



MATHS

BOOKS - PEARSON IIT JEE

FOUNDATION

PERMUTATIONS AND COMBINATION

Solved Example

1. $A = \{1, 2, 3, 4\}$ and $B = \{a, e, i, o, u\}$ are two sets. In how many ways can a number from A or a

letter from B be chosen?



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2. In how many ways can a prime or an odd number be chosen from $\{1,2,3,4,5,6,7,8,9,10\}$?



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3. A caterer's menu is to include 4 different sandwiches and 3 different desserts. In how

many ways can one order for a sandwich and a desert?



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4. A man has 7 trousers and 10 shirts. How many different outfits can be wear?



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5. A class has 20 boys and 15 girls . If one representative from each gender has to be

chosen, in how many ways can this be done?



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6. How many different outcomes arise from first tossing a coin and then rolling a die?



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7. A password of 4 letters is to be formed with vowels alone. How many such passwords are possible if.

(a) repetition of letters is allowed,

(b) repetition of letters is not allowed?



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8. Consider 4 elements a,b,c and d. list all permutations taken two at a time.



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9. There are 10 railway stations between a station X and another station Y. Find the

number of different tickets that must be printed so as to enable a passenger to travel from one station to any other.



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10. In how many ways can 8 athletes finish a race for Gold, Silver and Bronze medals?



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11. In how many ways can 3 letter boxes when each box can take any number of letters?



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12. Consider a,b,c,d, List all combination taken 3 at a time.



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13. In a library there are 10 research scholars. In how many ways can we select 4 of them?



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14. In how many ways can we select two vertices in a hexagon?



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15. From 8 gentlemen and 5 ladies, a committee of 4 is to be formed. In how many ways can this be done.

(a) when the committee consists of exactly three gentlemen?

(b) when the committee consists of at most three gentlemen?



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16. Find ${}^n C_3$, if ${}^n C_7 = {}^n C_4$.





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17. How many distinct positive integers are possible with the digits 1,3,5,7 without repetition?



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18. If ${}^n P_r = 990$ and ${}^n C_4 = 165$, then find the value of r .



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19. Number of different straight lines that can be formed by joining 12 different points on a plane of which 4 are collinear is



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20. Find the number of diagonals of a polygon of 10 sides.



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1. Find the value of $6!$.



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2. What is the value of $0!$?



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3. Factorial is defined for ___ numbers.



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4. The number of arrangements that can be made by taking r objects at a time from a group of n dissimilar objects, is denoted as ____.



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5. What is the formula for ${}^n P_r$?



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6. In ${}^6 C_n$ what are the possible values of r ?



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7. What is the formula for ${}^n P_r$?



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8. What is the relation between ${}^n P_r$ and ${}^n C_r$?

?



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9. The number of straight lines that can be formed by n points in a plane, where no three points are collinear is _____ and in case p of the given points are collinear is _____ .



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10. The number of triangles that can be formed by n points in a plane where no three points are collinear is _____ and when p of the given points are collinear is _____ .





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11. Find the number of 3-digit numbers, formed with the digit (2,5,4,6) when repetition of the digits is allowed.



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12. If ${}^n P_{100} = {}^n P_{99}$. Then find the value of n .



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13. If ${}^{100}C_3 = 161700$, then ${}^{100}C_{97}$ is equal to _____



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14. If ${}^nP_3 = 720$, then find the value of ${}^{11}P_n$.



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15. Find the number of four-digit numbers that can be formed using the digits 1,2,5,7,4 and 6,

if every digit can occur at most once in any number.



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16. Find the number of integers greater than 4000 that can be formed by using the digits 3,4,5 and 2 , if every digit can occur at most once in any number.



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17. How many 6-letter words with distinct letters in each can be formed using the letters of the word EDUCATION? How many of these begin with I?



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18. How many words with distinct letters can be formed by using all the letters of the word PLAYER, which begin with P and end with R?



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19. In a class, there are 45 students. On a new year eve, every student sends one greeting card to each of the other students. How many greeting cards were exchanged in all?



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20. In how many ways can 6 prizes be distributed among 4 students. If each student can receive more than one prize?



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21. If ${}^n P_r = 360$ and ${}^n C_r = 15$, then find the value of r .



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22. A bag contains 3 yellow balls and 4 pink balls. In how many ways can 2 pink balls and 1 yellow ball be drawn from the bag?



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23. A committee of 5 members is to be formed from 8 men and 6 women. Find the number of ways of forming the committee, if it has to contain 3 men and 2 women.



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24. In how many ways can 3 diamond cards be drawn simultaneously from a pack of cards?



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25. In a party there are 20 persons. If every person shook hand with every other person in the party exactly once, find the total number of handshakes exchanged in the party.



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26. A regular polygon has 20 sides. Find the number of diagonals of the polygon.



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27. How many different straight lines can be formed from 30 points in a plane? (no three points are collinear)



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28. If the number of diagonals of a regular polygon is three times the number of its sides, find the number of sides of the polygon.



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29. There are 20 points in a plane. How different triangles can be formed with these points? (no three points are collinear).



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Short Ans

1. If ${}^n P_r = 1716$ and $r = 3$, then ${}^n C_r =$



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2. A boy has 9 trousers and 12 shirts. In how many different ways can he select a trouser and a shirt?



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3. How many three letter words are formed using the letters of the word FAILURE?



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4. The number of selections that can be made to select 5 members from a group of 15 members is _____.



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5. There are 8 points, in a plane, how many different triangles can be formed using these points (no three points are collinear)?



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6. A bag contains 9 yellow balls, 3 white balls and 4 red balls. In how many ways can two balls be drawn from the bag?



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7. A question paper contains 20 questions in how many ways can 4 questions be attempted?



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8. If a polygon has 8 sides, then the number of diagonals of the polygon is _____.



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9. In a class there are 15 boys and 10 girls. How many ways can a pair of one boy and one girl be selected from the class?



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10. How many five-digit members can be formed using the digits (5,6,3,9,2) ? (no digit can occur more than once in any number)?



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11. In how many ways can 3 consonants be selected from the letters of the word EDUCATION?



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12. Using all the letters of the word NOKIA, how many words can be formed, which begin with N and end with A?



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13. Given 1 and 2 are two parallel lines. How many triangles can be formed with 12 points taking on 1 and 6 points on 2?



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14. A question paper contain 15 questions. In how many ways can 7 questions be attempted?



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15. A bag contains 5 white balls and 2 yellow balls. The number of ways of drawing 3 white balls is _____



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1. A four-digit number is formed using the digits (0,6,7,8,9). How many of these numbers are divisible by 3? (Each digit is occurred at most once in every number).



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2. There are 25 points in a plane. Six of these are collinear and no other combination of 3 points are collinear. How many different

straight lines can be formed by joining these points?



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3. There are 20 points in a plane, of which 5 points are collinear and no other combination of 3 points are collinear. How many different triangles can be formed by joining these points?



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4. Using the letters of the word TABLE. How many words can be formed so that the middle place is always occupied by a vowel?



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5. Find the value of

$${}^6C_2 + {}^6C_3 + {}^7C_4 + {}^0C_5 + {}^9C_6.$$



[Watch Video Solution](#)

1. ${}^n C_3 = \underline{\hspace{2cm}}$

A. $n!$

B. 1

C. nn

D. n

Answer:



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2. If a polygon has 6 sides, then the number of diagonals of the polygon is _____

A. 18

B. 12

C. 9

D. 15

Answer:



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3. How many two digit numbers can be formed using the digits (1,2,3,4,5) if no digit occurs more than once in each number?

A. 10

B. 20

C. 9

D. 16

Answer:



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4. If ${}^n C_4 = 35$, then ${}^n P_4 =$ ____

A. 120

B. 140

C. 840

D. 420

Answer:



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5. Using all the letters of the word QUESTION, how many different words can be formed?

A. $8!$

B. $7!$

C. $7 \times 7!$

D. $9!$

Answer: A



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6. If ${}^n P_r = 24 \cdot {}^n C_r$ then $r =$ _____

A. 24

B. 6

C. 4

D. 2

Answer:



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7. In how many ways can 5 prizes be distributed to 3 students, if each student is eligible for any number of prizes?

A. 3^5

B. 5^3

C. ${}^5 P_3$

D. ${}^5 C_3$

Answer: A



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8. Using the letters of the word PUBLIC, how many four letter words can be formed which begin with B and with P? (Repetition of letters is not allowed)

A. 360

B. 12

C. 24

D. 30

Answer:



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9. In a class there are 20 boys and 15 girls. In how many ways can 2 boys and 2 girls be selected?

A. ${}^{35}C_4$

B. ${}^{35}C_2$

C. ${}^{20}C_2 \times {}^{15}C_2$

D. 20×15

Answer:



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10. Using all the letters of the word OBJECTS, how many words can be formed which begin with B but do not end with S?

A. 120

B. 480

C. 600

D. 720

Answer:



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11. The number of diagonals of a regular polygon is 14. find the number of the sides of the polygon.

A. 7

B. 8

C. 6

D. 9

Answer:



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12. In how many ways can 5 letters be posted into 7 letter boxes?

A. ${}^7 C_5$

B. 5^7

C. 7^5

D. ${}^7 P_5$

Answer:



13. Sunil has 6 friends . In how many ways can be invite two or more of his friends for dinner?

A. 58

B. 57

C. 63

D. 49

Answer:



14. Find the value of

$${}^7C_4 - {}^6C_4 - {}^5C_3 - {}^4C_2.$$

A. 3

B. 8

C. 4

D. 15

Answer:



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15. How many different words can be formed using all the letters of the word SPECIAL, so that the consonants always in the odd positions?

A. 112

B. 72

C. 24

D. 144

Answer:



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16. In how many ways can 3 consonants be selected from the English alphabet?

A. ${}^{21}C_3$

B. ${}^{26}C_3$

C. ${}^{21}C_5$

D. ${}^{26}C_5$

Answer:



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17. From 8 boys and 5 girls, a delegation of 5 students is to be formed. Find the number of ways this can be done such that delegation must contain exactly 3 girls.

A. 140

B. 820

C. 280

D. 410

Answer:



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18. There are 18 stations between Hyderabad and Bangalore. How many second class tickets have to be printed, so that a passenger can travel from one station to any other station?

A. 380

B. 190

C. 95

D. 100

Answer:



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19. How many numbers greater than 3000 can be formed using the digits 0,1,2,3,4, and 5, so that each digit occurs at most once in each number?

A. 1000

B. 300

C. 1200

D. 1380

Answer:



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20. Using all the letter of the word EDUCATION.

How many words can be formed which begin with DU? (Repetition is not allowed).

A. 8!

B. 7!

C. $6!$

D. $9!$

Answer:



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21. Anil has 8 friends In how many ways can he invite one or more of his friends to a dinner?

A. 127

B. 128

C. 256

D. 255

Answer:



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

A. 4^3

B. 3^4

C. $6!$

D. 4

Answer:



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23. Using the letters of the word PRIVATE. How many 6-letter words can be formed which begin with P and end with E?

A. 3!

B. 4!

C. 7!

D. 5!

Answer:



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24. Find the number of 4 digit odd numbers that can be formed using the digit 4,6,7,9,3 so

that each digit occurs at most once in each number.

A. 120

B. 24

C. 48

D. 72

Answer:



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25. How many 5-digit numbers that are divisible by 5 can be formed using the digits (0,1,3,5,7,5)? (Each digit can be repeated any number of times)

A. 1080

B. 2160

C. 6480

D. 3175

Answer:



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26. How many four-digits even numbers can be formed using the digits (3,5,7,9,1,0) (Repetition of digits is not allowed).

A. 120

B. 60

C. 360

D. 100

Answer:





27. There is a three-digit password and it is known that each digit can have four values 5,6,7 or 8 . If there is exactly one correct password, how many distinct wrong passwords are there?

A. 63

B. 80

C. 81

D. 64

Answer:



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28. In how many ways can a committee consisting of 3 men and 4 women be formed from a group of 6 men and 7 women?

A. ${}^6C_4 \cdot {}^7C_3$

B. ${}^6C_3 \cdot {}^7C_5$

C. ${}^6C_3 \cdot {}^7C_4$

D. ${}^7C_5 \cdot {}^6C_4$

Answer:



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29. Thirty members attended a party. If each person shakes hands with every other person exactly once. Then find the number of handshakes made in the party.

A. ${}^{30}P_2$

B. ${}^{30}C_2$

C. ${}^{29}C_2$

$$D. \cdot {}^{60}C_2$$

Answer: B



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30. In how many ways can 6 members be selected from a group of 10 members ?

A. $\cdot {}^6C_4$

B. $\cdot {}^{10}C_4$

C. $\cdot {}^{10}C_5$

$$D. \cdot {}^{10}P_4$$

Answer:



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Level 2

1. In a class there are 20 boys and 25 girls. In how many ways can a pair of a boy and a girl be selected?

A. 400

B. 500

C. 600

D. 20

Answer:



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2. How many different odd numbers are formed using the digits (2,4,0,6)? (Repetition digits is not allowed).

A. 16

B. 0

C. 24

D. 108

Answer:



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3. There are 15 stations from New Delhi to Mumbai. How many first class tickets can be

printed to travel from one station to any other station?

A. 210

B. 105

C. 240

D. 135

Answer:



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4. In how many ways can 3 vowels be selected from the letters of the word EQUACATION?

A. 56

B. 10

C. 28

D. 40

Answer:



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5. In how many can 3 consonants and 3 vowels be selected from the letters of the word TRIANGLE?

A. 25

B. 13

C. 30

D. 20

Answer:



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6. A plane contains 12 points of which 4 are collinear. How many different straight lines can be formed with these points?

A. 50

B. 66

C. 60

D. 61

Answer:



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7. A plane contains 20 points of which 6 are collinear. How many different triangle can be formed with these points?

A. 1120

B. 1140

C. 1121

D. 1139

Answer:



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8. Using the letters of the word ENGLISH, how many five letters words can begin with G?

A. 2520

B. 360

C. 180

D. 1260

Answer:



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9. Twelve teams are participating in a cricket tournament. If every team play exactly one match with every other team, then the total number of matches played in the tournament is _____

A. 132

B. 44

C. 66

D. 88

Answer:





10. In how many ways can 4 consonants be chosen from the letters of the word SOMETHING?

A. ${}^9 C_4$

B. ${}^6 C_4$

C. ${}^4 C_4$

D. ${}^4 C_3$

Answer:



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11. How many three letter words can be formed using the letters of the word NARESH? (Repetition of letters is not allowed)

A. $3!$

B. ${}^5 P_3$

C. ${}^6 P_3$

D. ${}^6 C_3$

Answer:



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12. A four digit number is to be formed using the digits 0,1,3,5, and 7. how many of them are even numbers? (Each digit can occur for only one time).

A. 48

B. 60

C. 24

D. 120

Answer:



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13. How many numbers less than 1000 can be formed using the digits 0,1,3,4, and 5, so that each digit occurs almost once in each number?

A. 53

B. 69

C. 68

D. 60

Answer:



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14. There are 15 points in a plane. No three points are collinear except 5 points. How many different straight lines can be formed?

A. 105

B. 95

C. 96

D. 106

Answer:



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15. There are 12 points in a plane, no three points are collinear except 6 points. How many different triangles can be formed?

A. 200

B. 201

C. 220

D. 219

Answer:



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16. Twelve points are marked on a plane so that no three points are collinear. How many different triangles can be formed joining the points.

A. 180

B. 190

C. 220

D. 230

Answer:



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17. How many words can be formed from the letters of the word EDUCATION using any four letters in each word?

A. 840

B. 1680

C. 2080

D. 3050

Answer:



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18. Seventeen points are marked on plane so that no three points are collinear. How many

straight lines can be formed by joining these points?

A. 114

B. 136

C. 152

D. 160

Answer:



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19. The following are the steps involved in solving ${}^n C_2 = 36$ for n . Arrange them in sequential order.

A. $n^2 - n - 72 = 0$

B. As $s > 0$, $n = 9$

C. $n = 0$, $n = -8$

D. $(n - 9)(n + 8) = 0$

Answer:



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20. The following are the steps involved in finding the value of $\frac{n}{r}$ from ${}^n P_r = 1320$.

Arrange them in sequential order.

$$\text{A. } {}^n P_4 = \frac{12!}{9!} = \frac{12!}{(12-3)!}$$

$$\text{B. } \Rightarrow \frac{n}{r} = \frac{12}{3} = 4$$

$$\text{C. } \Rightarrow {}^n P_r = {}^{12} P_3$$

$$\text{D. } {}^n P_r = 1320 = 12 \times 11 \times 10$$

Answer:



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1. How many 4-digit even numbers can be formed using the digits (1,3,0,4,7,5)? (Each digit can occur only once)

A. 48

B. 60

C. 108

D. 300

Answer:



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2. Using the letters of the word CHEMISTRY, how many six letter words can be formed, which end with Y?

A. ${}^8 P_6$

B. ${}^9 P_6$

C. ${}^9 P_5$

D. ${}^8 P_5$

Answer:



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3. A telephone number has seven digits, no number starts with 0. In a city, how many different telephone numbers the formed using the digits 0 to 6?

(Each digit can occur only once)

A. $6!$

B. $6.6!$

C. $7!$

D. 2.7!

Answer:



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4. Using all the letters of the word PROBLEM, how many words can be formed such that the consonants occupy the middle place?

A. 3000

B. 4200

C. 720

D. 3600

Answer:



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5. Using the digits 0,1,2,5, and 7 how many 4-digit number that are divisible by 5 can be formed if repetition of the digits is not allowed?

A. 38

B. 46

C. 32

D. 42

Answer:



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6. If ${}^{2n}C_4 : {}^nC_3 = 21:1$, then find the value of n.

A. 4

B. 5

C. 6

D. 7

Answer:



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7. How many three-digit numbers that are divisible by 5, can be formed, using the digit

0,2,3,5,7, if no digit occurs more than once in each number?

A. 10

B. 15

C. 21

D. 25

Answer: C



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8. In how many ways can we select two vowels and three consonants from the letters of the word ARTICLE?

A. 12

B. 14

C. 18

D. 22

Answer:



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9. How many 3-digits numbers can be formed using the digits (2,4,5,7,8,9), if no digit occurs more than once in each number?

A. 80

B. 90

C. 120

D. 140

Answer:



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10. The number of ways of selecting five members to form a committee from 7 men and 10 women is _____,

A. 5266

B. 6123

C. 6188

D. 8123

Answer:



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11. Twenty points are marked on a plane so that non three points are collinear except 7 points. How many triangle can be formed by joining the points?

A. 995

B. 1105

C. 1200

D. 1250

Answer:



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12. There are four different white balls and four different black balls. The number of ways that balls can be arranged in a row so that white and black balls are placed alternately is _____

A. 1102

B. 1152

C. 2152

D. 1752

Answer: B



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13. In a party, there are 10 married couples. Each person shakes hands with every person other than her or his spouse. The total number of handshakes exchanged in that party is ___

A. 160

B. 190

C. 180

D. 170

Answer: C



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14. How many 4-digit odd number can be formed using the digit 0,2,3,5,6,8 (each digit occurs only once)?

A. 64

B. 72

C. 86

D. 96

Answer: D



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15. The number of the words that can be formed using all the letters of the word BRAIN such that it starts with R and but does not end with A.

A. 18

B. 14

C. 16

D. 20

Answer: A



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