CAT LEVEL 1 QUESTIONS

Thursday, August 17, 2023 5:45 PM

Permutation & Combinations

6 types ← Level I, Level II

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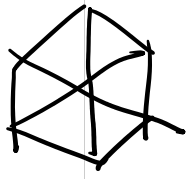
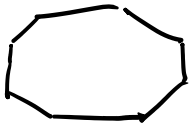
15 *Which one of the following polygon has as many diagonals as the number of sides in it?*

(a) 4 (b) 6 (c) 5 (d) 7





No of diagonals in Polygon → $nC_2 - n = n$

$nC_2 = 2n$

$\frac{n(n-1)}{2} = 2n$

$n^2 - n = 4n$

$n = 5$

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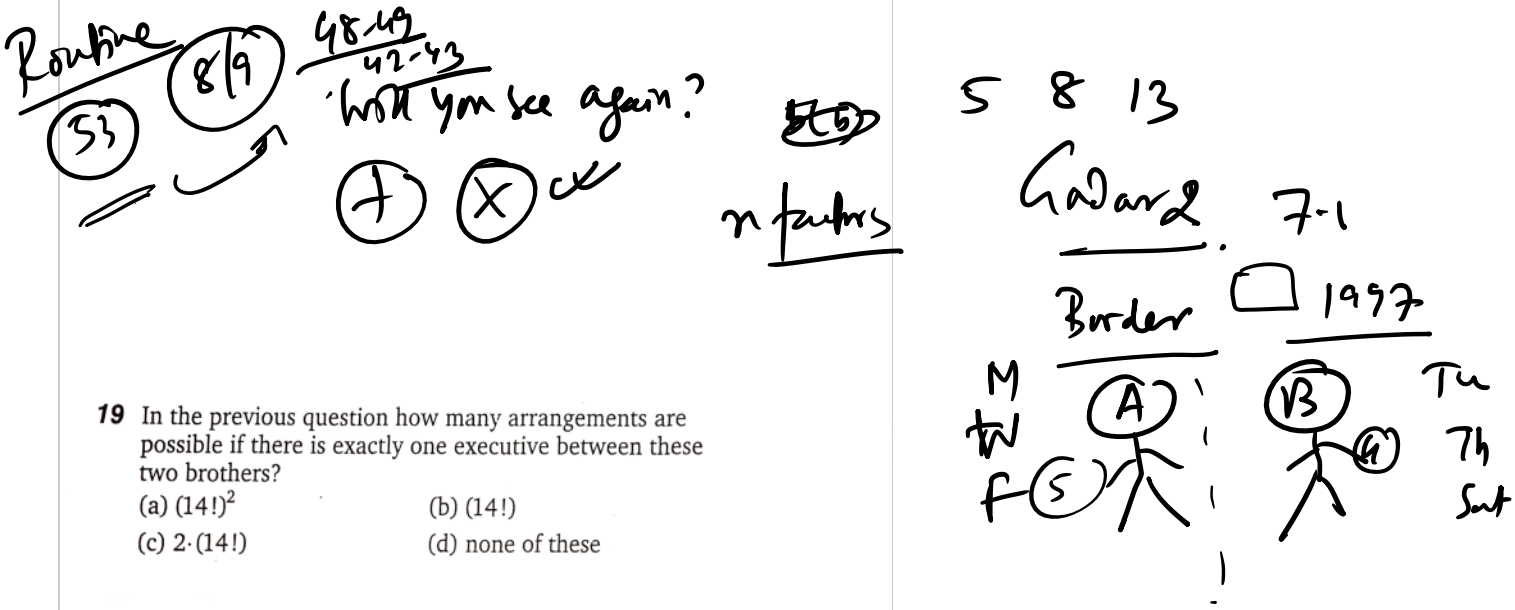


19 In the previous question how many arrangements are possible if there is exactly one executive between these two brothers?

(a) $(14!)^2$ (b) $(14!)$

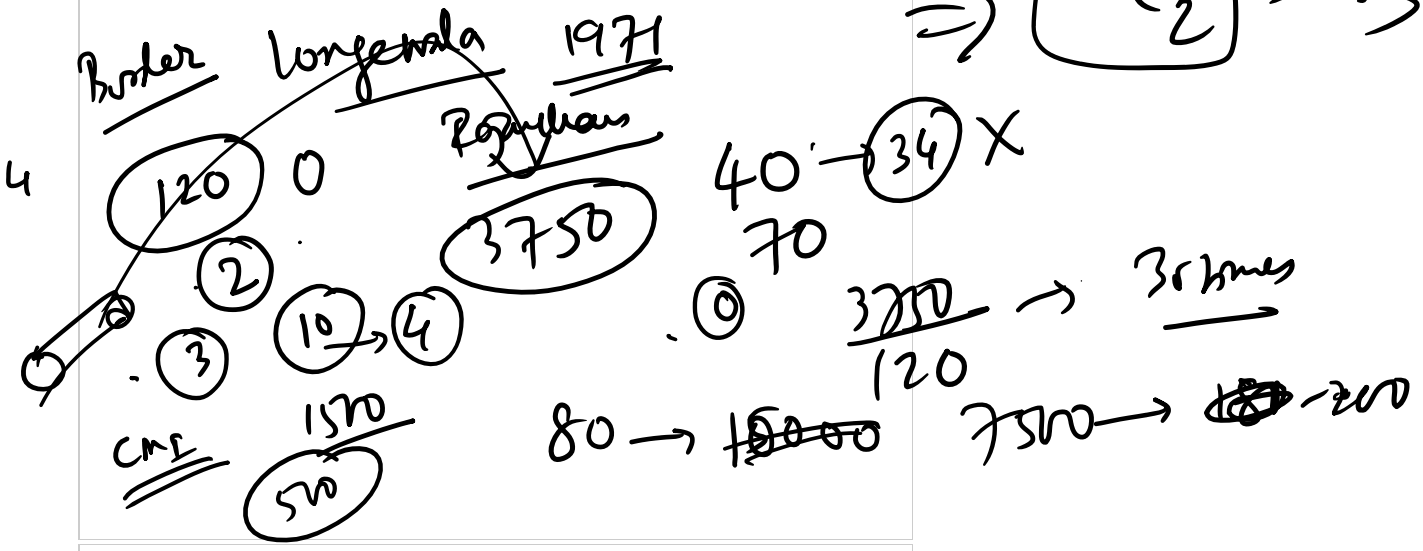
(c) $2 \cdot (14!)$ (d) none of these

0, 1, 2 ---

22 If $a + b + c = 21$, what is the total number of non-negative integral solutions?
(a) 123 (b) 253 (c) 321 (d) 231

$21 + {}^{3-1}C$ $3-1$

$\Rightarrow {}^{23}C_2 = 253$



$20+1+0$ $20+1+0$ X

$a+b+c=0$ $19+1+1$

23 If $a + b + c = 21$ what is the total number of positive integral solutions?
(a) 109 (b) 190 (c) 901 (d) 910

21, 0, 0

Line 0 $n-1 C r-1$

How many sol^n have 0 $\Rightarrow {}^{n-1}C_{r-1}$

$\Rightarrow {}^{21-1}C_{3-1} = {}^{20}C_2$

$\left({}^{22}C_2 - {}^{20}C_2\right)$

26 What is the total number of ways of selecting atleast one item from each of the two sets containing 6 different items each?

(a) 2856 (b) 3969

(c) 480 (d) none of these

63

63

3969

Kayros

$(2^6-1) + (2^6-1)$ A

$(2^6-1) \times (2^6-1)$ B

$63 \times 63 \Rightarrow 3969$

$n+r-1 C r-1$

$S_1 + S_2 + S_3 = 8$

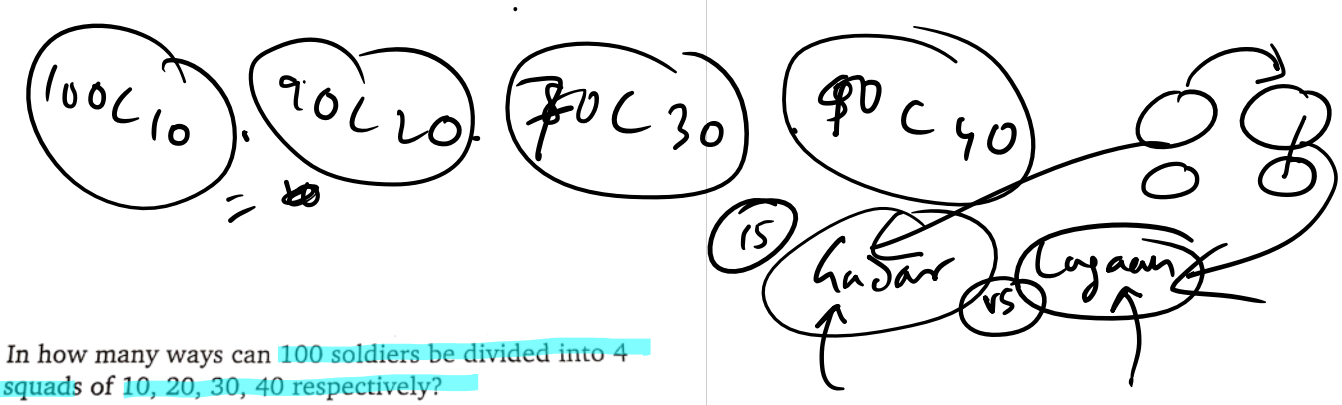
29 In how many ways can 8 identical apples be divided among 3 sisters?

(a) 25 (b) 65 (c) 45 (d) 24

→ equation banaka solve

digiye

$8+3-1 C 3-1 \Rightarrow {}^{10}C_2 = 45$



30 In how many ways can 100 soldiers be divided into 4 squads of 10, 20, 30, 40 respectively?

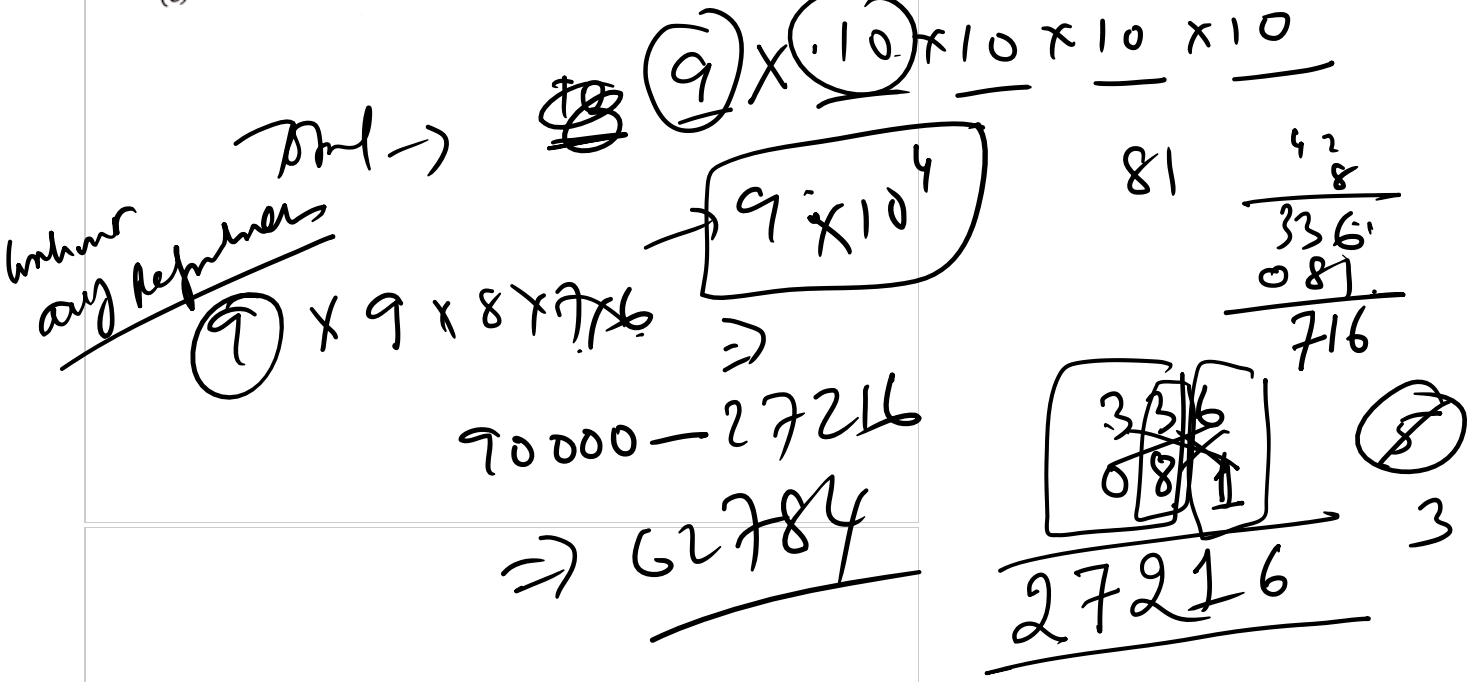
(a) 1700 (b) 18!

(c) 190 (d) none of these

44 The number of five digit numbers having atleast one of their digits repeated is :

(a) 900 (b) 1000

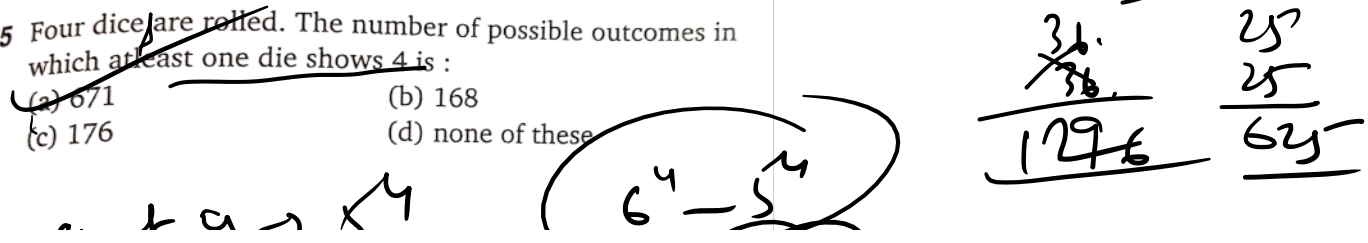
(c) 62784 (d) none of these



45 Four dice are rolled. The number of possible outcomes in which atleast one die shows 4 is :

(a) 671 (b) 168

(c) 176 (d) none of these



(c) 170 (d) none of these

$6^4 - 5^4$

671

$1'296$ 04

exact a → 5^4

46 The number of signals that can be generated by using 5 differently coloured flags, when any number of them may be hoisted at a time is :

(a) 235 (b) 253

(c) 325 (d) none of these

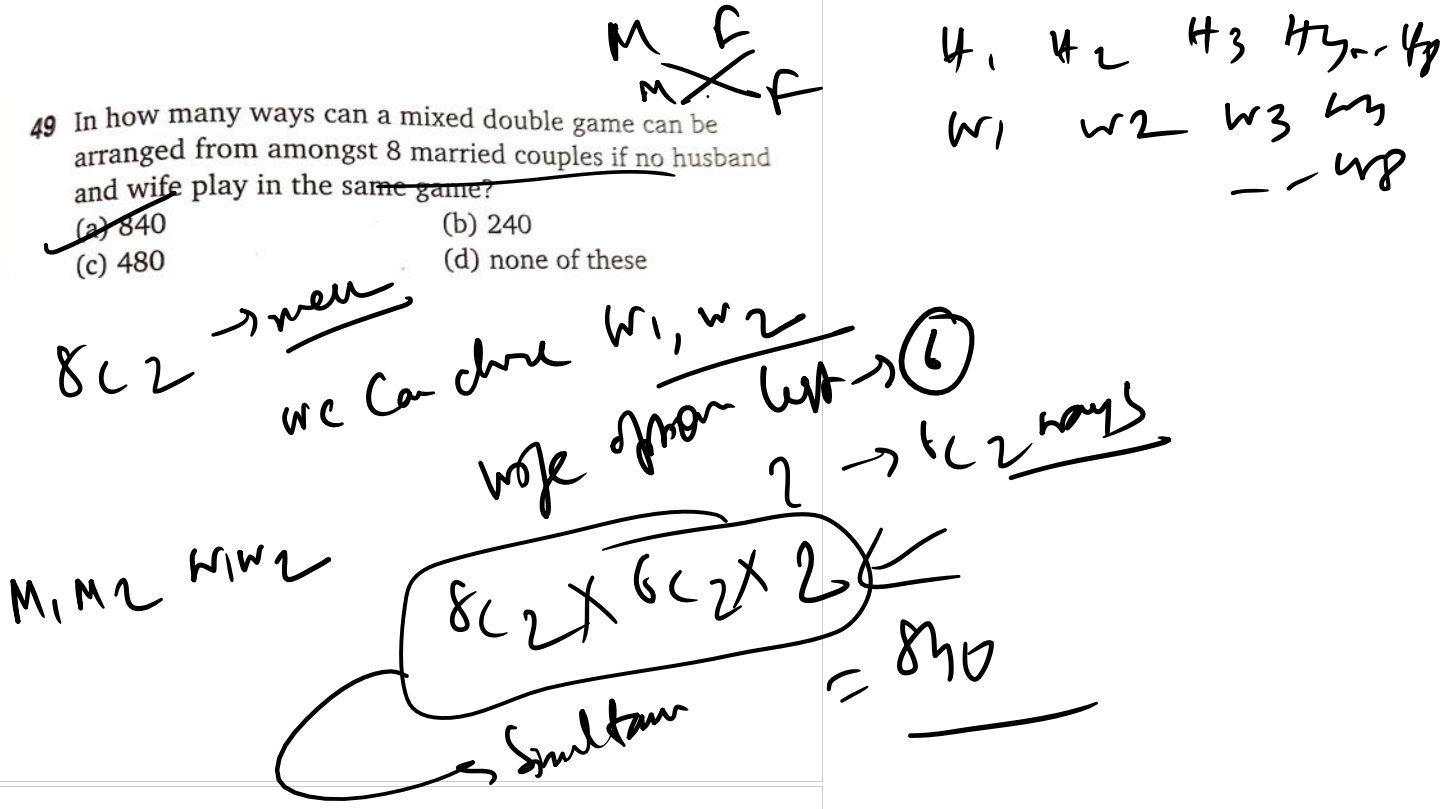
$5P_1 + 5P_2 + 5P_3 + 5P_4 + 5P_5$

$= 5 + 20 + 60 +$

49 In how many ways can a mixed double game can be arranged from amongst 8 married couples if no husband and wife play in the same game?

(a) 840 (b) 240

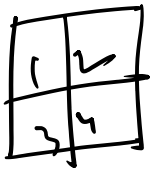
(c) 480 (d) none of these

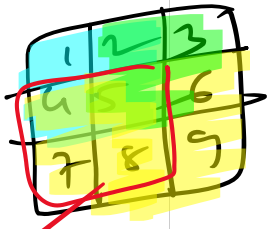


52 Five balls of different colours are to be placed in three boxes of different sizes. Each box can hold all five balls. The number of ways in which we can place the balls in the boxes so that no box remains empty is :

(a) 30 (b) 150 (c) 600 (d) 900

(a) 30 (b) 150 (c) 600 (d) 900





53 The number of squares on a chessboard is :
(a) 102 (b) 108 (c) 216 (d) 204

55 In how many ways can a committee of 4 women and 5 men be chosen from 9 women and 7 men, if Mr. *A* refuses to serve on the committee if Ms. *B* is a member?

(a) 1608 (b) 1860
(c) 1680 (d) 1806

59 If atleast one cap has to be distributed and the caps have to be arranged such that any box can have a maximum of one cap only, in how many ways can you arrange the caps among 5 boxes?

(a) 1 (b) 16

(c) 1545 (d) none of these

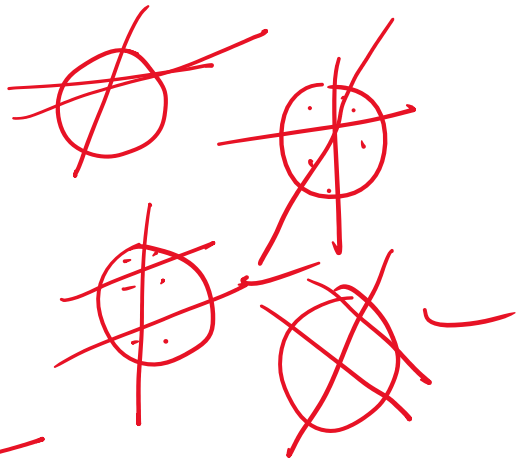
69 If you travel between Mumbai and Pune, you have to go through a 10 km long tunnel. Lately there has been a surge in the incidents of loot and plunder and many passengers have been harassed and injured inside the tunnel. Considering the enormity of the law and order problem, highway police decided to establish 4 security posts in order to ensure the safety of life and luggage of commuters. The minimum distance between any two posts is 1 km. Each security post must be n km ($n = 0, 1, 2, 3 \ldots$) apart from entry/exit of the tunnel and none of them will be outside the tunnel. Find the number of ways of selecting the spots for upcoming security posts.

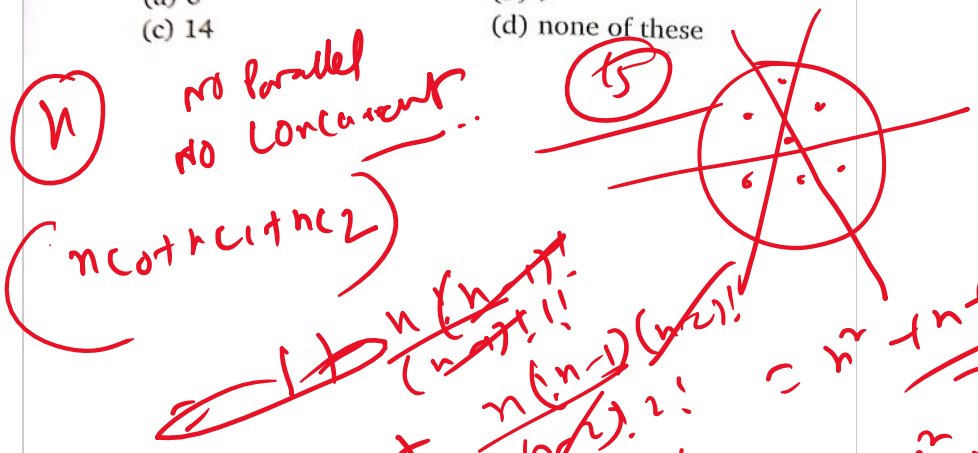
(a) 330 (b) 110 (c) 66 (d) 120

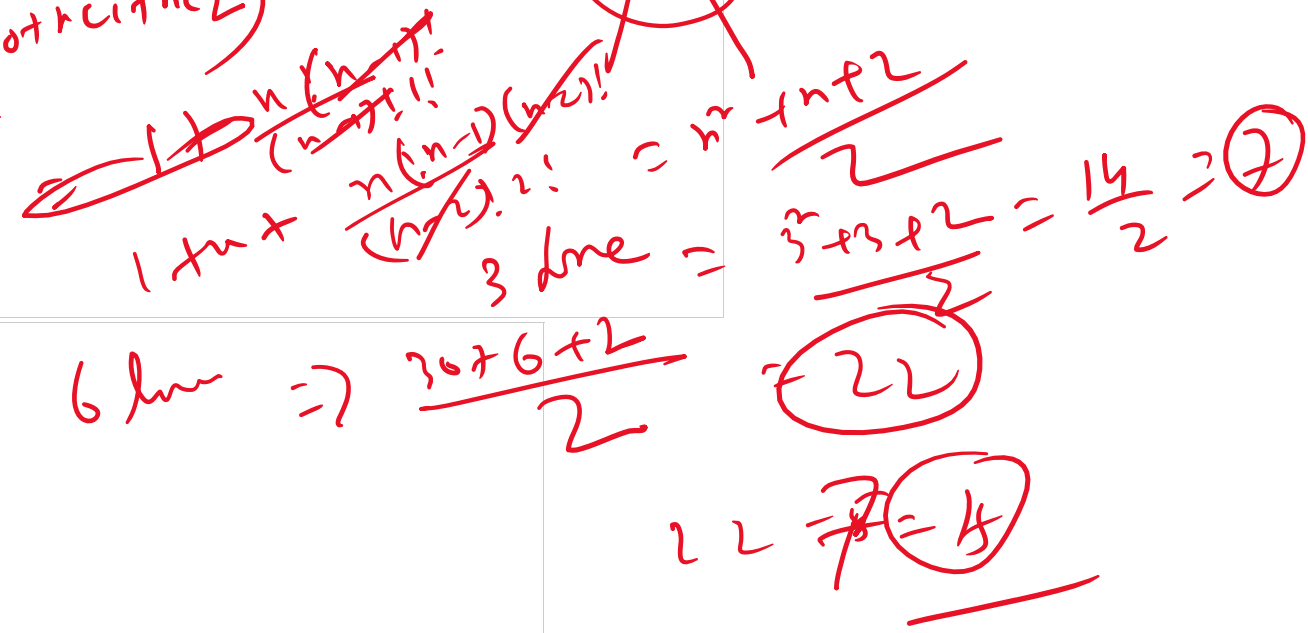
75 There are three straight lines dividing the circle into maximum possible number of regions. If three additional lines are drawn, what is the maximum possible number of additional regions that can be formed in the circle?

(a) 6 (b) 9

(c) 14 (d) none of these







76 Spiritual Guru H. E. Dalai Lama is on a world tour to speak on peace and compassion. His itinerary mentions only four continents – Asia, Africa, Europe and America – for this visit. What is the minimum number of countries he should visit to ensure that at least 21 Asian or at least 16 African or at least 11 European or at least 6 American countries must be visited?

(a) 24 (b) 51 (c) 54 (d) 57

To be done neatly

Level I..

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10 In how many ways can 11 identical books on English and 9 identical books on Maths be placed in a row on a shelf so that two books on Maths may not be together?
(a) 110 (b) 220 (c) 330 (d) 440

11 Find the total number of factors of 1680.
(a) 40 (b) 50 (c) 60 (d) 30

14 The number of triangles whose vertices are at the vertices of an octagon but none of the sides of such triangles are taken from the sides of the octagon.

(a) 8 (b) 15

(c) 16 (d) none of these

15 The number of ways in which we can select 5 numbers from the set of numbers {1, 2, 3, ..., 25} such that none of the selections includes four consecutive numbers is :

(a) 53109 (b) 13350

(c) 10035 (d) none of these

16 The number of integral solutions for the equation $a + b + c + d = 12$, where $(a, b, c, d) \geq -1$ is :

(a) ${}^{19}C_3$ (b) ${}^{18}C_4$

(c) ${}^{20}C_4$ (d) none of these

19 There are three piles of identical red, green and blue balls and each pile contains atleast 10 balls. The number of ways of selecting 10 balls if twice as many red balls as green balls are to be selected is :

(a) 1 (b) 2 (c) 4 (d) 6

21 The number of ways in which an examiner can assign 30 marks to 8 questions, giving not less than 2 marks to any question is :

(a) 11 (b) ${}^{21}C_7$ (c) 18 (d) 235

26 The total number of ways of selecting 6 coins out of 10 one rupee coins, 6 fifty paise coins and 8 twenty paise coins is :

(a) 28 (b) 14 (c) 13 (d) 19

27 Nargis has 8 children and she takes 3 at a time to children's park as often as she can without taking the same 3 children together more than once. The number of times she will go to the park is :

(a) 56 (b) 14 (c) 28 (d) 76

30 The number of all the possible selections which a student can make for answering one or more questions out of 10 given questions in a paper, when each question has an alternative is :

(a) 1345 (b) 23560 (c) 541340 (d) 59048

31 The number of ways in which a team of eleven players can be selected from 22 players including 2 of them and excluding 4 of them is :

(a) ${}^{15}C_{10}$ (b) ${}^{16}C_{10}$

(c) ${}^{16}C_{9}$ (d) none of these

38 The number of non-negative integral solutions of $x_1 + x_2 + x_3 + x_4 \leq n$ (where n is a positive integer) is :

(a) ${}^{n+3}C_3$ (b) ${}^{n+2}C_3$ (c) ${}^{n+4}C_4$ (d) ${}^{n+4}C_3$

40 Number of rectangles on a chessboard is :
(a) 1008 (b) 1296 (c) 1124 (d) 1600

42 The number of natural numbers which are smaller than $2 \cdot 10^8$ and which can be written by means of the digits 1 and 2 is :

(a) 678 (b) 786 (c) 766 (d) 677

50 Priyanka has 11 different toys and Supriya has 8 different toys. Find the number of ways in which they can exchange their toys so that each keeps her initial number of toys.

(a) ${}^{19}C_{11}$ (b) ${}^{18}C_{10}$ (c) ${}^{20}C_{11}$ (d) ${}^{19}C_{11} - 1$

57 How many different eight digit numbers can be formed using only four digits 1, 2, 3, 4 such that the digit 2 occurs twice?

(a) 20412 (b) 12042
(c) 25065 (d) none of these

60 *In how many ways one black and one white rook can be placed on a chessboard so that they are never in an attacking position?*

(a) 1234 (b) 3136 (c) 9516 (d) 1024

66 Find the number of numbers that can be formed using all the digits 1, 2, 3, 4, 3, 2, 1 only once so that the odd digits occupy odd places only.

(a) 9 (b) 16 (c) 18 (d) 27

78 In how many ways all these coins can be distributed if all coins are different but all pots are identical?

(a) 14 (b) 21

(c) 27 (d) none of these

79 In how many ways all these coins can be distributed such that no pot is empty if all coins are different but all pots are identical?

(a) 16 (b) 6 (c) 42 (d) 21

80 In how many ways all these coins can be distributed such that no pot is empty if all coins are identical but all pots are different?

(a) 6 (b) 3 (c) 9 (d) 27