MATHS

BOOKS - VIKRAM PUBLICATION (ANDHRA PUBLICATION)

PERMUTATIONS AND COMBINATIONS

Solved Problems

1. If $^nP_4 = 1680,$ find n.

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2. If $^{12}P_r = 1320,$ find r.

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3. If $^{(n+1)}P_5 : {}^nP_5 = 3:2$, find n

4. If $^{56}P_{(r+6)} : {}^{54}P_{(r+3)} = 30800:1$, find r.

5. In how many ways 9 mathematics papers can be arranged so that the best and the worst (i) may come together (ii) may not come together ?

6. Find the number of ways of arranging 6 boys and 6 girls in row. In how many of these arrangements.

all the girls are together

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7. Find the number of ways of arranging 6 boys and 6 girls in row. In how many of these arrangements.

no two girls are together

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8. Find the number of ways of arranging 6 boys and 6 girls in row. In how many of these arrangements.

boys and girls come alternately ?

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9. Find the number of 4- letter words that can be formed using the letters of the word. MIRACLE. How many of them begin with an vowel

10. Find the number of 4- letter words that can be formed using the letters of the word. MIRACLE. How many of them begin and end with vowels

11. Find the number of 4- letter words that can be formed using the letters of the word. MIRACLE. How many of them end with a consonant ?

12. Find the number of ways of permuting the letters of the word

PICTURE so that

all vowels come together

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13. Find the number of ways of permuting the letters of the word

PICTURE so that

no two vowels come together

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14. Find the number of ways of permuting the letters of the word

PICTURE so that

the relative positions of vowels and consonants are not distributed.

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15. If the letters of the word PRISON are permuted in all possible ways and the words thus formed are arranged in dictionary order, find the rank of the word. PRISON

16. Find the member of 4-digit numbers that can be formed using the digits 2,3,5,6,8 (without repetition). How many of them are divisible by 2

17. Find the member of 4-digit numbers that can be formed using the digits 2,3,5,6,8 (without repetition). How many of them are divisible by 3

18. Find the member of 4-digit numbers that can be formed using the digits 2,3,5,6,8 (without repetition). How many of them are divisible by 4

19. Find the member of 4-digit numbers that can be formed using the digits 2,3,5,6,8 (without repetition). How many of them are divisible by 5

20. Find the member of 4-digit numbers that can be formed using the digits 2,3,5,6,8 (without repetition). How many of them are divisible by 25

21. Find the sum of all 4- digited numbers that can be formed using the digits 1,3,5,7,9.

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22. How many four digited numbers can be formed using the digits 1,2,5,7,8,9 ?

How many of them begin with 9 and end with 2 ?

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23. Find the number of injections of a set A with 5 elements to a set B with 7 elements.

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24. Find the number of ways in which 4 letters can be put in 4 addressed envelopes so that no letter goes into the envelope meant for it.

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25. Find the number of 5 letter words that can be formed using the letters of the word 'MIXTURE' which begin with an vowel when repetitions are allowed.

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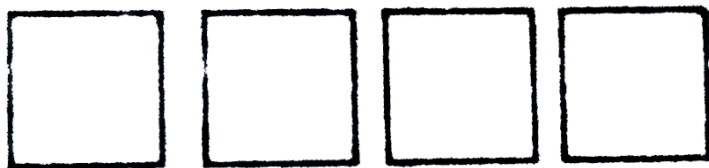**26.** Find the number of functions from a set A with m elements to a set B with n elements.

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27. Find the number of surjections from a set A with n elements to a set B with 2 elements when $n > 1$.

28. Find the number of permutations of 4-digit numbers that can be formed using the digits 1,2,3,4,5,6 when repetition is alowed.

29. Find the number of 4- digit numbers that can be formed using the digits 1,2,3,4,5,6 that are divisible by (i) 2 (ii) 3 when repetition is allowed.

30. Find the number of 5 - letter words that can be formed using the letters of the word EXPLAIN that begin and end with a vowel when repetitions are allowed.

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31. Find the number of ways of arranging the letters of the word SINGING so that

they begin and end with I

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32. Find the number of ways of arranging the letters of the word SINGING so that

the two G's come together

33. Find the number of ways of arranging the letters of the word

SINGING so that

relative positions of vowels and consonants are not disturbed.

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34. Find the number of ways of arranging the letters of the word

$a^4 b^3 c^5$ in its expanded form.

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35. If the letters of the word EAMCET are permuted in all possible

ways and if the words thus formed are arranged in the dictionary

order, find the rank of the word EAMCET.

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36. Find the number of ways of arranging 8 men and 4 women around a circular table. In how many of them all the women come together

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37. Find the number of ways of arranging 8 men and 4 women around a circular table. In how many of them no two women come together

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38. Find the number of ways of seating 5 Indians, 4 Americans and 3 Russians at a round table so that all Indians sit together

39. Find the number of ways of seating 5 Indians, 4 Americans and 3

Russians at a round table so that

no two Russians sit together

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40. Find the number of ways of seating 5 Indians, 4 Americans and 3

Russians at a round table so that

presons of same nationality sit together.

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41. Find the number of different chains that can be prepared using 7

different coloured beads.

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42. Find the number of different ways of preparing a garland using 7 distinct red roses and 4 distinct yellow roses such that no two yellow roses come together.

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43. 14 persons are seated at a round table. Find the number of ways of selecting two persons out of them who are not seated adjacent to each other.

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44. Find the number of ways of selecting 4 boys and 3 girls from a group of 8 boys and 5 girls.

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45. Find the number of ways of selecting 4 English, 3 Telugu and 2 Hindi books out of 7 English, 6 Telugu and 5 Hindi books.

46. Find the number of ways of forming a committee of 4 members out of 6 boys and 4 girls such that there is atleast one girl in the committee.

47. Find the number of ways of selecting 11 member cricket team from 7 bats men, 6 bowlers and 2 wicket keepers so that the team contains 2 wicket keepers and atleast 4 bowlers.

48. If a set of 'm' parallel lines intersect another set of 'n' parallel lines (not parallel to the lines in the first set), then find the number of parallelograms formed in this lattice structure.

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49. The are m points in a plane out of which p points are collinear and no three of the points are collinear unless all the three are from these p points. Find the number of different

Straight lines passing through pairs of distinct points.

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50. The are m points in a plane out of which p points are collinear and no three of the points are collinear unless all the three are from these p points. Find the number of different

triangles formed by joining these points (by line segments).

51. A teacher wants to take 10 students to a park. He can take exactly 3 students at a time and will not take the same group of 3 students more than once. Find the number of times (i) each student can go to the park (ii) the teacher can go to the park.

52. A double decker minibus has 8 seats in the lower deck and 10 seats in the upper deck. Find the number of ways of arranging 18 persons in the bus if 3 children want to go to the upper deck and 4 old people can not go to the upper deck.

53. Prove that

$$^{10}C_3 + {}^{10}C_6 = {}^{11}C_4$$

54. Prove that

$$^{25}C_4 + \Sigma_{r=0}^{4}\,{}^{(29-r)}C_3 = {}^{30}C_4$$

55. If $^{12}C_{(s+1)} = {}^{12}C_{(2s-5)}$, then find s.

56. If $^{n}C_{21} = {}^{n}C_{27}$ find $^{49}C_n$

57. If there are 5 alike pens, 6 alike pencils and 7 alike erasers, find the number of ways of selecting any number of (one or more) things out of them.

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58. Find the number of positive divisors of 1080

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Very Short Answer Questions

1. If $^n P_3 = 1320$, find n.

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2. If $^nP_7 = 42.\ ^nP_5.$ find n.

3. If $10.\ ^nC_2 = 3.\ ^{n+1}C_3$ find n.

4. If $^{15}C_{2r-1} = \ ^{15}C_{2r+4}$, find r.

5. If $^nC_5 = (n)C_6$, then find 13_{Cn}.

6. If $^nP_4 = 1680,$ find n.

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7. Find the number of ways of selecting 4 boys and 3 girls from a group of 8 boys and 5 girls.

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8. Find the value of $^{10}C_5 + 2.\ ^{10}C_4 + \ ^{10}C_3.$

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Short Answer Questions

1. If $^{(n+1)}P_5 : \ ^nP_5 = 3:2,$ find n

2. Find the number of ways of preparing a chain with 6 different coloured beads.

3. If $^nP_r = 5040$ and $^nC_r = 210,$ find n and r.

4. If $^{12}C_{r+1} = {}^{12}C_{3r-5},$ find r.

5. Simplify $^{34}C_5 + \Sigma_{r=0}^4 {}^{(38-r)}C_4.$

6. Find the number of ways of selecting 3 vowels and 2 consonants from the letters of the word EQUATION.

Long Answer Questions

1. Find the sum of all 4 digited numbers that can be formed using the digits 0,2,4,7,8 without repetition.

2. If the letters of the word MASTER are permuted in all possible ways and the words thus formed are arranged in the dictionary order,

then find the ranks of the words

i) REMAST ii) MASTER

3. Find the number of ways of arranging the letters of the word.

INDEPENDENCE

4. Find the number of ways of arranging the letters of the word.

MATHEMATICS

5. Find the number of ways of arranging the letters of the word.

SINGING

6. Find the number of ways of arranging the letters of the word.

PERMUTATION

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7. Find the number of ways of arranging the letters of the word.

COMBINATION

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8. Find the number of ways of arranging the letters of the word.

INTERMEDIATE

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9. Prove that $\dfrac{^{4n}C_{2n}}{^{2n}C_n} = \dfrac{1.3, 5......(4n-1)}{\{1.3.5....(2n-1)\}^2}$

10. If a set A has 12 elements, find the number of subsets of A having

(i) 4 elements (ii) Atleast 3 elements (iii) Atmost 3 elements.

11. Find the number of ways of forming a committee of 5 members out of 6 Indians and 5 Americans so that always the Indians will be in majority in the committee.

12. Find the sum of all 4- digited numbers that can be formed using the digits 1,3,5,7,9.

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1. If $^nP_7 = 42.\ ^nP_5.$ find n.

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2. If $^{(n+1)}P_5 : ^nP_6 = 2 : 7$, find

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3. If $^{12}P_5 + 5.\ ^{12}P_4 = ^{13}P_r$, find r.

4. If $^{18}P_{(r-1)} : {}^{17}P_{(r-1)} = 9 : 7$, find r.

5. A man has 4 sons and there are 5 schools within his reach. In how many ways can he admit his sons in the schools so that no two of them will be in the same school.

6. If there are 25 railway stations on a railway line, how many types of single second class tickets must be printed, so as to enable a passenger to travel from one station to another.

7. In a class there are 30 students. On the New year day, every student posts a greeting card to all his ther classmates. Find the total number of greeting cards posted by them.

8. Find the number of ways of arranging the letters of the word TRIANGLE so that the relative positions of the vowels and consonants are not disturbed.

9. Find the number of numbers that are greater than 4000 which can be formed using the digits 0,2,4,6,8 without repetition.

10. Find the number of ways of arranging the letters of the word MONDAY so that no vowel occupies even place.

11. Find the number of ways of arranging 5 different mathematics books, 4 different Physics books and 3 different chemistry books such that the books of the same subject are together.

12. Find the number of 5 letter words that can be formed using the letters of the word CONSIDER. How many of them begin with "C", how many of them end with 'R' and how many of them begin with "C" and end with "R" ?

13. Find the number of ways of seating 10 students $A_1, A_2 \ldots \ldots A_{10}$ in a row such that (i) A_1, A_2, A_3 sit together (ii) A_1, A_2, A_3 sit in a specified order (iii) A_1, A_2, A_3 sit together ina specified order.

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14. Find the number of ways in which 5 red balls, 4 black balls of different sizes can be arranged in a row so that

no two balls of the same colour come together.

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15. Find the number of ways in which 5 red balls, 4 black balls of different sizes can be arranged in a row so that

the balls of the same colour come together.

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16. Find the number of 4 - digit numbers that can be formed using the digits 1,2,5,6, 7. How many of them are divisible by i) 2 ii) 3 iii)4 iv) 5 v) 25.

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17. If the letters of the word BRING are permuted in all possible ways and the words thus formed are arranged in the dictionary order, then find the 59th word.

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18. Find the sum of all 4 digited numbers that can be formed using the digits 1,2,4,5,6 without repetition.

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19. There are 9 objects and 9 boxes. Out of 9 objects, 5 cannot fit in three small boxes. How many arrangements can be made such that each object can be put in one box only.

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20. Find the number of 4- digited numbers that can be formed using the digits 1,2,4,5,7,8 when repetition is allowed.

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21. Find the number of 5 letter words that can be formed using the letters of the word RHYME if each letter can be used any member of times.

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22. Find the the number of functions from a set A containing 5 elements into a set B containing 4 elements.

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23. Find the number of palindromes with 6 digits that can be formed using the digits (i) 0,2,4,6,8 (ii) 1,3,5,7,9

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24. Find the number of 4 - digit telephone numbers that can be formed using the digits 1,2,3,4,5,6 with atleast one digit repeated.

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25. Find the number of bijections from a set A containing 7 elements onto itself.

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26. Find the number of ways of arranging 'r' things in a line using the given 'n' different things in which atleast one thing is repeated.

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27. Find the number of 5 letter words that can be formed using the letters of the word NAUTRE that begin with N when repetition is allowed.

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28. Find the number of 5 - digit numbers divisible by 5 that can be formed using the digits 0,1,2,3,4,5 when repetition is allowed.

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29. Find the number of numbers less than 2000 that can be formed using the digits, 1,2,3,4 if repetition is allowed.

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30. 9 Different letters of an alphabet are given. Find the number of 4 letter words that can be formed using these 9 letters which have (i) no letter is repeated (ii) atleast one letter is repeated.

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31. Find the number of 4 - digit numbers which can be formed using the digits 0,2,5,7,8 that are divisible by (i) 2 (ii) 4 when repetition is allowed.

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32. The number of 4 digited numbers that can be formed using the digits $\{0, 1, 2, 3, 4, 5\}$ that are divisible by 6 when repetition is allowed

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33. Find the number of ways of arranging 7 persons around a circle.

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34. Find the number of ways of arranging the chief minister and 10 cabinet ministers at a circular table so that the chief minister always sits in a particular seat.

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35. Find the number of ways of arranging 4 boys and 3 girls around a circle so that all the girls sit together.

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36. Find the number of ways of arranging 7 gents and 4 ladies around a circular table if no two ladies wish to sit together.

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37. Find the number of ways of arranging 7 guests and a host around a circle if 2 particular guests wish to sit on either side of the host.

38. Find the numberof ways of preparing a garland with 3 yellow, 4 white and 2 red roses of different sizes such that the two red roses come together.

39. Find the number of ways of arranging 6 boys and 6 girls around a circular table so that (i) all the girls sit together (ii) no two girls sit together (iii) boys and girls sit alternately.

40. Find the number of ways of arranging 6 red roses and 3 yellow roses of different sizes into a garland. In how many of them (i) all the yellow roses are together (ii) no two yellow roses are together

41. A round table conference is attended by 3 Indains, 3 Chinese, 3 Canadians and 2 Americans. Find the number of ways of arranging them at the round table so that the delegates belonging to same country sit together.

42. A chain of beads is to be prepared using 6 different red coloured beads and 3 different blue coloured beads. In how many ways can this be done so that no two blue coloured beads come together.

43. A family consists of father, mother, 2 daughters and 2 sons. In how many different ways can they sit at a round table if the 2 daughters wish to sit on either side of the father ?

44. Find the number of 7 - digit numbers that can be formed using 2,2,2,3,3,4,4.

45. Find the number of 4 - letter words that can be formed using the letters of the word RAMANA.

46. How many numbers can be formed using all the digits 1,2,3,4,3,2,1 such that even digits always occupy even places ?

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47. In a library, there are 6 copies of one book, 4 copies each of two different books, 5 copies each of three different books and 3 copies each of two different books. Find the number of ways of arranging all these books in a shelf in a single row.

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48. A book store has 'm' copies each of, 'n' different books. Find the number of ways of arranging the books in a shelf in a single row.

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49. Find the number of 5 - digit numbers that can be formed using the digits 0,1,1,2,3.

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50. In how many ways can the letters of the word CHEESE be arranged so that no two E's come together ?

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51. Find the number of ways of arranging the letters of the word ASSOCIATIONS. In how many of them i) all the three S's come together ii) The two A's do not come together.

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52. Find the number of ways of arranging the letters of the word MISSING so that the two S's are together and the two I's are together.

53. If the letters of the word AJANTA are permuted in all possible ways and the words thus formed are arranged in dictionary order, find the ranks of the words i) AJANTA ii)JANATA.

54. If $^nP_4 = 210$, find n.

55. If $^{12}C_r = 495$, find the possible values of (r).

56. If $^{n}P_r = 5040 \text{ and } {}^{n}C_r = 210$, find n and r.

57. If $^{n}C_4 = {}^{n}C_6$, find n.

58. If $^{17}C_{2t+1} = {}^{17}C_{3t-5}$, find t.

59. If $^9C_3 + {}^9C_5 = {}^{10}C_r$ then find r.

60. Find the number of ways of forming a committee of 5 members from 6 men and 3 ladies.

61. Find the number of ways of forming a committee of 5 members from 6 men and 3 ladies.

In question no. 10, how many comittees contain alteast two ladies.

62. Prove that for $3 \leq r \leq n$,

$$^{(n-3)}C_r + {}^{(n-3)}C_{(r-1)} + 3. {}^{(n-3)}C_{(r-2)} + {}^{(n-3)}C_{(r-3)} = {}^nC_r.$$

63. Find the number of ways of selecting 3 girls and 3 boys out of 7 girls and 6 boys.

64. Find the number of ways of selecting a committee of 6 members out of 10 members always including a specified member.

65. Find the number of ways of selecting 5 books from 9 different mathematics books such that a particular book is not included.

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66. Find the number of diagonals of a polygon with 12 sides.

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67. If n persons are sitting in a row, find the number of ways of selecting two persons, who are sitting adjacent to each other.

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68. Find the number of ways of giving away 4 similar coins to 5 boys if each boy can be given any member (less than or equal to 4) of

coins.

69. Prove thaty $\dfrac{^{4n}C_{2n}}{^{2n}C_n} = \dfrac{1.3.5.\,\ldots\,.(4n-1)}{\{1.3.5.\,\ldots\,.(2n-1)\}^2}$

70. Find the numbers of ways of selecting a cricket team of 11 players from 7 batsmen and 6 bowlers such that there will be atleast 5 bowlers in the team.

71. If 5 vowels and 6 consonants are given, then how many 6 letter words can be formed with 3 vowels and 3 consonants.

72. Find the number of ways in which 12 things be (i) divided into 4 equal groups (ii) distributed to 4 persons equally.

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73. A class contains 4 boys and g girls. Every Sundy, five students with atleast 3 boys go for a picnic. A different group is being sent every week. During the picnic, the class teacher gives each girls in the group a doil. If the total number of dolls distributed is 85, find g

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