MATHS

BOOKS - RS AGGARWAL MATHS (HINGLISH)

PERMUTATIONS

Solved Example

1. Compute:

$(i)\ \frac{10!}{(7!)\times(3!)}$ $(ii)\ \frac{30!}{28!}$ $(iii)\ \frac{11!-10!}{9!}$

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2. If $\frac{x}{10!}=\frac{1}{8!}+\frac{1}{9!}$, find the value of x

A. 100

B. 90

C. 900

D. 110

Answer: A

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3. Express each of the following products in factorials:

$(i) 5 \times 6 \times 7 \times 8 \times 9 \qquad (ii) 2 \times 4 \times 6 \times 8 \times 10$

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4. Find the LCM of $(5!, 6!, 7!)$.

A. $(7!)$.

B. $(6!)$.

C. $(5!)$.

D. None of these

Answer: A

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5. If $(n+1)! = 90 \times (n-1)!$, find n.

A. $n = 11$

B. $n = 8$

C. $n = 10$

D. $n = 9$

Answer: D

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6. If $(n+2)! = 60 \times (n-1)!$, find n.

A. 4

B. 3

C. 5

D. 6

Answer: B

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7. Prove that $(n! + 1)$ is not divisible by any natural number between $2 and n$.

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8. Prove that $n(n-1)(n-2)...(n-r+1) = \frac{n!}{(n-r)!}$.

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9. Prove that $\frac{(2n)!}{n!} = 2^n \times \{1 \times 3 \times 5 \times \ldots \times (2n-1)\}$.

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10. Prove that `(n !)^2

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Example

1. In a class there are 15 boy and 12 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 the selection?

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2. In a class there are 16 boys and 9 girls. The teacher wants to select either a boy a girl as a class representative. In how many ways can the

teacher make the selection?

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3. In how many ways can 6 persons stand in a queue?

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4. How many different signals can be made by 4 flags from 6 flags of different colours?

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5. Eight athletes are participating in a race. In how many ways can the first 3 prizes be won by them?

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6. In how many ways three different rings can be worn in four fingers with at most one in each finger?

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7. Three men have 4 coats, 6 waistcoats and 5 caps. In how many ways can they wear them?

A. ${}^4P_3.\ {}^6P_3.\ {}^5P_3(3!)^3$

B. ${}^4C_3.\ {}^6C_3.\ {}^5C_3$

C. ${}^4C_3.\ {}^6C_3.\ {}^5C_3.6!.4!.5!$

D. ${}^4P_3.\ {}^6P_3.\ {}^5P_3$

Answer: D

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8. How many different signals can be given using any number of flags from 4 flags of different colours?

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9. A code word is to consist of two distinct English alphabets followed by two distinct number from $1 \to 9$. for example, $CA23$ is a code word. How many such code words are there? How many of them end with an even integer?

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10. Find the number of ways in which 5 boys and 3 girls can be arranged in a row so that no two girls are together.

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11. There are 2 English, 3 Sanskrit and 4 Hindi books. In how many ways can they be arranged on a self so as to keep all the books of the same language together?

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12. In how many ways can 7 exmination paopers be arranged so that the best and the worst papers are never together?

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13. In how many ways can 6 balls of different colours, namely black, white, blue, red, green and yellow be arranged in a row in such a way that the black and white balls ar never together?

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14. The Principal wants to arrange 5 students on the platform such that the boy SALIM occupies the second position and such that the girl. SITA is always adjacent to the girl RITA. How many such arrangements are possible?

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15. How many words, with or without meaning, can be formed by using all the letters of the word DELHI using each letter exactly once?

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16. How many 4-letter word, with or without meaning, can be formed out of the letters of the word, LOGARITHMS, if repetition of letters is not allowed?

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17. Find the number of different 8-letter arrangements that can be made from the letters of the word DAUGHTER so that (i) all vowels occur together (ii) all vowels do not occur together.

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

(i) 4 letters are used at a time?

(ii) all letters are used at a time?

(iii) all letters are used but first letter is a vowel?

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19. How many words can be formed from the letters of the word, TRIANGLE? How many of these will begin with T and end with E?

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20. How many words can be formed with the letters of the words ORDINATE so the vowels occupy odd places?

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21. How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?

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22. Find the number of 4-digit numbers that can be formed using the digits 1,2,3,4,5 if no digit is repeated. How many of these will be even?

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23. How many 6-digit telephone numbers can be constructed with digits 0,1,2,3,4,5,6,7,8,9 if each number starts with 35 and no digit appears more

than once?

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Illustrative Examples

1. In a cinema hall, there are three entrance doors and two exit doors. In how many ways can a person enter the hall and then come out?

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2. Three persons enter a railway carriage, where there are 5 vacant seats. In how many ways can they seat themselves?

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3. The flag of a newly formed forum is in the form □ □ □ of three blocks, each to be coloured differently. If there are six different colours on

the whole to choose from, how many such designs are possible ?

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4. There are 4 routes between Delhi and Patna. In how many different ways can a man go from Delhi to Patna and return, if for returning

(i) any of the routes is taken,

(ii) the same route is taken,

(iii) the same route is not taken?

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5. There are six multiple - choice questions in an examination. Find the total number of ways of answering these questions, if the first three questions have 5 choices each and the next three have 4 choices each.

A. $(5 \times 5 \times 5 \times 4 \times 4 \times 4)$

B. $(5 \times 4 \times 3 \times 4 \times 3 \times 2)$

C. $(5 \times 5 \times 5 \times 5 \times 5 \times 5)$

D. $(4 \times 4 \times 4 \times 4 \times 4 \times 4)$

Answer: A

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6. Four flags of different colours are given. How many different signals can be genrated, if a signal requires the use of two flags, one below the other?

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7. Find the number of 4-letter words. with or without meaning, which can be formed out of the letters of the word, 'NOSE' , when :

(i) the repetition of the leters is not allowed,

(ii) the repetition of the letters is allowed.

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8. How many words (with or without meaning) of three distinct letters of the English alphabet are there?

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9. How many numbers are there between 100 and 1000 in which all the digits are distinct?

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10. How many 9-digit numbers of different digits can be formed?

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11. How many numbers between 2000 and 3000 can be formed from the digits 2, 3, 4, 5, 6, 7 when repetition of digits is not allowed?

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12. How many 3-digit odd numbers can be formed by using the digits 1, 2, 3, 4, 5, 6 when

(i) the repetition of digits is not allowed?

(ii) the repetition of digits is allowed?

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13. How many odd numbers less than 1000 can be formed by using the digits 0, 2, 5, 7 when the repetition of digits is allowed?

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14. How many numbers are there between 100 and 1000 such that 7 is in the unit's place?

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15. How many numbers are there between 100 and 1000 such that at least one of their digits is 7?

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16. How many numbers are there between 100 and 1000, which have exactly one of their digits as 7?

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17. How many numbers are there between 100 and 1000 such that every digit is either 2 or 9?

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18. How many three digit numbers can be formed without using the digits 0,2,3,4,5 and 6?

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19. In how many ways can 8 students be arranged in

(i) a line, (ii) a circle?

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20. If 20 persons were invited for a party, in how many ways can they and the host be seated at a circular table?

In how many of these ways will two particular persons be seated on either side of the host?

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21. In how many ways can a party of 4 men and 4 women be seated at a circular table so that no two women are adjacent?

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22. A round table conference is to be held between delegates of 20 cuntries. In how many ways can they can they be seated if two particular delegates may wish to sit together?

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23. The number of ways can seven persons sit around a table so that all shall not have the same neighbours in any two arrangements is

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24. 3 boy and 3 girls are to be seated around a table in a circle. Among them, the boy X does not want any girl neighbour and the girl Y does not want any boy neighbour. How many such arrangements are possible?

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25. Find number of ways that 8 beads o different colors be strung as a necklace.

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Solved Examples

1. Evaluate

(i) ${}^{12}P_4$ (ii) ${}^{75}P_2$ (iii) ${}^{8}P_8$

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2. Find the value of n such that

(i) ${}^{n}P_5 = 42 \times {}^{n}P_3, n > 4$ (ii) $\frac{{}^{n}P_4}{{}^{n-1}P_4} = \frac{5}{3}, n > 4.$

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3. Find r if

(i) $.^5 P_r = 2.^6 P_{r-1}$ (ii) $.^5 P_r = ^6 P_{r-1}$.

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4. If $^n P_4 = 2 \times ^5 P_3$, find n.

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5. (i) If $^{15} P_r = 2730,$ find the value of r.

(ii) If $^{10} P_r = 5040,$ find the value of r.

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

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7. If $\hat{} \ 2n+1P_{n-1} : {}^{2n-1}P_n = 3:5, f \in dn.$

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8. If ${}^{22}P_{r+1} : {}^{20}P_{r+2} = 11:52,$ find r.

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9. Prove that:

(i)

${}^nP_n = {}^nP_{n-1}$ (ii) ${}^nP_r = n \cdot {}^{n-1}P_{r-1}$ (iii) ${}^{n-1}P_r + r \cdot {}^{n-1}P_{r-1} =$

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10. If $r < s \leq n$ then prove that ${}^nP_s$ is divisible by ${}^nP_r.$

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11. Find the number of permutations of 7 objects, taken 3 at a time.

A. ${}^{7}P_{3}$

B. ${}^{7}C_{3}$

C. ${}^{7}P_{3}7!$

D. ${}^{7}P_{3}3!$

Answer: A

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12. Find the number of different permutations of the letters of the word $BANANA$?

A. 180

B. 720

C. 60

D. None

Answer: C

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13. How many words can be formed using the letter A thrice, the letter B twice and the letter C thrice?

A. $\frac{8!}{(3!) \times (2!) \times (3!)}$

B. $8!$

C. $\frac{(8 \times 2 \times 3 \times 3)!}{(3!) \times (2!) \times (3!)}$

D. None

Answer: A

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14. (i) Find how many arrangements can be made with the letters of the word 'MATHEMATICS'.

(ii) In how many of them are the vowels together?

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15. Find the number of arrangements of the letters of the INDEPENDENCE. In how many of these arrangements, (i) do the words start with P (ii) do all the vowels always occur together (iii) do the vowels never occur together (iv) do the words begin wit

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16. How many different words can be formed by using all the letters of the word ALLAHABAD? In how many of them vowels occupy the even positions? In how many of them both L do not come together?

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17. In how many of the distinct permutations of the letters in MISSISSIPPI do the four I's not come together?

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18. (i) How many words can be formed with the letters of the word, 'HARYANA'?

How many of these

(ii) have H and N together?

(iii) begin with H and end with N?

(iv) have 3 vowels together?

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19. In how many ways can the letters of the word 'PERMUTATIONS' be arranged, if

(i) the words start with P and end with S?

(ii) the vowels are all together?

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20. If the different permutations of all the letter of the word EXAMINATION are listed as in a dictionary; how many words are there in this list before the first word starting with E?

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21. Find the number of words with or without meaning which can be made using all the letters of the word AGAIN. If these words are written as in a dictionary, what will be the 50th word?

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22. How many numbers greater than a million can be formed with the digits 2, 3, 0, 3, 4 , 2, 3?

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23. How many numbers greater than 400000 can be formed by using the digits 0, 2, 2, 4, 4, 5?

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24. How many numbers can be formed using the digits 1, 2, 3, 4, 3, 2, 1 so that the odd digits always occupy the odd places?

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25. In how many ways can 4 letters be posted in 3 letter boxes?

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26. In how many ways can 6 different rings be worn in 4 fingers of the hand?

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27. In how many ways can 5 apples be distributed among 6 boys, there being no restriction to the number of apples each boy may get?

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28. In how many ways can 3 prizes be distributed among 4 boys, when

(i) no boy gets more than 1 prizes ,

(ii) a boy may get any number of prizes,

(iii) no boy gets all the prizes?

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29. How many four-digit numbers can be formed with the digits 1, 2, 3, 4, 5, 6 when a digit may be repeated any number of times in any arrangement ?

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30. How many 4-digit numbers are there, when a digit may be repeated any number of times?

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Exercise 8 A

1. Compute:

$(i)\dfrac{9!}{(5!)\times(3!)}$ $(ii)\dfrac{32!}{29!}$ $(iii)\dfrac{(12!)-(10!)}{9!}$

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2. Prove that LCM {6!, 7!, 8!} = 8!.

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3. Prove that $\frac{1}{10!}+\frac{1}{11!}+\frac{1}{12!}=\frac{145}{12!}$.

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4. If $\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!}$, find x.

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5. Write the following products in factorial notaion:

(i) $6\times7\times8\times9\times10\times11\times12$ (ii) $3\times6\times9\times12\times15$

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6. Which of the following are true or false?

$(2+3)!=2!+3!$ (ii) $(2\times3)!=(2!)\times(3!)$

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7. If $(n+1)! = 12 \times (n-1)!$, find the value of n.

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8. if $(n+2)! = 2550 \times n!$, find the value of n.

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9. If $(n+3)! = 56 \times (n+1)!$, find the value of n.

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10. If $\frac{n!}{(2!) \times (n-2)!} : \frac{n!}{(4!) \times (n-4)!} = 2:1$, find the value of n.

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11. If $\frac{(2n!)}{(3!) \times (2n-3)!} : \frac{n!}{(2!) \times (n-2)!} = 44:3$, find the value of n.

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12. Evaluate $\frac{n!}{(r!) \times (n-r)!}$, when n = 15 and r = 12.

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13. Proove that $(n+2) \times (n!) = (n!) + (n+1)!$.

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14. Prove that :

(i) $\frac{n!}{r!} = n(n-1)(n-2)...(r+1)$

(ii) $(n-r+1) \cdot \frac{n!}{(n-r+1)!} = \frac{n!}{(n-r)!}$

(iii) $\frac{n!}{r!(n-r)!} + \frac{n!}{(r-1)!(n-r+1)!} = \frac{(n+1)!}{r!(n-r+1)!}$

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Exercise 8 B

1. There are 10 buses running between Delhi and Agra. In how many ways can a man go from Delhi to Agra and return by a different bus?

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2. A, B and C are three cities. There are 5 routes from A to B and 3 routes from B to C. How many different routes are there from A to C via B?

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3. There are 12 steamers plying between A and B. In how many ways could the round trip from A be made if the return was made on (i) the same steamer? (ii) a different steamer?

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4. In how many ways can 4 people be seated in a row containing 6 seats?

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5. In how many ways can 5 ladies draw water from 5 taps, assuming that no tap remains unused?

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6. In a textbook on mathematics there are three exercise A, B and C consisting of 12, 18 and 10 questions respectively. In how many ways can three quesitons be selected choosing one from each exercise?

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7. In a school, there are four sections of 40 students each in XI standard. In how many ways can a set of 4 student representatives be chosen, one

from each section?

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8. In how many ways can a vowel, a consonant and a digit be chosen out of the 26 letters of the English alphabet and the 10 digits?

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9. How many 8- digit telephone numbers can be constructed using the digits 0 to 9 if each number starts with 270 and no digit appears more than once?

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10. (a) A coin is tossed three times and the outcomes are recorded. How many possible outcomes are there?

(b) How many possible outcomes if the coin is tossed:

(i) four times? (ii) five times? (iii) n times?

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11. Find the number of different signals that can be generated by arranging at least 2 flags in order (one below the other) on a vertical staff, if five different flags are available.

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12. How many 4 - letter codes can be formed using the first 10 letters of the English alphabet, if no letter can be repeated?

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13. Given, A = {2, 3, 5} and B = {0, 1}. Find the number of different ordered pairs in which the first entry is an element of A and the second is an

element of B.

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14. How many arithmetic progressions with 10 terms are there whose first term is the set {1, 2, 3} and whose common difference is in the set {2, 3, 4} ?

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15. There are 6 items in column A and 6 items in column B. A student is asked to match each item in column A with an item in column B. How many possible (correct or incorrect)answers are there to this questions?

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16. A mint prepares metallic calendars specifying months, dates and days in the form of monthly sheets (one plate for each month). How many

types of February calendars should it prepare to serve for all the possibilities in the future years?

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17. From among the 36 teachers in a school, one principal and one vice-principal are to be appointed. In how many ways can this be done?

A. 1360

B. 1260

C. 1060

D. 1160

Answer: 1260

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18. A sample of 3 bulbs is tested. A bulb is labelled 'G' if it is good and 'D' if it defective. Find the number of all the possible outcomes.

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19. For a set of five true or false questions, no student hs written the all correct answer and no two students have given the same sequence of answers. What is the maximum number of students in the class for this to be possible?

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20. In how many ways can the following prizes be given away to a class of 20 students:

first and second in mathematics,l first and second in chemistry, first in physics and first in English?

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21. Find the total number of ways of answering 5 objective-type questions, each question having 4 choices.

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22. A gentleman has 6 friends to invite. In how many ways, can he send invitation cards to them, if he has three servants to carry the cards?

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23. In how many ways 6 rings of different types can be worn in 4 fingers?

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24. In how many can 5 letters be posted in 4 letter boxes?

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25. How many 3-letter words can be formed using a, b, c, d, e if

(i) repetition of letters is not allowed?

(ii) repetition of letters is allowed?

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26. How many 4-digit numbers are there, when a digit may be repeated any number of times?

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27. How many numbers can be formed from digits 1, 3, 5, 9 if repetition of digits is not allowed?

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28. How many 3-digit numbers are there with no digit repeated?

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29. How many 3-digit numbers can be formed from the digits 0, 1, 3, 5, 7, 9 when no digit is repeated? How many of them are divisible by 10 ?

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30. How many 6-digit numbers can be formed form the digits 0, 1, 3, 5, 7, 9 when no digit is repeated? How many of them are divisible by 10?

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31. How many natural numbers less than 1000 can be formed from the digits 0, 1, 2, 3, 4, 5 when a digit may be repeated any number of times?

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32. How many 6-digit telephone numbers can be constructed using the digits 0 to 9, if each number starts with 67 and no digit appears more than once?

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33. In how many ways can three jobs I, II and III be assigned to three persons A, B and C if one person is assigned only one job and all are capable of doing each job?

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34. A number lock on a suitcase has three wheels each labelled with ten digits 0 to 9. If opening of the lock is a particular sequence of three digits with no repeats, how many such sequences will be possible? Also, find the number of unsuccessful attempts to open the lock.

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35. A customer forgets a four digit code for an Automatic Teler Machine (ATM) in a bank. However, he remembers that this code consists of digits 2, 3, 6 and 9. Find the largest possible number of trials necessary to obtain the correct code.

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36. In how many ways can 3 prizes be distributed among 4 girls, when

(i) no girl gets more than one prize?

(ii) a girl may get any number of prizes?

(iii) no girl gets all the prizes?

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Exercise 8 C

1. Evaluate:

(i) ${}^{10}P_4$ (ii) ${}^{62}P_3$ (iii) ${}^{6}P_6$ (iv) ${}^{9}P_0$

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2. Prove that ${}^{9}P_3 + 3 \times {}^{9}P_2 = {}^{10}P_3$.

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3. (i) If ${}^{n}P_5 = 20 \times {}^{n}P_3$, find n.

(ii) If $16 \times {}^{n}P_3 = 13 \times {}^{n+1}P_3$, find n.

(iii) If ${}^{2n}P_3 = 100 \times {}^{n}P_2$, find n.

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4. (i) If ${}^{5}P_r = 2 \times {}^{6}P_{r-1}$, find r.

(ii) If ${}^{20}P_r = 13 \times {}^{20}P_{r-1}$, find r.

(iii) If ${}^{11}P_r = {}^{12}P_{r-1}$, find r.

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5. (i) If ${}^{n}P_{4} : {}^{n}P_{5} = 1:2$, find n.

(ii) If ${}^{n-1}P_{3} : {}^{n+1}P_{3} = 5:12$, find n.

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6. If ${}^{15}P_{r-1} : {}^{16}P_{r-2} = 3:4$, find r.

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7. If ${}^{2n-1}P_{n} : {}^{2n+1}P_{n-1} = 22:7$, find n.

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8. Find n, ${}^{n+5}P_{n+1} = \frac{11}{2}(n-1) \cdot {}^{n+3}P_{n}$.

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9. Prove that

$1 + 1 \cdot {}^{1}P_1 + 2 \cdot {}^{2}P_2 + 3 \cdot {}^{3}P_3 + \ldots + n \cdot {}^{n}P_n = {}^{n+1}P_{n+1}.$

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10. Find the number of permutations of 10 objects, taken 4 at a time.

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Exercise 8 D

1. In how many ways can 5 persons occupy 3 vacant seats?

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2. In how many ways can 7 people line up at a ticket window of a cinema hall?

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3. In how many ways can 5 children stand in a queue?

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4. In how many ways can 6 women draw water from 6 wells, if no well remains unused?

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5. In how many ways can 4 different books, one each in chemistry, physics, biology and mathematics, be arranged on a shelf?

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6. Six students are contesting the election for the presidentship of the students' union. In how many ways can their names be listed on the ballot papers?

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7. It is required to seat 5 men and 3 women in a row so that the women occupy the even places. How many such arrangements are possible ?

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8. There are 6 items in column A and 6 items in column B. A student is asked to match each item in column A with an item in column B. How many possible, correct or incorrect, answer are there to this question?

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9. Five letters F, K, R, T and V one in each were purchased from a plastic warehouse. How many ordered pairs of letters, to be used as initials, can be formed from them?

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10. Ten students are participating in a race. In how many ways can the first three prizes be won?

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11. There are six periods in each working day of the school. In how many ways can one arrange 5 subjects such that each subject is allowed at least one period?

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12. In how many ways can 6 pictures be hung from 4 picture nails on a wall?

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13. How many words, with or without meaning, can be formed using all the letters of the word EQUATION, using each letter exactly once.

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14. Find the number of different 4-letter words (may be meaningless) that can be formed from the letters of the word 'NUMBERS'.

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15. How many words can be formed from the letters of the word SUNDAY? How many of these begin with D?

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16. How many words beginning with C and ending with Y can be formed by using the letters of the word 'COURTESY' ?

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17. Find the number of permutations of the letters of the word 'ENGLISH'. How many of these begin with E and end with I?

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18. In how many ways can the letters of the word 'HEXAGON' be permuted? In how many words will the vowels be together?

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19. How many words can be formed out of the letters of the word, ORIENTAL, so that the vowels always occupy the odd places?

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20. In how many ways can the letters of the word FAILURE be arranged so that the consonants may occupy only odd positions?

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21. In how many arrangements of the word 'GOLDEN' will the vowels never occur together ?

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22. In how many different ways can the letters of the word MACHINE be arranged so that the vowels may occupy only the odd positions? (a) 210

(b) 576 (c) 144 (d) 1728 (e) 3456

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23. How many permutations can be formed by the letters of the word 'VOWELS', when

(i) there is no restriction on letters,

(ii) each word begins with O and ends with L,

(iv) all vowels come together,

(v) all consonants come together?

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24. How many numbers divisible by 5 and lying between 3000 and 4000 can be formed by using the digits 3, 4, 5, 6, 7, 8 when no digit is repeated in any such number?

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25. In an examination, there are 8 candidates out of which 3 candidates have to appear in mathematics and the rest in different subject. In how many ways can they be seated in a row, if candidtes appearing in mathematics are not to sit together ?

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26. In how many ways can 5 children be arranged in a line such that

(i) two of them, Rajan and Tanvy, are always together?

(ii) two of them, Rajan and Tanvy, are never together?

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27. When a group photograph is taken, all the seven teachers should be in the first row and all the twenty students should be in the second row. If the two corners of the second row are reserved for the two tallest students, interchangeable only between them, and if the middle seat of

the front row is reserved for the principal, how many arrangements are possible?

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28. Find the number of ways in which m boys and n boys and n girls may be arranged in a row so that no two of the girls are together, it being given that $m > n$.

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Exercise 8 E

1. Find the total number of perpemutations of the letters of each of the words given below:

(i) APPLE (ii) ARRANGE (iii) COMMERCE

(iv) INSTITUTE (v) ENGINEERING (vi) INTERMEDIATE

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2. In how many ways can the letters of the expressions $x^2y^3z^4$ be arranged when written without using exponents?

A. 1250

B. 1260

C. 1270

D. 1280

Answer: B

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3. There are 3 blue balls, 4 red balls and 5 green balls. In how many ways can they be arranged in a row?

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4. A child has three plastic toys bearing the digits 3, 3, 5 respectively. How many 3-digit numbers can be make using them?

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5. How many different signals can be transmitted by arranging 2 red, 3 yellow and 2 green flags on pole, if all the seven flags are used to transmit a signal?

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6. How many words can be formed by arranging the letters of the word 'ARRANGEMENT', so that the vowels remian together?

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7. How many words can be formed by arranging the letters of the word 'INDIA', so that the vowels are never together?

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8. Find the number of arrangements of the letters of the word 'ALGEBRA' without altering the relative positions of the vowels and the consonants.

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9. How many words can be formed from the letters of the word 'SERIES', which start with S and end with S?

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10. In how many ways can the letters of the word 'PARALLEL' be arranged so that all L' s do not come together ?

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11. How many different words can be formed with the letters of the word 'CAPTAIN'? In how many of these C and T are never together ?

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12. In how many ways can the letters of the word ASSASSINATION be arranged so that all the S s are together ?

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13. (i) How many arrangements can be made by using all the letters of the word 'MATHEMATICS'?

(ii) How many of them begin with C?

(iii) How many of them begin with T?

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14. In how many ways can the letters of the word INTERMEDIATE be arranged so that: the vowels always occupy even places? the relative order of vowels and consonants do not alter?

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15. (i) Find the number of different words formed by using all the letters of the word, 'INSTITUTION'.

In how many of them

(ii) are the three T's together ?

(iii) are the first two letters the two N's?

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16. How many five-digit numbers can be formed with the digits 5, 4, 3, 5, 3?

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17. How many numbers can be formed with the digits 2, 3, 4, 5, 4, 3, 2 so that the odd digits occupy the odd places?

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18. How many 7-digit numbers can be formed by using the digits 1, 2, 0, 2, 4, 2, 4?

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19. How many 6-digit numbers can be formed by using the digits 4, 5, 0, 3, 4, 5?

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20. The letters of the word 'INDIA' are arranged as in a dictionary. What are the 1st, 13th, 25th, 49th and 60th words?

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Exercise 8 F

1. A child has 6 pockets. In how many ways can he put 5 marbles in his pocket?

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2. In how many ways can 5 bananas be distributed among 3 boys, there being no restriction to the number of bananas each boy may get?

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3. In how many ways can 3 letters be posted in 2 letter boxes?

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4. How many 3-digit numbers are there when a digit may be repeated any number of times?

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5. How many 4-digit numbers can be formed with the digits 0, 2, 3, 4, 5 when a digit may be repeated any number of times in any arrangement?

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6. In how many ways can 4 prizes be given to 3 boys when a boy is eligible for all prizes?

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7. There are 4 candidates for the post of a lecturer in Mathematics and one is to be selected by votes of 5 men. What is the number of ways in

which the votes can be given ?

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Exercise 8 G

1. In how many ways can 6 persons be arranged in

(i) a line, (ii) a circle?

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2. There are 5 men and 5 ladies to dine at a round table. In how many ways can they seat themselves so that that no two ladies are together?

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3. In how many ways can 11 members of a committee sit at a round table so that the secretary and the joint secretary are always the neighbours of

he president?

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4. In how many ways can 8 persons be seated at a round table so that all shall not have the same neighbours in any two arrangements?

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5. In how many different ways can 20 different pearls be arranged to form a necklace?

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6. In how many different ways can a garland of 16 different flowers be made?

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Exercise 8 H Very Short Answer Questions

1. If $(n+1)! = 12 \times [(n-1)!]$, find the value of n.

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2. If $\frac{1}{4!} + \frac{1}{5!} = \frac{x}{6!}$, find the value of x.

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3. How many 3-digit numbers are there with no digit repeated?

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4. How many 3-digit numbers above 600 can be formed by using the digits 2, 3, 4, 5, 6, if repetition of digits is allowed?

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5. How many numbers divisible by 5 and lying between 4000 and 5000 can be formed from the digits 4, 5, 6, 7, 8, if repetition of digits is allowed?

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6. In how many ways can the letters of the word 'CHEESE' be arranged?

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7. In how many ways can the letters of the word 'PERMUTATIONS' be arranged if each word starts with P and ends with S?

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8. How many different words can be formed by using all the letters of the word 'ALLAHABAD'?

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9. How many permutations of the letters of the word 'APPLE' are there?

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10. How many words can be formed by the letters of the word 'SUNDAY'?

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11. In how many ways can 4 letters be posted in 5 letter boxes?

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12. In how many ways can 4 women draw water from 4 taps, if no tap remains unused?

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13. How many 5-digit numbers can be formed by using the digits 0, 1 and 2?

14. In how many ways can 5 boys and 3 girls be seated in a row so that each girl is between 2 boys?

15. A child has plastic toys bearing the digits 4, 4 and 5. How many 3-digit numbers can he make using them?

16. In how may ways can the letters of the word 'PENCIL' be arranged so that N is always next to E?

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