the word QUESTION without repetition so that the vowels occupy the even places?
    a) 1024 b) 840 c) 720 d) 576

13. In how many ways can the letters of the word QUESTION be permuted so that the vowels are never separated?
    a) 720 b) 1440 c) 5040
    d) 4320 e) None

14. An eight-letter word is formed by using all the letters of the word "EQUATION". How many of these words begin with a vowel and end with a consonant?
    a) 3600 b) 10800 c) 2160 d) 720

15. In how many ways can the letters of the word COMBINATION be permuted?

16. Find the number of ways of arranging the letters of the word "MATERIAL" such that all the consonant are always together?
    a) 720 b) 1440 c) 1860 d) 2160

17. In how many ways can two consonants and two vowels be selected from the letters of the word 'TRIANGLE"?
    a) 25 b) 30 c) 40 . d) 20

18. In how many ways can the letters of the word VARIETY be arranged so that exactly two vowels are together?
    a) 2880 b) 5184 c) 1440 d) 2160

19. The letters of the word SERENDIPITY are arranged in all possible ways. In how many arrangements are all the vowels are never together?
    a) 8! x 4! b) 8! x 6
    c) 7! x 4! d) 2! x 7! e) none

Directions for questions 20 to 22: **These questions are based on the data given below.**
All the letters of the word "RAINBOW' are arranged in all possible ways.

20. Find the number of 7-letter words possible, such that each letter is used at most once.
    a) 24 b) 1 c) 7! d) 120

21. The number of 7-letter words that begin with B when each letter occurs only once is
    a) 2(7!) b) 6! c) 7! 2! d) 6(6!)

22. If each letter is used exactly once, the number of seven-letter words which begin with W and end with N is
    a) 5! b) 6! c) 4! d) 5! 2!

23. Find the number of ways in which the letters of the word MATHEMATICS can be arranged so that all Ms are together and all Ts are together.

a) $\frac{9!}{2!}$ b) $\frac{9!}{2!2!2!}$ c) $\frac{11!}{2!2!2!}$ d) 11!

24. In how many ways can the letters of the word RESULT be arranged so that the vowels appear in the even places only?

25. Find the number of ways in which the letters of the word VARIETY can be permuted so that no two vowels appear together.
a) $\frac{4!\times5!}{2}$ b) 4! × 3!
c) 7! – 4! 2! d) 7! – 5! 3!

26. How many different words can be formed using the letters of the word CHILDREN such that the consonants appear in reverse alphabetical order?

27. Six persons A, B, C, D, E and F have to address a gathering. In how many ways can they speak such that A speaks before D and D speaks before F?

II) Based on Numbers

28. (i) How many three-digit numbers can be formed using the digits 1, 2, 3, 4 without repetition of digits?
(ii) How many three-digit odd numbers can be formed using the digits 1, 2, 3, 4, 5, 6 when each digit occurs at most once in any of the numbers?
(iii) How many five-digit numbers which are divisible by 5 are formed using the digits 0 to 8 without repeating the digits?

29. (i) How many four-digit numbers can be formed by using the digits 0, 1, 2, 3, 4, 5 if repetition of digits is allowed?
(ii) In the above problem, how many of the numbers are even?

30. The number of 3-digit numbers that can be formed using the digits0, 1, 2, 3, 4, 5, 6 such that each digit occurs at most once in every number is

31. Find the number of four-digit numbers that can be formed using the digits 1, 2, 3, 4, 8, 9 when each digit can occur any number of times in each number.
a) 4^6 b) $^6P_4$ c) $^6P_6$ (d) 6^4

32. Find the number of even numbers that can be formed using all the digits 1, 2, 3, 4, 5 when each digit occurs only once in a number.
a) 4! b) 5! c) 4!2 d) $^5P_4$

33. How many four-digit numbers having distinct digits can be formed using the digits 0 to 9?
a) 5040 b) 2688 c) 3656 d) 4536

34. In the above problem, how many of the numbers are divisible by 5!
a) 342 b) 504 c) 448 d) none

35. How many four-digit numbers that are divisible by 3 can be formed using the digits 0, 2, 3, 5, 8. If no digit occurs more than once in each number?

36. How many even numbers between 20,000 and 40,000 (excluding the extremes) can be formed using the digits 0, 2, 3, 4, 6, 8 if any digit can occur any number of times?
a) 2160 b) 2593 c) 2161 d) 2159

37. A five-dive digit number is formed using the digits 0,1 2, 3, 5 and 6 without repeating the digits.
(i) How many such five-digit numbers can be formed?
(ii) How many of them are odd?
(iii) How many of them are divisible by 5?
(iv) How many of them are divisible by 8?

38. How many four-digit numbers are there between 3200 and 7300, in which 6, 8 and 9 together or separately do not appear?
a) 1077 b) 1422 c) 1420 d) 1421

39. How many times does the digit 5 appear in the numbers from 9 to 1000?

40. If all possible five-digit numbers that can be formed using the digits 4, 3, 8, 6 and 9 without repetition are arranged in the ascending order, then the position of the number 68943 is

41. A four-digit number is formed using the digits, 0, 2, 4, 6, 7 without repetition any one of them. What is the sum of all such possible numbers?

42. How many four-digit odd numbers can be formed such that every 4 in the numbers is succeeded by a 5?
a) 108 b) 2592 c) 2660 d) 2700

43. Find the sum of all four-digit numbers formed by taking all the digits 2, 4, 6, 8?
a) 335240 b) 244420 c) 533280 d) 133320

Directions for questions 10 and 11: These questions are based on the following data.
Find the number of six-digit numbers that can be formed by using the digits 0, 1, 2, 3, 4, 5 without repetition so that

44. the number is divisible by 5.
a) 512 b) 48 c) 96
d) 216 e) 120

45. the number is even.
a) 96 b) 120 c) 312
d) 216 e) 420

46. How many four digit numbers can be formed using the digits {1, 3, 4, 5, 7, 9}? (repetition of digits is not allowed)
a) 360 b) 60 c) 300 d) 180

47. The number of 5 distinct digit numbers that can be formed using all the digits 1, 2, 4, 5, 6 which are divisible by 6 is
a) 24 b) 36 c) 48 d) 72

48. How many 7 digit numbers can be formed using the digits 0, 2, 2, 4, 4, 7, 7?
a) 198 b) 200 c) 240 d) 540

49. Find the sum of all numbers that can be formed using all the digits 1, 3, 7, 8 and 6 without repetition.
a) 5555500 b) 666600
c) 4444400 d) 6666600

50. How many 8 digit numbers can be formed using the digits 4, 5 and 6 so that the number contains at least one of each of these three digits?
a) 243 b) 112(36) c) 5696 d) 5796

51. How many 9 digit multiples of 6 can be formed using only the digits 2 or 3?
a) 56 b) 84 c) 86 d) None

52. A password of length 5 is to be formed using one or more of the symbols {P, Q, R, S, T, 1, 2, 3, 4}. How many of these follow a palindrome pattern? (Palindrome is a word that reads the same backward or forward)

III) Based on selection/Arrangement

53. 15 candidates applied for a vacant post in a TATA. In how many ways can four candidates be selected for the interview such that a particular candidate must be selected?

54. In the above problem, 'in how many ways can four candidates be selected such that a particular candidate must be rejected?

55. In the above problem, in how many ways can five persons be selected such that one particular person is always selected and another particular person is never selected?

56. A committee of four members is to be formed from a group of 8 men and 6 women. In how many ways can the committee be formed such that it comprises
(i) two women?
(ii) at least three women?
(iii) at most one woman?
(iv) at least one man and at least one woman?

57. In a party there are 25 guests. Each of them shook hands with every other guest once. Find the total number of handshakes that were exchanged at the party.

58. There are sixteen friends. On the eve of New year, they exchanged greeting cards among themselves. How many cards did they exchange altogether?

59. On a rail route between two stations A and B. there are exactly twelve stations. How many different tickets of a particular class are to be printed so that passengers can travel from any station to any other station?

60. In how many ways can a girl invite at least two of her nine friends to a party?

61. In the above problem, in how many ways can the girl invite at most seven of her friends to the party?

62. A committee of five members is to be formed from 9 men and 7 women. In how many ways can the committee be formed such that:
(i) it contains more men than women?
(ii) a particular man and a particular woman never be together in the committee?

63. In how many ways can a cricket team of 11 members be selected from 16 players, so that two particular player are included and another particular player is left out?

64. (a) Find the number of ways of selecting a team of 5 people from a group of 10 people such that a particular person is always included in the team.
a) ${}^{9}C_4$ b) ${}^{9}C_5$ c) ${}^{10}C_4$ d) ${}^{10}C_5$

(b) Find the number of ways of selecting a team of 4 people from a group of 8 persons such that a particular person is not included in the team.
a) ${}^{8}C_4$ b) ${}^{7}P_4$ c) ${}^{7}C_4$ d) ${}^{6}C_3$

65. The number of ways of forming a committee of six members from a group of 12 men and 7 women is

66. The number of ways of distinct lines that can be formed by joining 16 points on a plane, of which no three points are collinear is
a) 190 b) 380 c) 360 d) 120

67. Find the number of triangles that can be formed by joining 25 points on a plane, no three of which are collinear.
a) 2024 b) 2026 c) 2023 d) 2300

68. (a) The number of diagonals of a convex decagon is
a) 53 b) 35 c) 45 d) 60

(b) If the number of diagonals of a convex ‘n’ sided polygon is 90, than the value of ‘n’ is
a) 10 b) 14 c) 15 d) 18

69. In how many ways can seven persons be selected from 9 men, 3 women, 5 boys and 4 girls?

70. A committee of 5 members is to be formed from a group of 8 men and 6 women. In how many ways can the committee be formed such that it contains more men than women?
a) 180 b) 186 c) 126 d) none

71. Of 20 points on a plane, 8 are collinear. Except for the triplets formed from among these 8 points, no other triplet of points is collinear. By joining these 20 points
(i) How many straight lines can be formed?
(ii) How many triangles can be formed?

72. The number of diagonals in a regular polygon of 20 vertices is_____.

73. The number of, diagonals in a regular polygon of 10 vertices is
(i) On an 8 x 8 chess board, the number of squares of all sizes is_____.
(ii) In the above problem the number of rectangles is_____.

Directions for questions 74 to 76: These questions are based on the following data.
From 8 Indians and 5 Americans, a committee of 5 is to be formed. In how many ways, can it be done.

74. if the committee consist exactly two Indians?
a) 84 b) 371 c) 120
d) 480 e) 216

75. if the committee consist at least two Indians?
a) 186 b) 60 c) 66
d) 126 e) 142

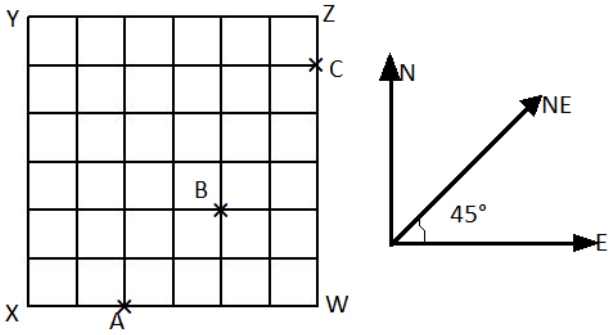
76. if the committee consist atmost two Indians?
a) 182 b) 66 c) 60
d) 6 e) 45

77. In how many ways can a panel of 6 doctors be formed from 8 surgeons and 9 physicians if the panel has to include more surgeons than physicians?
a) 82 b) 81 c) 65 d) None

78. In how many ways can a delegation of 4 professors and 3 students be constituted from 8 professors and 5 students, if Wasim an Arts student refuses to be in the delegation when Prof. Ram, the maths professor is included in it?
a) 280 b) 210 c) 490 d) 560

79. There are 16 points in a plane. If 4 of them are on a straight line and no other three points are on a straight line, then find the difference between the number of triangles and the number of straight lines that can be formed using these points.
a) 215 b) 216 c) 156 d) none

80. WXYZ is a 6 × 6 square grid.



(i) How many straight lines can be formed using the dots?
(ii) How many triangles can be formed using the dots?
(iii) How many rectangles are there in the given grid?
(iv) How many square are there in the given grid?
(v) In how many ways can one go from A to C without going through B? (One can only go horizontally right, vertically up and diagonally North-East)?

81. There are 7 QA books, 5 DILR books and 4 English books.
In how many ways can a person select.
(i) At least 1 book?
(ii) At least 1 book of each subject?

82. There are 6 identical Maths books, 5 identical Reasoning books and 3 identical English books.
In how many ways can a person select
(i) at least 1 book?
(ii) At least 1 book of each subject?

83. (i) In how many ways can three new cars be parked in nine vacant parking lots if no two cars are parked in adjacent parking lots?
(ii) In how many ways can twelve girls be seated in a row such that two particular girls never sit together?

84. In how many ways can 8 boys and 7 girls be arranged in a row so that boys and girls sit alternately?
a) $(8!)^2$ (b) $(7!)^2$ c) 8! × 7! d) 2 × 8! × 7!

85. In how many ways can 7 boys and 6 girls be arranged in a row so that no two girls sit together?
a) 12! b) 6! $^8P_7$ c) $^8P_6$ × 7! d) 13!

86. In how many ways can 15 boys and 10 girls be arranged in a row so that all the girls sit together?
a) 16! b) 17! c) 25! d) 16! × 10!

87. A question paper consists of 5 problems, each problem having 3 internal choices, in how many ways can a candidate attempt one or more problems?
a) 15 b) 1023 c) 511 d) 63

88. In how many arrangements of the word MATHEMATICS, the two A's are separated?
a) 9 × 10! b) $\frac{10!}{2!2!2!}$ c) $\frac{9!}{2!2!2!}$ d) $\frac{9\times10!}{2!2!2!}$

89. The number of batting orders in which 7 batsman can go for bats. So that the youngest player may not be the last is
a) 4000 b) 2160 c) 4320 d) 5300

90. In how many ways can 7 boys and 5 girls be arranged in a row so that no two girls are together?
a) 5! x 7! b) 7P5 x 5!
c) 7! x 8P5 d) 7P5 x 7i
e) None of these

91. A secret lock consists of 4 rings each of which having numbers varying 0 to 9. The maximum number of unsuccessful attempts to open the lock is

92. A boat is to be manned by eight men, of whom, one cannot row on the bow side and two cannot row on the stroke side. In how many ways can the crew be arranged?
a) 4320 b) 2880 c) 5760 d) 1440

93. The number of ways in which six boys and six girls can be seated in a row for a photograph so that no two boys sit together is.
a) (6!)2 b) 6! x 7P6 c) 2(6!) d) 6! x 7

94. The number of ways 4 students and a teachers can be seated in 5 Chairs such that the principle always sit in the middle is
a) 4! b) 5! c) 3! d) 3! × 2!

95. There are 18 stations between Lucknow and Delhi. How many second class tickets have to be printed, so that a passenger can travel from any station to any other station?
a) 200 b) 380 c) 95 d) 100

96. (I) In how many ways can ten persons be seated around a circular table?
(ii) In how many ways can ten distinct flowers be arranged on a garland?

97. (i) In how many ways seven boys and seven girls can be seated around a circular table so that no two boys sit together?
(ii) In how many ways can 12 beads be arranged in a necklace such that four particular beads are always together?

98. Kavya invites 10 of her friends for lunch and seats 5 of them around a round table and the remaining 5 around another round table. Find the total number of ways in which she can seat all her 10 friends.
a) 10! b) 10! $(5!)^2$ c) $\frac{10!(4!)^2}{(5!)^2}$ d) $(4!)^2$

99. Sixteen guests have to be seated around two circular tables, each accommodating 8 members. 3 particular guests desire to sit at one particular table and 4 others at the other table. The number of ways of arranging these guests is
a) $\left(\frac{9!(7!)}{4!5!}\right)$ b) $^9C_5$ c) $(7!)^2$ d) $\frac{9!(7!)^2}{4!5!}$

100. In how many ways can 12 students be seated around a circular table so that three students always sit together?

101. Five boys including Sam and five girls including Sania have to be seated around a circular table such that no two boys are adjacent and Sania is not adjacent to Sam. In how many ways can this be done?
a) 4! x 5! b) $(4!)^2$
c) 3 x $(4!)^2$ d) 3 x $(5!)^2$

IV) Grouping and Distribution

102. (i) 120 books are to be divided equally, among five boys. In how many ways can this be done?
(ii) In how many ways can 120 books be divided into five equal parcels?

103. In how many ways can 40 different books be divided equally
(i) among 4 boys?
(ii) into 4 parcels?

104. In how many ways 12 prizes be distributed to 3 boys?
a) 315 b) 312 c) 123 d) 33

105. A question paper consists of 20 problems, each problem having an internal choice of 2 questions. In how many ways can a candidate attempt one or more problems?
a) 20! b) 2×20! c) 21! d) None

106. Eight distinct books are distributed among 8 students. A student may receive any number of books. In how many ways can the distribution be done if a particular student has to receive exactly 3 specified books?
a) 6 b) 5 c) 35 d) $^7C_5$

107. In how many ways can ten identical mangoes be placed into three distinct baskets if at least two mangoes are placed in each basket?
a) 10 b) 15 c) 30 d) 80

108. Pinki has 12 chocolates with her; 4 similar 5-star, 5 similar dairy milk, and 3 similar munch, which she wants to distribute among her friends.
In how many ways can Pinki give away one or more chocolates?
a) 59 b) 60 c) 119 d) 120

109. There are 9 different books and 2 identical copies of each in a library. The number of ways in which one or more books can be selected is
a) 2^9 b) $3^9 - 1$ c) $2^9 - 1$ d) 3^9

110. In how many ways can 12 distinct pens be divided equally
(a) Among 3 children?
a) $\frac{12!}{(4!)^3}$ b) $\frac{12!}{3!\,4!}$ C) $\frac{12!}{(4!)^3 3!}$ d) $\frac{12!}{(3!)^4}$
(b) into 3 parcels?
a) $\frac{12!}{3!\,4!}$ b) $\frac{12!}{(4!)^4}$ c) $\frac{12!}{(4!)^3 3!}$ d) $\frac{12!}{(4!)^3}$

111. In how many ways can 24 different books be divided equally
(a) among 4 boys?
a) 4^6 b) 6^4 c) $24!/(4!)^4$ d) $24!/(6!)^4$
(b) into 4 parcels?
a) $\frac{24!}{6!(4!)^4}$ b) $\frac{24!}{4!(6!)^4}$ c) $\frac{24!}{(6!4!)^4}$ d) $\frac{24!}{6!4!}$

112. A hotel bus can accommodate 100 guests, 60 in the ground floor and 40 in the 1st floor. In how many can 100 guests be accommodate, if 15 of them want to be in the ground floor only and 10 want to be in the 1st floor only?
a) $\frac{75!60!40!}{50!25!}$ b) $\frac{100!}{60!40!}$ c) $\frac{75!}{45!30!}$ d) $\frac{75!60!40!}{45!30!}$

113. In how many ways can we divide 20 identical marbles among 3 boys such that each gets at least 1 marble?

114. There are 4 letters and 3 letter boxes in which the letters are to be posted. Find the number of ways of doing it, if
(i) all the letters are non-identical, and the boxes are non-identical.
(ii) all the letters are non-identical, but the boxes are identical.
(iii) all the boxes are non-identical, but the letters are identical.
(iv) All the letters are identical, and the boxes are identical.

115. Number of positive integer solutions of abc = 105?

116. How many terms will $(a + b + c)^{24}$ have? Whole/Natural Number Solutions-

117. (i) For the equation $x_1 + x_2 + x_3 + x_4 = 24$, the number of non-negative integral solutions is
(ii) For the equation $x_1 + x_2 + x_3 + x_4 = 36$, the number of positive integral solutions is

118. Find the number of points (x, y, z) in space with negative integers as co-ordinates such that x + y + z + 20 = 0.
a) 182 b) 205 c) 171 d) 135

V) Dearrangement

119. There are 5 letters and 5 addressed envelopes in which these letters are to be posted. Such that
(i) all the letters posted correctly?
(ii) exactly 4 letters posted correctly?
(iii) exactly 2 letters posted correctly?
(iv) no letter posted correctly?

VI) MIXED

120. Pankaj attempts a question paper that has 3 sections with 6 questions in each section. If Pankaj has to attempt any 8 questions, choosing at least two questions from each section, then in how many ways can he attempt the paper?
a) 9375 b) 28125 c) 10125 d) 18000

121. A certain group of friends met on a x-mas eve party and each person shook hands with everybody else in the group exactly once and the number of handshakes turned out to be 120. On the occasion of new year eve, if each person in this group sends a greeting card to every other person in the group, then how many cards are exchanged?

122. Yogita attempts a question paper consisting of 12 questions. Each question has 4 choices. If Yogita answers the questions randomly, then the number of ways in which she can attempt the entire paper is
a) 124 b) 412 c) $^{12}P_4$ d) 48

123. Twelve villages in a district are divided into 3 zones with four villages per zone. The telephone department of the district intends to connect the villages with telephone lines such that every two villages in the same zone are connected with three direct lines and every two villages belonging to different zones are connected with two direct lines. How many direct lines are required?
a) 210 b) 96 c) 54 d) 150

124. The letters of the word TINSEL are permuted in all possible ways and are arranged in a dictionary pattern. The rank of the word LISTEN is
a) 240 b) 281 c) 360 d) 280

125. An advertisement board is to be designed with seven vertical stripes using some or all of the colours red, black, yellow and blue. In how many ways can the board be designed such that no two adjacent stripes have the same colour?
a) 972 b) 2916 c) 729 d) 2187

126. A question paper contains four sections, each section contains 6 questions. In how many ways can a person answer 17 questions so that he answers at least 4 questions from each section?
a) 81000 b) 20250 c) 4(15)4 d) (15)4

127. In how many ways is it possible to express 36 as a product of 3 positive integers?
a) 8 b) 6 c) 12 d) None

128. The letters of the word "BANANA" are permuted in all possible ways and listed in alphabetical order as in a dictionary. What is the rank of the word "NANAAB"?
a) 50 b) 39 c) 51 d) 49

129. Three numbers are selected from the first 15 natural numbers in ascending order. How many such triplets are in arithmetic progression?
a) 64 b) 169 c) 49 d) 81

130. An 8 × 8 chess board is such that its dimensions are 8 cm x 8 cm. In how many ways can we choose two white squares (1 cm × 1 cm), so that they are neither in the same row nor in the same column?
a) 800 b) 992 c) 400 (ID) 1024

131. My mother gave me 5 Rasgollas and went out at 7:00 P.M. She is expected to return by 8:00 P.M. She knew that I would eat them all and so she told me to give a gap of at least 5 minutes between any two rasgollas. Assuming that I can instantaneously eat a rasagolla and I eat them only at the middle of the minute, what is the number of combinations of times at which I could have eaten my rasagollas (of course all) during that one hour?
a) $^{39}C_5$ b) $^{4}C_5$ c) $^{41}C_5$ d) $^{44}C_5$

132. A bag contains ten different green balls and eight different red balls.'In how many ways can 4 balls be drawn such that there are at least one green and at least one red ball?
a) 3060 b) 2780 c) 2220 d) 2740

133. Find the total number of ways in which 14 boys and 10 girls can be seated in a row such that no two girls sit adjacent to each other and a particular boy and a particular girl sit adjacent to each other.