MATHS

BOOKS - VK JAISWAL ENGLISH

PERMUTATION AND COMBINATIONS

Exercise 1 Single Choice Problems

1. The number of 3- digit numbers containing the digit 7 exactly once :

A. 225

B. 220

C. 200

D. 180

Answer: A

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2. Let $A = \{x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8\}, B = \{y_1, y_2, y_3, y_4\}$. The total number of function $f: A \to B$ that are onto and there are exactly three elements x in A such that $f(x) = y_1$ is :

A. 11088

B. 10920

C. 13608

D. None of these

Answer: D

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3. The number of arrangements of the word " IDIOTS " such that vowels are at the places which form three consecutive terms of an A.P. is :

A. 36

B. 72

C. 24

D. 108

Answer: D

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4. Consider all the 5 digit numbers where each of the digits is chosen from the set { 1, 2, 3, 4} . Then the number of numbers, which contain all the four digits is :

A. 240

B. 244

C. 586

D. 781

Answer: A

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5. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order?

A. 120

B. 480

C. 360

D. 240

Answer: C

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6. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation having α/β and β/α as its roots is :

A. $3x^2 - 19x + 3 = 0$

B. $3x^2 + 19x - 3 = 0$

C. $3x^2 - 19x - 3 = 0$

D. $x^2 - 5x + 3 = 0$

Answer: A

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7. A students is to answer 10 out of 13 questions in an examminations such that he must choose at least 4 from

the first five questions. Find the numbers of choices available to him.

A. 140

B. 196

C. 280

D. 346

Answer: B

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8. Let set $A = \{1, 2, 3, \ldots\ldots, 22\}$. Set B is a subset of A and B has exactly 11 elements, find the sum of elements of all possible subsets B .

A. $252^{21}C_{11}$

B. $230^{21}C_{10}$

C. $253^{21}C_{9}$

D. $253^{21}C_{10}$

Answer: D

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9. The value of $\left[\frac{2009! + 2006!}{2008! + 2007!}\right]$ is K. Then value of $\frac{K}{1004}$ ($[\cdot]$ denotes greatest integer function.)

A. 3

B. 2

C. 4

D. 1

Answer: B

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10. If $P_1, P_2, P_3, \ldots\ldots, P_{m+1}$ are distinct prime numbers. Then the number of factors of $P_1^n P_2 P_3 \ldots\ldots P_{m+1}$ is :

A. $m(n+1)$

B. $(n+1)2^m$

C. $n \cdot 2^m$

D. 2^{nm}

Answer: B

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11. A basket ball team consists of 12 pairs of twin brothers. On the first day of training, all 24 players stand in a circle in such a way that all pairs of twin brothers are neighbours. Number of ways this can be done is :

A. $(12)!2^{11}$

B. $(11)!2^{12}$

C. $(12)!2^{12}$

D. $(11)!2^{11}$

Answer: B

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12. Let ' m ' denotes the number of four digit numbers such that the left most digit is odd, the second digit is even and all four digits are different and ' n ' denotes the number of four digit numbers such that left most digit is even, second digit is odd and all four digit are different. If m=nk, then k equals :

A. $\frac{4}{5}$

B. $\frac{3}{4}$

C. $\frac{5}{4}$

D. $\frac{4}{3}$

Answer: C

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13. The number of three-digit numbers of the form xyz such that `x

A. 156

B. 204

C. 240

D. 276

Answer: D

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14. A and B are two sets and their intersection has 3 elements. If A has 1920 more subsets than B has, then the number of elements of A union B is :

A. 12

B. 14

C. 15

D. 16

Answer: C

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15. All possible 120 permutations of WDSMC are arranged in dictionary order, as if each were an ordinary five- letter word. The last letter of the 86^{th} word in the list, is : i) W ii) D iii) M iv) C

A. W

B. D

C. M

D. C

Answer: B

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16. The number of permutation of all the letters AAAABBBC in which the A's appear together in a block of 4 letters or the B's appear together in a block of 3 letters is :

A. 44

B. 50

C. 60

D. 89

Answer: A

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17. Number of zero's at the ends of $\prod_{n=5}^{30}(n)^{n+1}$ is :

A. 111

B. 147

C. 137

D. None of these

Answer: C

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18. The number of positive integral pairs (x, y) satisfying the equation $x^2 - y^2 = 3370$ is :

A. 0

B. 1

C. 2

D. 4

Answer: A

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19. The number of ways of selecting ' n ' things out of '3n ' things of which 'n ' are of one kind and alike and 'n ' are of second kind and alike and the rest unlike is :

A. $n2^{n-1}$

B. $(n-1)2^{n-1}$

C. $(n+1)2^{n-1}$

D. $(n+2)2^{n-1}$

Answer: D

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20. If a, b,c,d are odd natural numbers such that a+b+c+d=20, then find the number of values of the ordered quadruplet (a, b,c d).

A. 18

B. 19

C. 20

D. 21

Answer: B

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21. A dice is rolled 4 times, the numbers appearing are listed. The number of different throws, such that the largest number appearing in the list is not 4, is : :

A. 175

B. 625

C. 1040

D. 1121

Answer: D

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22. Let m denotes the number of ways in which 5 boys and 5 girls can be arranged in a line alternately and n denotes the number of ways in which 5 boys and 5 girls an be arranged in a circle so that no two boys are together . If m= kn then the value of k is :

A. 2

B. 5

C. 6

D. 10

Answer: D

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23. Number of ways in which 4 students can sit in 7 chair in a row, if there is no empty chair between any two students is :

A. 24

B. 28

C. 72

D. 96

Answer: D

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24. Number of zero's at the ends of $\prod_{n=5}^{30}(n)^{n+1}$ is :

A. 111

B. 147

C. 137

D. None

Answer: C

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25. The number of words of four letters consisting of equal number of vowels and consonants (of english language) with repetition permitted is :

A. 51030

B. 50030

C. 63050

D. 66150

Answer: D

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26. Ten different letters of an alphabet are given. Words with five letters are formed from these given letters. Determine the number4 of words which have at least one letter repeated.

A. 30240

B. 69760

C. 69780

D. 99784

Answer: B

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27. Number of four digit numbers in which at least one digit occurs more than once, is :

A. 4464

B. 4644

C. 4446

D. 6444

Answer: A

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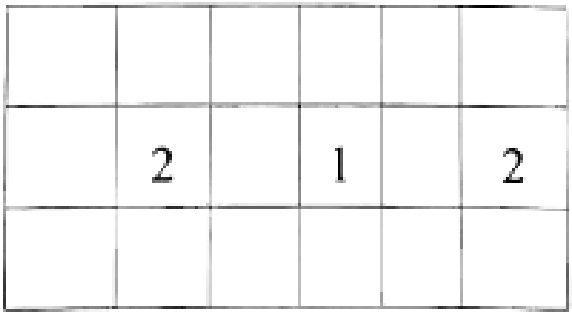
28. In a game of minesweeper, a number on a square denotes the number of mines that share at least one vertex with that square. A square with a number may not have a mine, and the blank squares are undetermined. In how many ways can the mines be placed in the given configuration on blank squares :



A. 120

B. 105

C. 95

D. 100

Answer: C

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29. Let the product of all the divisors of 1440 be P . If P is divisible by 24^x , then the maximum value of x is :

A. 28

B. 30

C. 32

D. 36

Answer: B

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30. Let N be the number of 4- digit numbers which contain not more than 2 different digits. The sum of the digits of N is :

A. 18

B. 19

C. 20

D. 21

Answer: A

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31. The number of different permutations of all the letters of the word 'PERMUTATION' such that any two consecutive letters in the arrangement are neither both vowels nor both identical is

A. $63 \times \lfloor 6 \times \lfloor 5$

B. $8 \times \lfloor 6 \times \lfloor 5$

C. $57 \times \lfloor 5 \times \lfloor 5$

D. $7 \times \lfloor 7 \times \lfloor 5$

Answer: C

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32. A batsman can score 0, 1, 2, 3, 4 or 6 runs from a ball. The number of different sequences in which he can score exactly 30 runs in an over of six balls :

A. 4

B. 72

C. 56

D. 71

Answer: D

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33. A batsman can score 0, 2, 3, or 4 runs for each ball he receives. If N is the number of ways of scoring a total of 20

runs in one over of six balls, then N is divisible by :

A. 5

B. 7

C. 14

D. 16

Answer: D

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34. The number of non- negative integral solutions of the equation $x + y + z = 5$ is :

A. 20

B. 19

C. 21

D. 25

Answer: C

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35. The number of solutions of the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 101$, where $x_i's$ are odd natural numbers is :

A. ${}^{105}C_4$

B. ${}^{52}C_5$

C. ${}^{52}C_4$

D. ${}^{50}C_4$

Answer: C

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36. A dice is rolled 4 times, the numbers appearing are listed. The number of different throws, such that the largest number appearing in the list is not 4, is : :

A. 175

B. 625

C. 1121

D. 1040

Answer: C

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37. Number of four letter words can be formed using the letters of word VIBRANT if letter V is must included, are :

A. 840

B. 480

C. 120

D. 240

Answer: B

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38. The number of rectangles that can be obtained by joining four of the 12 vertices of a 12-sided regular polygon is

A. 66

B. 30

C. 24

D. 15

Answer: D

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39. Number of five digit integers, with sum of the digits equal to 43 are :

A. 5

B. 10

C. 15

D. 35

Answer: C

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Exercise 2 One Or More Than One Answer Is Are Correct

1. The number of 5 letter words formed with the letters of the word CALCULUS is divisible by :

A. 2

B. 3

C. 5

D. 7

Answer: A::B::C

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2. The coefficient of x^{50} in the expansion $\sum_{k=0}^{100} {}^{100}C_k(x-2)^{100-k}3^k$ is also equal to :

A. Number of ways in which 50 identical books can be distributed in 100 students, if each student can get atmost one book.

B. Number of ways in which 100 different white balls and 50 identical red balls can be arranged in a circle, if no two red balls are together.

C. Number of dissimilar terms in $(x_1 + x_2 + x_3 + ... + x_{50})^{51}$.

D. $\frac{2 \cdot 6 \cdot 10 \cdot 14 \ldots\ldots 198}{50!}$

Answer: A::D

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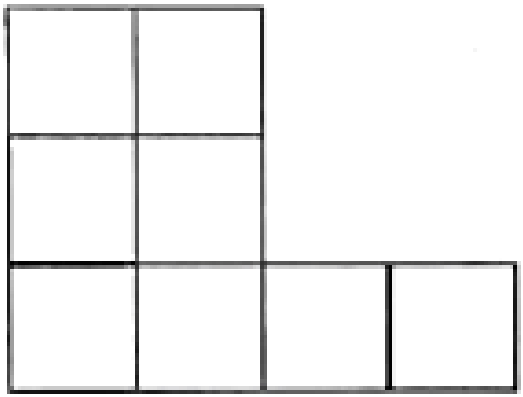
3. Number of ways in which the letters of the word "NATION" can be filled in the given figure such that no row remains empty and each box contains not more than one letter, are :



A. $11\lfloor 6$

B. $12\lfloor 6$

C. $13\lfloor 6$

D. $14\lfloor 6$

Answer: C

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4. Let a, b, c, d be non zero distinct digits. The number of 4 digit numbers abcd such that ab + cd is even is divisible by :

A. 3

B. 4

C. 7

D. 11

Answer: A::B::D

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Exercise 3 Comprehension Type Problems

1. Consider all the six digit numbers that can be formed using the digits 1, 2, 3, 4, 5 and 6, each digit being used exactly once. Each of such six digit numbers have the property that for each digit, not more than two digits smaller than that digit appear to the right of that digit.

Q. Number of such six digit numbers having the desired property is :

A. 315426

B. 135462

C. 234651

D. None of these

Answer: B,C

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2. Consider all the six digit numbers that can be formed using the digits 1, 2, 3, 4, 5 and 6, each digit being used exactly once. Each of such six digit numbers have the property that for each digit, not more than two digits smaller than that digit appear to the right of that digit.

Q. Number of such six digit numbers having the desired property is :

A. 120

B. 144

C. 162

D. 210

Answer: C

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Exercise 4 Matching Type Problems

1. All letters of the word BREAKAGE are to be jumbled. The number of ways of arranging them so that :

	Column-I		Column-II
(A)	The two A's are not together	(P)	720
(B)	The two E's are together but not two A's	(Q)	1800
(C)	Neither two A's nor two E's are together	(R)	5760
(D)	No two vowels are together	(S)	6000
		(T)	7560

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2. Consider the letters of the word MATHEMATICS. Set of repeating letters = {M, A, T}, set of non repeating letters = {H, E, I, C, S} :

	Column-I		Column-II
(A)	The number of words taking all letters of the given word such that atleast one repeating letter is at odd position is	(P)	$28 \cdot (7!)$
(B)	The number of words formed taking all letters of the given word in which no two vowels are together is	(Q)	$\frac{(11)!}{(2!)^3}$
(C)	The number of words formed taking all letters of the given word such that in each word both M's are together and both T's are together but both A's are not together is	(R)	$210(7!)$
(D)	The number of words formed taking all letters of the given word such that relative order of vowels and consonants does not change is	(S)	$840\,(7!)$
		(T)	$\frac{4!7!}{(2!)^3}$

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Exercise 5 Subjective Type Problems

1. number of ways in which eight digit number can be formed using the digits from 1 to 9 without repetition, if first four places of the numbers are in increasing order and last 4 places are in decreasing order , is 'n' then $\frac{n}{70}$ is equal to.

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2. Number of ways in which the letters of the word DECISIONS be arranged so that letter N be somewhere to the right of the letter "D" is $\frac{\lfloor 9}{\lambda}$. Find λ.

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3. There are 10 stations enroute. A train has to be stopped at 3 of them. Let N be the ways in which the train can be stopped if atleast two of the stopping stations are consecutive. Find the value of $\sqrt{N}$.

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4. There are 10 girls and 8 boys in a class room including Mr. Ravi, Ms. Rani and Ms. Radha. A list of speakers consisting of 8 girls and 6 boys has to be prepared. Mr. Ravi refuses to speak if Ms. Rani is a speaker. Ms. Rani refuses to speak if Ms. Radha is a speaker. The number of ways the list can be prepared is a 3 digit number $n_1n_2n_3$, then $|n_3 + n_2 - n_1| =$

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5. Nine people sit around a round table. The number of ways of selecting four of them such that they are not from adjacent seats, is

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6. Find the number of arrangements of all digits of 12345 such that at least 3 digits will not come in its positions.

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7. The number of triangles with each side having integral length and the longest side is of 11 units is equal to k^2,

then the value of 'k' is equal to

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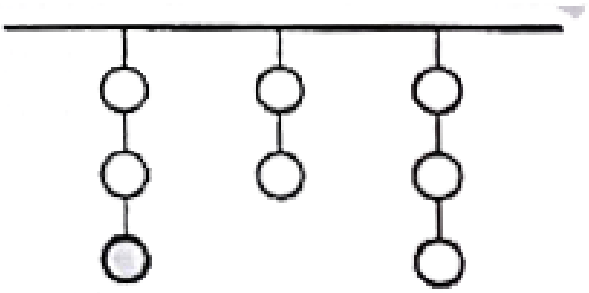
8. 8 clay targets are arranged as shown. If N be the number of different way they can be shot (one at time) if no target can be shot until the target(s) below it have been shot. Find the ten's digit of N.



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9. There are n persons sitting around a circular table. They start singing a 2 minute song in pairs such that no two persons sitting together will sing together. This process is continued for 28 minutes. Find n.

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10. The number of ways to choose 7 distinct natural numbers from the first 100 natural numbers such that any two chosen numbers differ atleast by 7 can be expressed as ${}^{n}C_{7}$. Find the number of divisors of n.

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11. Four couples (husband and wife) decide to form a committee of four members. The number of different committees that can be formed in which no couple find a place is λ, then the sum of digits of λ is :

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12. The number of ways in which 2n objects of one type, 2n of another type and 2n of a third type can be divided between 2 persons so that each may have 3n objects is $\alpha n^2 + \beta n + \gamma$. Find the value of $(\alpha + \beta + \gamma)$.

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13. Let N be the number of integral solution of the equation

$x + y + z + w = 15$ where $x \geq 0, y > 5, z \geq 2$ and $w \geq 1$

. Find the unit digit of N. `

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