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India's Number 1 Education App

## MATHS

## BOOKS - KC SINHA ENGLISH

## COMBINATIONS - FOR BOARDS

Solved Examples

1. Evaluate: ${ }^{10} C_{5}$

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## 2. Evaluate: ^ $100 C_{97}$

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3. Prove that $\sum_{r=1}^{5} 5 C_{r}=31$

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4. Evaluate : ${ }^{\wedge} 25 C_{22}-{ }^{24} C_{21}$

D Watch Video Solution
5. If ${ }^{15} C_{3 r}={ }^{15} C_{r+3}$, find $r$.

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6. IF ${ }^{18} C_{r}={ }^{18} C_{r+2}$, Find the value of ${ }^{r} C_{5}$

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## 7. Determine n if

(i) ${ }^{2 n} C_{3}: \cdot{ }^{n} C_{3}=12: 1$
(ii). ${ }^{2 n} C_{3}: \cdot{ }^{n} C_{3}=11: 1$

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## 8. If. ${ }^{n} C_{8}={ }^{n} C_{6}$, determine n and hence . ${ }^{n} C_{2}$

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9. find n if ${ }^{n} C_{6}:{ }^{n-3} C_{3}=33: 4$

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10. If $.{ }^{n-1} C_{r}::^{n} C_{r}:{ }^{n+1} C_{r}=6: 9: 13$ find n and r .

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11. The value of expression
^ $47 C_{4}+\sum_{j=1}^{5} \wedge(52+j) C_{3}$ is equal to a.
${ }^{\wedge} 47 C_{5}$ b. ${ }^{\wedge} 52 C_{5} \mathrm{c} .{ }^{\wedge} 52 C_{4}$ d. none of these
12. Prove that product of $r$ consecutive positive integers is divisible by $\mathrm{r}!$.

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13. Find the number of triangles which can be formed having vertices at angular points of a convex polygon of $m$ sides.

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14. Show that a convex polygon of $m$ sides has $m(m-3)$

2 diagonals

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15. A polygon has 44 diagonals. Find the number of sides of the polygon.

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16. A teacher takes three children from her class to a zoo at a time, but she does not take the same three children to the zoo more than once. She finds that she went to the zoo 84
times more than a particular child has gone to
the zoo. The number of children her class is
a. 12 b .10 c .60 d . none of these

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17. On a new year day every student of a class
sends a card to every other student. The post man delivers 600 cards. How many students are there in the class?

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18. We wish to select 6 person from 8 but, if
the person $A$ is chosen, then $B$ must be chosen. In how many can selections be made?
19. A boy has 3 library tickets and books of his interest in the library. Of these 8 , he does not wasnt to borrow Chemistry part II, unless

Chemistry Part I is also borrowed. In how many ways can be choose th three books to be borrowed?

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20. Out of 6 gentlemen and 4 ladies a committee of 5 is to be formed. In how many
ways can this be done so as to include at least one lady in each commiittee?

## D Watch Video Solution

21. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of: (i) exactly 3 girls (ii) atleast 3 girls (iii) atmost 3 girls
22. 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
(i) no girls.
(ii) atleast one boy and one girl.
(iii) atleast three girls.

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23. From a class of 25 students, 10 are to be chosen for an excursion party. There are 3 students who decide that either all of them
will join or none of them will join. In how many ways can the excursion party be chosen?

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24. In a village, there are 87 families of which

52 families have at most 2 children. In a rural
development programme, 20 families are to be
helped chosen for assistance, of which at least 18 families must have at most 2 children. In how many ways can the choice be made?
25. Determine the number of 5-card combinations out of a deck of 52 cards if each selection of 5 cards has exactly one king.

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26. about to only mathematics
27. There are ten points in a plane. Of these ten points, four points are in a straight line and with the exceptionof these four points, on three points are in the same straight line. Find
i. the number of triangles formed, ii the number of straight lines formed iii the number of quadrilaterals formed, by joining these ten points.

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28. There are 4 oranges, 5 apples and 6 mangoes in a fruit basket and all fruits of the
same kind are identical. In how many ways can
a person make a selection of fruits from among the fruits in the basket?

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29. There are five different green dyes, four different blue dyes and three different red dyes. The total number of combinations of
dyes that can be chosen taking at least one green and one blue dye, is

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30. Find the number of divisors of 21600.

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31. It is necessary to pass in each subject out of 6 subjects in an examination. In how many ways can a student failed?

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32. In how many ways 12 different things can be divided equally among 3 persons? Also find in how many ways can these 12 things be divided in three sets each having 4 things.

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33. In how many ways 50 different things can
be divided in 5 sets three of them having 12
things each and tow of them having 7 things each.

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## 34. about to only mathematics

## D Watch Video Solution

35. Five balls of different color are to be placed
in three boxes of different size. Each box can
hold all five. In how many different ways can
we place the balls so that no box remains empty?

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36. How many words of 4 different letters can be formed out 7 capital letters 3 vowels and 5 consonants if each word starts with a capital letter and contains at least one vowel.
37. The English alphabet has 5 vowels and 21 consonants. How many words with 2 different
vowels and 2 different consonants can be formed from the alphabet?

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38. Find the number of permutations of $n$ different things taken $r$ at a time such that two specific things occur together?
39. The number of words of four letters that
can be formed from the letters of the word

EXAMINATION is a. 1464 b. 2454 c. 1678 d. none of these

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40. Find the total number of ways of selecting
five letters from the word INDEPENDENT.
41. An 8 ored boat to be manned from a crew of 11, out of which 3 can only steer but cannot row. 8 can row but cannot steer.In how many ways the staff can be arranged if 2 of the men can only row on bow side.

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## Exercise

1. Find $n$ if $\frac{\wedge(2 n) C_{2}}{\wedge(n) C_{2}}=12: 1$

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## 2. If . ${ }^{n} C_{30}={ }^{n} C_{4}$, find n

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$$
\text { 3. If. }{ }^{n} C_{12}={ }^{n} C_{8} \text {, find. }{ }^{n} C_{17} \text { and }{ }^{22} C_{n}
$$

## - Watch Video Solution

$$
\text { 4. If. }{ }^{18} C_{r}={ }^{18} C_{r+2} \text {, find. }{ }^{r} C_{6}
$$

5. If . ${ }^{n} C_{n-4}=15$, find . ${ }^{n} C_{6}$

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6. If $15 \mathrm{Cr}: 15 \mathrm{C}(\mathrm{r}-1)=11: 5$ find r .

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7. Evaluate $.{ }^{10} C_{4}+{ }^{10} C_{5}$

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8. Evaluate ${ }^{\wedge} 13 C_{6}+{ }^{13} C_{5}$ `

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9. Evaluate. ${ }^{19} C_{18}+{ }^{19} C_{17}$

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10. Evaluate $.{ }^{31} C_{26}-{ }^{30} C_{26}{ }^{\text {' }}$

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11. Evaluate $.{ }^{61} C_{57}-{ }^{60} C_{56}$

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12. If ${ }^{\wedge} n C_{9}={ }^{n} C_{8}$, find ${ }^{\wedge} n$

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13. If $.{ }^{n} C_{10}={ }^{n} C_{12}$, determine n and hence
.${ }^{n} C_{5}$

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14. Prove that: $1+{ }^{3} C_{1}+{ }^{4} C_{2}={ }^{5} C_{3}$

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15. Prove that: $2 \times{ }^{7} C_{4}={ }^{8} C_{4}$
16. Prove that:. ${ }^{2} C_{1}+{ }^{3} C_{1}+{ }^{4} C_{1}={ }^{5} C_{3}-1$

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## 17.

Show
that:
$.{ }^{20} C_{13}+{ }^{20} C_{14}-{ }^{20} C_{6}-{ }^{20} C_{7}=0$

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18. Prove that $.{ }^{n-1} C_{3}+.{ }^{n-1} C_{4}>\cdot{ }^{n} C_{3}$ if $n>7$.

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19. 

$.{ }^{n} C_{r}=84, .{ }^{n} C_{r-1}=36$ and. ${ }^{n} C_{r+1}=126$,
then find the value of $n$.

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20. In how many ways can a committee be selected from 15 persons if the committee is to have (i). 3 members, (ii). 13 members

## D Watch Video Solution

21. How many different teams of 7 players can
be chosen from 10 players?

## D Watch Video Solution

22. Sudha wants to choose any 9 stamps from a set of 11 different stamps. How many different selections can she make?

## D Watch Video Solution

23. How many chords can be drawn through 21
points on a circle?

D Watch Video Solution
24. Seven points lie on a circle. How many chords can be drawn by joining these points.

D Watch Video Solution
25. How many selection of 4 books can be made from 8 different books?

D Watch Video Solution
26. In how many ways can a student choose a programme of 5 courses if 9 courses are available and 2 specific courses are compulsory for every student?

## D Watch Video Solution

27. How many quadrilaterals can be formed joining the vertices of a convex polygon of $n$ sides?

- Watch Video Solution

28. A man has 7 friends and he wants to invite

3 of them at a party. Find how many parties to each of 3 different friends he can give and how many times any particular friend will attend the parties?

## D Watch Video Solution

29. Prove that the number of combinations of
n things taken r at a time in which p particular
things always occur is.${ }^{n-p} C_{r-p}$

## - Watch Video Solution

30. A delegation of 6 members is to be sent abroad out of 12 members. In how many ways can the selection be made so that , a particular member is included?

## - Watch Video Solution

31. A delegation of 6 members is to be sent abroad out of 12 members. In how many ways
can the selection be made so that, $A$ particular member is excluded?

- Watch Video Solution

32. There are 6 students $A, B, C, D, E, F$. In how many ways can they be seated in a line so that
$C$ and $D$ do not sit together?

D Watch Video Solution
33. There are 6 students $A, B, C, D, E, F$. In how many ways can a committee of 4 be formed so as to always include C?

## D Watch Video Solution

34. There are 6 students $A, B, C, D, E, F$. In hoiw many ways can a committee of 4 be formed so as to always include $C$ but exclude $E$ ?

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35. There are n stations on a railway line. The number of kinds of tickets printed (no return tickets) is 105 . Find the number of stations

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36. Twelve persons meet in a room and each
shakes hand with all others. Find the number oif hand shakes.
37. Determine the number of 5 card combinations out of a deck of 52 cards if there is exactly one ace in each combination.

## D Watch Video Solution

38. There are 15 points in a plane, no three of which are in the same straight line with the exception of 6 , which are all in the same straight line. Find the number of i. straight lines formed, ii. number of triangles formed by joining these points.

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39. There are 10 points in a plane out of which

5 are collinear. Find the number of quadrilaterals formed having vertices at these points.

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40. In how many ways can a team of 11 players be selected from 14 players when two of them can play as goalkeepers only?

## - Watch Video Solution

41. In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers?

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42. To fill 12 vacancies, there are 25 candidates of which 5 are from scheduled caste. If three of
the vacancies are reserved for scheduled caste candidates while the rest are open to all; the number of ways in which the selection can be made is a. ${ }^{\wedge} 5 C_{3} \times{ }^{22} C_{9}$ b. ${ }^{\wedge} 22 C_{9}-{ }^{5} C_{3}$ c. ${ }^{\wedge} 22 C_{3} 3+{ }^{\wedge} 5 C_{3} 3 \mathrm{~d}$. none of these

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43. A committee consisting of 2 men and 2 women is to be chosen from 5 men and 6 women. IN how many ways can this be done?
44. A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

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45. In how many ways a committee consisting
of 3 men and 2 women can be chosen from 7
men and 5 women?
46. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (i) four cards are of the same suit, (ii) four cards belong to four different suits, (iii) are face cards, (iv) two are red cards and two are bla
47. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.

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48. In how many ways can a team of 3 boys
and 3 girls be selected from 5 boys and 4 girls?
49. A bag contains 5 black and 6 red balls, determine the number of ways in which 2 black and 3 red balls can be selected from the lot.

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50. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of:
exactly 3 girls (ii) atleast 3 girls (iii) atmost 3 girls

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51. At an election, three wards of a town are convassed by 4,5 , and 8 men respectively. If
there are 20 volunters. In how many ways can they be alloted to different wards?

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52. Out of 7 men and 4 ladies committee of 5
is to be formed. In how many ways can this be done so as to include at least 3 ladies?

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53. A candidate is required to answer 6 out of

10 questions, which are divide into two groups, each containing 5 questions. He is not permitted to attempt more than 4 questions from either group. The number of different
ways in which the candidate can choose 6 questions is a. 50 b. 150 c. 200 d. 250

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54. A mathematics paper consists of 10 questions divided into two parts I and II each part containing 5 questions. A student is required to attempt 6 questions in al, taking at least 2 questions from each part. In how many ways can student select the questions?
55. In an examination, a question paper consists of 12 questions divided into two parts i.e., Part I and Part II, containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In

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56. There are 10 professors and 20 students out of whom a committee of 2 professors and

3 students is to be formed. A)Find the number of ways in which this can be done. B) Further find in how many of these committees: A particular professor is included A particular student is included Particular student is excluded

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57. From 6 boys and 7 girls a committee of 5 is
to be formed so as to include at least one girl.

Find the number of ways in which this can be done.

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58. From 6 gentlemen and 4 ladies a committee of 5 is to be formed. In how many
ways can this be done if,( i). there is no restriction (ii). the committee is to include at least one lady.
59. From 8 gentlemen and 4 ladies a committee of 5 is to be formed. In how many ways can this be done so as to include at least one lady?

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60. A committee of 6 is to be formed out of 4
boys and 6 girls. In how many ways can it be done so that the girls may not be out numbered?
61. A persons has got 12 friends of whom 8 are relatives. In how many ways can he invite 7 guests such that 5 of them may be relatives ?

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62. A candidate is required to answer 7 questions out of 12 questions, which are divided into two groups, each containing 6 questions. He is not permitted to attempt
more than 5 questions from either group. Find
the number of different ways of doing questions.

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63. Each of two parallel lines has a number of
distinct points marked on them. On one line
there are 2 points $P$ and $Q$ and on the other
there are 8 points. i. Find the number of triangles formed having three of the 10 points
as vertices. ii. How many of these triangles include $P$ but exclude $Q$ ?

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64. There are 7 men and 3 ladies contesting
for two vacancies, an elector can vote for any number of candidates not exceeding the number of vacancies. In how many ways can be vote?

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65. A committee of 6 is chosen from 10 men
and 7 women so as to contain at least 3 men
and 2 women. In how many ways can this be done if two particular women refuse to serve on the same committee? a. 850 b. 8700 c. 7800 d. none of these

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66. For examination, a candidate has to select

7 subjects from 3 different groups A, B, C which contain $4,5,6$ subjects, respectively. The
number of different way in which a candidate
can make his selection if he has to select at least 2 subjects form each group is?

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67. From 5 apples, 4 mangoes \& 3 bananas, in
how many ways we can select atleast two
fruits of each variety if fruits of same species are identical?

## D Watch Video Solution

68. Find the total number of selections of at
least one red ball from 4 red balls and 3 green balls, if (a) the balls of the same colour are different, (b) the balls of the same colour are identical.

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69. How many different amounts can be formed with 4 one rupee coins, 5 two rupee coins ad 6 five rupee coins?
70. There are 5 questions in a questions paper.

In how many ways can boy solve one or more questions?

D Watch Video Solution
71. In an election for 3 seats there are 6 candidates. Voter cannot vote for more than 3 candidates. In how many ways can he vote?
72. In an election the nuber oif candidates is one more than thenumber of members to be electeed. If a voter cn vote in 30 different weaqys, find the number of candidates (A voter has to vote for at least one candidate).

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73. In how many ways 12 different books can be distributed equally distributed equally among 4 persons?
74. Number of ways in which 12 different books can be distributed equally among 3 persons, is

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75. (i) In how many ways can a pack of 52 cards
be divided equally among four players? (ii) (ii)
In how many ways can you divide these cards
in four sets, three of them having 17 cards each and the four the one just one card?

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76. In how many ways can 7 cross marks $X$ be placed in the given figure so that each row has at least one cross mark?

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77. Out of 10 consonants and 4 vowels, how many words can be formed each containing 3 consonants and 2 vowels ?

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78. How many words, with or without meaning,
each of 3 vowels and 2 consonants can be
formed from the letters of the word INVOLUTE?
79. How many words, with or without meaning,
each of 2 vowels and 3 consonants can be formed from the letters of the word

## DAUGHTER?

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80. A table has 7 seats, 4 being on one side facing the window and 3 being on the opposite side. In how many ways can 7 people be seated at the table.

If 3 people , $X, Y$ and $Z$ must sit on the side facing the window ?

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81. A tea party is arranged for 16 persons along two sides of a long table with 8 chairs on each
side. Four persons wish to sit on one particular and two on the other side. In how many ways can they be seated?
82. Eight chairs are numbered 1 to 8 . Two women and 3 men wish to occupy one chair each. First the women choose the chairs from amongst the chairs 1 to 4 and then men select from the remaining chairs. Find the total number of possible arrangements.

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83. A team of 8 players is to be chosen from a group of 12 players. Out of the 8 players one is to be elected as captain and another an, vice-
captain. In how many ways can this is done?
(A) 27720 (B) 13860 (C) 6930 (D) 495

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84. How many three letter words can be made using the letters of the word ORIENTAL?

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